UNIVERSITY OF KWAZULU-NATAL

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EXPLORING THE EXPERIENCES OF AFRICAN FEMALE STUDENTS IN THE

ENVIRONMENTAL SCIENCE PROGRAM AT THE UNIVERSITY OF KWAZULU-NATAL PIETERMARITZBURG AND WESTVILLE CAMPUSES.

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This dissertation is submitted in fulfillment of the degree of Masters of Social science in Gender studies in the Faculty of Humanities and Social Science at the University of

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DECLARATION

This serves to declare that this work in its entirety is my own original work. Unless specifically indicated to the contrary text, this thesis is a product of the author's own work. None of the present has been submitted previously for any portfolio examination in any other University. This thesis was undertaken at the school of Social Science (Discipline of Gender Studies), University of KwaZulu-Natal, Pietermaritzburg Campus. The sources used have been indicated and acknowledged in the references list.

Student signature …………………………Date ………………………

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DEDICATION

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Lamentations 3 verse 24 and 25

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ABSTRACT

The study is based on African female students and the different obstacles they have faced and continue to face due to aspects such as social, political and economic oppression that have hindered their growth in the academic and work environment. The aim of the study was to explore the experiences of African female students in the Environmental sciences field at the University of KwaZulu-Natal. The study gathered the different experiences that Black female students' experience in the previously male dominated field of study phase. The study also looked at different aspects such as the factors influencing Black female students' choice of Environmental Science.

The study included various questions that broadened experiences and asked specific questions that looked into the influences on black females in the environmental science field and how negotiation will impact the women's personal and work environment. The questions also included the challenges that the women faced and what their future aspirations were. These sets of questions opened up different areas of experience that the affected women had and their influences in shaping their experience in the field. The study identified various challenges faced by Black women in environmental sciences. Racial discrimination is one of the major challenges that Black female environmental science students at the University of KwaZulu-Natal are faced with. The study also suggested further research in the environmental sciences at postgraduate level is needed. The study also suggested that several studies look at engineering and medicine, it would be more informative if environmental science is viewed as a field that can stand on its own and not be organized under Science, Technology Engineering, and Mathematics (STEM) fields.

Key words: African female students, Environmental Sciences, Career choice, Gender Roles

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List of acronyms and abbreviations

AIDS: Acquired immune deficiency syndrome

CRISP: Crime, Reduction in the School project

Doe: Department of education

FET: Further education and training

GEM: Girls Education movement

HIV: Human immunodeficiency virus

HSRC: Human science research council

NASA: National Aeronautics and Space Administration

NRF: National research foundation

NSF: National Science Foundation

PHD: Doctor of philosophy

PMB: Pietermaritzburg

SA: South Africa

STEM: Science, Technology, Engineering, Mathematics

ST&I: Science, Technology &Innovation

UCT: University of Cape Town

UKZN: University of KwaZulu-Natal

UNESCO: United Nations Educational, Scientific and Cultural Organization

UNICEF: United Nations Children's Fund

U.S: United States

CHAPTER ONE:

INTRODUCTION AND OUTLINE OF STUDY.

1.1 Introduction.

This is an introductory chapter which is aimed at introducing the study. Thereafter it sets the tone for the chapters that will follow. In so doing it will serve as an outline of the study that will provide guidance to the overall project/thesis. To begin, this section of the dissertation will start by contextualizing the study by accounting for a brief background of the overall study and the outline of the research problem that the researcher seeks to address.

In addition to the above, the rationale for venturing into this study is briefly captured, while the objectives and key questions underpinning this study are accounted for. Furthermore, the basis for conducting this study is briefly discussed through an overview of the available literature and the theoretical framework that was employed as a tool of analysis. This chapter ends by offering a description of this study which is ultimately the breakdown of all the chapters.

1.2 Rationale of the study.

1.2.1 Background of the study.

Environmental sciences as a career choice for black females needs to be understood against the broader background of oppression that black women have faced (Stead, 1999).Oppression has previously hindered black women from various opportunities. These opportunities are now slowly opening up for them. Environmental science is a field that has, for years, been dominated by males, particularly white males. Social scientists have studied it, lawyers have tried to fix it and post-feminist society is over it. Women are still outnumbered by men in mathematics, science and engineering fields (Forsyth, 2003). Most of the overt discrimination against women in the sciences have been reduced in recent decades through legal, academic, corporate and measures taken by government. A climate that is less friendly to women remains and its texture is still taken for granted that it tends to be invisible (Babcock, 2003). The proportion of women receiving doctoral degrees in mathematics, science and engineering has increased slightly in recent years. According to the National science report published in 2003, women accounted for

30 percent of the doctorate degrees in science and nearly 9 %percent of those were awarded in engineering. (Gorman, 2010).

The fact that government and organizations are promoting gender equality in all sectors of education and employment have cemented the way for women to take up previously male dominated fields. However, women are still confronted with various challenges with regards to previously male dominated fields. Women are still subjected to unequal participation in most of the science fields (Xu, 2008).

Despite the challenges faced by black people-of being discriminated against-in terms of their race, ethnicity and gender, women have made expansions in the area of sciences and technology. Women, especially those from previously disadvantaged ethnic groups, are breaking grounds and challenging themselves so that they may be recognized in all areas of education and the corporate world. Also, black females at the University of KwaZulu-Natal have broken boundaries and are dominating the environmental science field. Moreover, women are becoming aware of the opportunities in the sciences and are becoming engaged not only at beginner's levels but taking over top management positions. Women have started occupying positions in environmental sciences that were previously only suitable for men (Bill, 1998).

Various studies have been done with regards to women in science. Specific studies that I will highlight are research studies and journal articles done on women entering the 'Science', 'mathematics' and 'engineering fields'. These have been done by a number of scholars globally such as (Schweitzer, 2011). The given study explores the career pipeline gender differences in pre-career expectation. The study explores the career pipeline: gender differences in pre-career expectations. The study looked at the career priorities of 23,413 pre-career men and women using a large scale of Canadian post-secondary students who are about to embark on their first careers. The results from the study indicate that, although women are increasingly entering male-dominate fields such as, science /engineering and business they continue to have lower salary expectations and expect a longer time to gain promotions than their male counterparts (Linda, 2011). A research study done by Dr Faulkner (2006) studies the various ways in which engineering might be gendered. The findings from this empirical study clearly state that the engineering field is gendered with males as the dominant gender. Findings also show that the

society also has a lot to do with engineering being a male dominated field. "Seeking congruity between goals and roles: a new look at why women choose options outside science, engineering, technology and mathematics" by (Diekman, 2010) aims to understand why women choose fields outside of the male dominated field. The results from the study indicate that even after development, women remain minorities in male dominant fields which is why they choose, fields outside of science (Diekman, 2010). Studies done in South Africa, as was done by the National Research Foundation NRF (2012) looked at the number of women in the sciences and result of the study showed that there has been progress in women entering science.

The findings of the study on Career aspirations of female engineering students who are at tertiary levels of education and training in the South Africa Gauteng region, show that females in engineering are most likely to have chosen the career field because of external and internal role models that have encouraged them to take up a career in such a male dominated field (Foster, 2005). Most of the research if not all done under women in science, focuses on engineering, mathematics and agriculture, none paying specific attention to the field of environmental science. My study aims to close that gap and provide information about the experiences of black women in environmental sciences.

1.2.2 Reason for the Topic choice

From a gender point of view while there is literature on black females in the sciences, the literature which I have chosen is exclusive to black female students in environmental sciences at institutions in either developing countries or developed countries.

This study, upon its completion will contribute to the body of knowledge that is limited but, already in existence regarding black female students in environmental sciences. It will focus on how women experience the environmental sciences and the different influences that have encouraged the choice of environmental sciences. Also I look at how these black females choice of environmental science impacts their lives and how they negotiate their family life and gender roles.

From a practical point of view, the researcher intends to identify the challenges that these women face and how they overcome them and what ways or methods that these women can share so that future generation of women in the environmental science, do not face the same challenges as

them. The researcher also seeks to understand how these women negotiate their career and family life, also how their career choice has influenced their gender roles.

1.3 Overview of the Literature

1.3.1. Overview of the literature

There is scarcity of local and international literature on the topic of Black women in the environmental sciences. It has become clear that black women experiences in the environmental sciences are not well researched as a critical point of enquiry which speaks to gender transformation and the enriching of women in previous male dominated fields.

In reviewing the literature of this study, the researcher engaged in a mixture of international and local literature in order to broaden the depth of the study. As a point of departure the literature begins with the engagement of women in science in South Africa, Africa and globally, the historical background of education in South Africa, the contemporary context of black South African women in the education sector and also looking at black women at high school levels, tertiary levels and the work place environment. In doing so the researcher further contextualizes the study by looking at the progress that has come above for black women to be involved in a previously white male dominated field. Following the history of African women in South Africa and the gender disparity that has for decade's hindered academic and occupational growth, here, the researcher goes on to elaborate the different ideas and challenges of black women in the environmental sciences. This is the center of the study.

The literature is narrowed down to focus on the growth of black women entering the environmental science field at the University of KwaZulu-Natal. Here it looks at the growing statistics of black women entering the fields of sciences. Building on the findings from trend analyses of occupational, academic segregation by sex, science and engineering stand out as the stubborn exceptions to the general trend of significant progress towards gender equity (YU XIE, 2003).

1.4 Overview of the theoretical framework

The theoretical framework is one of the essential tools of a research project. According to Mertens (1998) theoretical framework "relates to philosophical bases on which the research takes

place and form the link between theoretical aspects and practical component of the investigation undertaking". Furthermore, "the theoretical framework therefore has implications for every decisions made in the research process" (Mertens, 1998:3). Therefore, theories are employed to underpin this research, namely the feminist intersectionality that clearly describes the overlapping or interesting, social identities and related systems of oppression, domination or discrimination. The feminist intersectional framework gives the idea that multiple identities intersect to create a whole that is different from component identities. (McCall, 2005). 2) The social learning theory clearly indicates that learning is a cognitive process that takes place in the social context and can occur purely through observation or direct instruction. This theoretical framework forms direct parts of the study because of the influences that observation has on these women. 3) The feminist standpoint theory, which is a postmodern method for analysing inter-subjective discourses, looks directly at how authority is engrained in individual knowledge, perspectives and the power that authority exerts (Brenda, 1996). The usage of this theory is linked to the authority that these women have over their choices and future aspirations in the environmental science field.

1.5 Outline of the research problem

1.5.1 Overall purpose of the study

There is a lack of literature on the subject of black female students in the environmental science. Even studies that have been produced do not go deep into analysing the experiences of female black students. In particular, they do not pay attention to the experiences of women in environmental science. The literature is limited to medicine, engineering and science. It does not look at environmental science as a field that is able to stand on its own.

The purpose of the study is to explore environmental science because it is one of the sciences that is always left behind. The main focus always goes to engineering, medicine and physics leaving environmental science unexplored. Reasons for the topic choice is that it is important to focus on environmental science because most of the studies that have been done have focused on engineering, science and technology thus excluding environmental science. This research will therefore contribute to the limited literature on women in environmental Science. The study particularly focuses on African female students performing their third year in Environmental

science. The study has particularly chosen third year students because they have been in the program long enough to engage in the study with enriched data. The aim of the study is to explore the experiences of black female students in the Environmental Science programme at the University of KwaZulu-Natal

1.5.2   Research objectives.

Objectives:

- To investigate how race, class and gender factors influence black female students' choice of and experiences in environmental sciences.
- To investigate their experiences within the environmental science program.
- To examine how their choice of environmental science, impacts on their personal and parental family life and gender roles
- To determine the impact that the negotiation between their partner, children, siblings and parents has on their future career.

1.5.3 Key research questions:

Key question asked:

The central question in the study.

What are the experiences of black female third year students in the Environmental science program at the UKZN?

Under the central question, the following questions will be asked:

1. What are the factors influencing black female students choice of environmental sciences?
2. What are their experiences within the environmental sciences program?
3. How does their choice of environmental science impact on their family life (partner and children or parents and siblings) and gender roles?
4. How does this negotiation impact their future career in the chosen field of environmental science?

1.6 Outline of the study.

The study consists of six chapters and these are concisely outlined below.

Chapter One: Introduction and background of the study.

This is an introductory chapter which provides a background and an outline of the study. It covers the problem statement, objectives, key questions, researcher's incentive, the overview of the literature review, theoretical framework, the overview of research methodology and design. In doing so it sets the nature of the overall study.

Chapter Two: Literature review.

The notion of women in science is well established in literature. It is on the background of some of that literature that the study is conducted. Therefore, chapter two is a justification of some of the literature and perusing through it will illustrate that it covers both the local and international context, this chapter begins by outlining women in science on the global scale and how women are related to ecofeminism and the natural environment. It goes to look at women in science in Africa and South Africa. The literature goes further and analyses the connections between women and nature are looked at and how gender affects or impacts environmental management. The literature also clearly outlines the history of black women in the education and work sector, and the challenges women are faced with in the academic sector and the work sector. The theoretical frameworks that shape the study are discussed in this chapter.

Chapter Three: Methodology and methods.

This chapter starts with an establishment of the methodology which was employed for the undertaking of the study. Further, to justify the suitability and the relevance of the selected research methodology. The methodology includes aspects such as: methods of sampling, data collection and analysis.

Chapter four: The impact of career choice on family life and future career aspiration.

 This chapter presents the findings and the analysis of such findings as made by the researcher. This data analysis establishes the experiences and the influences that these women in environmental science have and the different challenges that come forward in their chosen field of study. The study also goes to detail about the desires that have pushed these women to go

against traditional gender norms and the passion that has driven the women up to their third academic level. The findings also look at the choices of choosing environmental science as a second option and the women that are motivated by their evident strengths in science subjects in high school.

Chapter five: The impact of career choice on family life and future career aspiration.

This chapter presents the findings of how career choice impacts on family life and future career aspirations. This data establishes how one's career choice of environmental science has impacted on female's family life and what their career aspirations are in the future.

Chapter six: Conclusion and recommendations.

This chapter establishes the general conclusion of the study based on the analysis and presentation of findings. This chapter is the synthesis of the study which also gives a highlight of the experiences of women in environmental sciences and how they have overcome gender disparity and their visions for the future. Recommendations, on how the environmental science can be more 'black female friendly' and more accepting to this race of individuals and how challenges can be overcome in this study field, will be brought to the forefront.

Definition of the term African.

The term African (black) in this context, refers to a person of whose parents are or were members of an indigenous community in Africa.

CHAPTER TWO:

LITERATURE REVIEW AND THEORECTICAL FRAMEWORK.

2. Introduction.

This chapter looks at different women in different spectrums of environmental science. The chapter discusses black women in science from a global perspective, the ecofeminist literature of women in science and the African and South African perspective of women in science. The chapter goes further and discusses the history of black women in science, the historical background of black women's education, the contemporary context of women in the education sector, black women's high school and tertiary education, the context of women in science at the University of KwaZulu- Natal and the significance of the study. The chapter also brings forward the different theoretical frameworks that are utilized in the study which are relevant to the study's context.

2.1 Women in science globally

Historically, walking into a higher institution of the agriculture, sciences and engineering department one was most likely to encounter gender disparity (Ickes, 1993). Very few women than men seem to go into fields involving science, engineering, technology and mathematics. Over the years' educators and government authorities and the department of education have bemoaned the gender gap and have encouraged students, particularly women to participate in them. The problem does not seem to lie in women entering this male dominated field. Studies have shown that most women who enter this field, even if they are successful, they are likely to quit, "They tend to drop out at higher rates than their male peers" (Winter, 2016).

Women have been numerous challenges that have been the main issues which have set women aside keeping them away from science such as sexism and discrimination. These are the major apprehensions that have driven women into other fields. African women, in particular suffer the most from this sexism and being discriminated against. These are not the only issues they are faced with, there lies issues of a poor education system, unmotivated teachers who only motivate them to go into fields of nursing, teaching and administration as well as unsupportive families not being well informed of the science fields. (Winter, 2016).

Women are under-represented in academic fields that involve mathematics and sciences. The scientific field sets to point out the gender imbalance as opposed to ability and opportunity (Rowena, 1998). Women are under-represented in all natural science fields, particularly in the theoretical and decision making levels of the profession (King, 2014).

According to Jennifer Hunt (1995) of the Rutgers's paper, the gap cannot only be attributed to fewer women entering the field, but even within the field, women are less likely than males to work in development or design, where patents originate. Women in science are finding it difficult to advance when compared to other fields. The lack of female mentors and indirect male discrimination-or work conditions in which males communicate in a way women find unprofessional and disrespectful- are common factors (Hunt, 1995).

Madline Heilman (2012), a psychology professor at the University of New York and an expert in gender stereotypes has suggested that this problem is more deeply rooted than anticipated. According to (Steven, 2007) women are seen as communal, caring, emotional and very concerned about other people, whereas men are regarded as rational and logical beings. The way women are portrayed by society makes it difficult for women to become successful in the engineering field and have men respect their success (Marder, 2012). Swainson (1993) highlights that women make up the minority in agriculture science and engineering, for example, The National Science Foundation in 2008 found that 41 percent of male University students planned to do scientific studies whereas only 30 percent of women planned to do the same. Women tend to avoid the fields that include computer science, physics and engineering. Nowhere is disparity more pronounced than in mathematics, sciences and agriculture

Previous work provides some insights into why women may be less likely than men to pursue Environmental science. For example, female under-representation in environmental science and related fields may be partially because of the effects of occupational stereotypes and the traditional male domination in the fields. Women tend to sex-type science as a masculine pursuit (Hughes, 2002) and negate the utility of mathematics (Eccles, 1994). Engineering and scientific fields are generally stereotyped as physically challenging, unfeminine, and aggressive (Adams, 2001). They are perceived as an object oriented rather than people-oriented (Lippa, 1998). Engineering is viewed as a field lacking in social responsibility which contributes to environmental problems (Hersh, 2000). Additionally, the current under-representation of women

in engineering may foster the impression that engineering is an unusual career for women (Byrne, 1993). While some of their male contemporaries' view female scientists as "honorary men," other see them as "flawed women" (Etzkowitz, 2000). Due in part to their under-representation when pursuing a career in engineering, women face gender-related barriers throughout their development (e.g. Lack of role models, social isolation) that may divert them from their path at multiple points along the way (Etzkowitz, 1994:266). Hutchison (2006) further argues that women view a conflict between their gender role and the characteristics perceived as important for success in an engineering career (e.g., Assertiveness and a fascination with technology), which tend to be associated with the male gender role. In addition, they argue that because engineering is highly male dominated, men tend to create a workplace culture that is very male-identified, which puts women at a disadvantage. Thus, for many reasons, the existing under-representation of women in the field may discourage female students from pursuing it. Female students' levels of self-efficacy regarding math, science, and engineering may also affect their intentions to pursue engineering careers (Hutchison, 2006). Example, Self-efficacy refers to the belief that one is competent to meet situational demands (Bandura, 1998).

Female engineering students tend to perceive themselves as less competent than their male peers (Goodman, 2002). Low self-efficacy in math, science, and engineering begins early for female students. Females as young as elementary age, tend to underestimate their math capability, even though their actual performance may be equivalent to that of same-aged males (Eccles, 1994). At the college level, (Besterfield-Sacre et, 2001) found that female first year engineering students' self-reported lower competency on basic engineering skills and knowledge, problem solving ability and engineering abilities compared to male first-year students, even though objective assessments of their abilities did not differ from those of the males. Additionally, female students tend to believe that math and engineering aptitudes are fixed abilities thus accrediting failure or success to stable factors (Heymans, 2002). Further compounding these issues, black women's self-confidence may also be undermined by the perception that white faculty and students regard black students as having a lower ability of self-efficacy (Seymour, 1997). According to a study done by Foster (2005), family members, female role models and confidence in science are factors that influence females who choose engineering as a career. The results also reveal that gender stereotypes did not deter women from choosing engineering and regardless of the challenges faced in the field, women remain content with their career choice.

According to UNESCO (2015), the statistics of women in the United States who have gone beyond their gender and academic stereotypes and entered sciences' male dominated academic fields has increased over the years. The percentage of Bachelor's degrees obtained in health sciences amounted to 84.4% biological and biomedical sciences 58, 5% physical sciences and science technology 39, 3. The number of master's degrees obtained in STEM fields and health science 81, 8%, biological biomedical sciences 56, 5% physical sciences and science technologies 38, 3. PhD's obtained from women amounted to 58, 4 in health science 53, 2 in biological and biomedical science and 33, 3% in physical sciences and science technologies.

In 2015, women accounted for over half 54, 9% of medical scientist (e.g. Medical researcher, toxicologists, epidemiologist) in the United States. Among other fields women made up a quarter of (42.6%) Biological scientists,(36,1%) Chemists and materials scientists,(27.5%). Environmental scientist and geoscientists all other physical scientists (41, 4%). Female students' achievement in mathematics and science is on par with their male peers and female students who participate in high level mathematics and science courses at similar rates as their male peers with the exception of computer science and engineering (NSF, Science & Engineering Indicators, 2016).

In general, female and male students perform equally well in mathematics and science on standardized tests, but larger gaps exist between students of different racial and ethnic backgrounds or family income. White and Asian/Pacific Islander students and those from higher income families scored higher than their counterparts who are black, Hispanic, or American Indian/Alaska Native or those who are from lower income families. Students enrolled in level-1 science courses in 2012 at comparable rates regardless of sex and race and ethnicity. However, students with less-educated parents or of lower Socioeconomic Status (SES) were less likely to take these courses.

Female and male students enrolled in advanced science courses at comparable rates, with females slightly more likely than males to do so (22% versus 18%). However, only 15% of black students and 17% of Hispanic students took these courses. Enrollment in higher level mathematics courses did not significantly differ by sex but did vary by race and ethnicity, parent education level, and SES. For example, the proportion of Asian or Pacific Islander students

(64%) enrolled is significantly higher than that of black students (30%) and Hispanic students (28%).

Female and male students took AP exams in calculus AB, statistics and chemistry at roughly the same rates in 2013. However, males were more likely to take advanced level AP exams, including calculus BC, physics B and physics C.

Male students were more likely than female students to choose engineering (3% versus 1%) and computer science courses (7% versus 4%) and enrolled in AP computer science A at a much higher rate (81% males; 19% females). The unfortunate truth regarding women who go into the science field is that they find themselves in a field where the road has various twists and turns supported by biases and negative attitudes. Women in science are most likely not to succeed in the fields because of the way that men treat them. Underrepresentation of women in scientific fields are due to stereotypes (Swainson, 1993).

2.1.1 WOMEN AND ENVIRONMENTAL SCIENCES.

More and more black women have broken the barriers, challenging the misconceptions of environmental science being a white male dominated field. Black women are slowly entering and occupying spaces in the environmental science field. According to an article by Farah Sheikh (2015), black women around the globe have profoundly contributed to the environmental sciences. These female scientists have generated new knowledge as well as influencing many other female students to contribute to the environmental sciences by undertaking environmental science research careers, thus making a difference in the environmental science and innovation for future generations. It is also important to note that great efforts have been made in building equalities between the genders in the environmental science field. However, there is still a gap between male and female environmental scientist, but regardless of the challenges that women face in the science field, women are closer to the environment than their male counterparts (Sheikh, 2015).

2.1.2 GENDER AND ENVIRONMENTAL MANAGEMENT.

The terms gender and development converge in various ways among them the consideration of varied roles that both sexes can play in development. The gendered distribution of benefits accruing from development together with how these benefits (and costs) affect men and women.

Environmental sustainability is a gender issue since both men and women are beneficiaries and conservers of the environment. Although programs targeting the proper use of the environment have in many cases ignored the value of integrating gender identities, the rationale 'for the inclusion of both men and women is not an issue in contention. Being male or female within society has several dictates. On one level, it represents different social and cultural experience and on another, it indicates particular access and control over both natural and social resources (Otor, 2001).

The gender approach to development has emerged within the last four decades. Prior to this, past approaches to development gave no attention to gender as a factor. Consequently, the roles of men and women in development were not carefully assessed while development was perceived as something that happened to a nation rather than a process requiring conscious integration of various actors and mobilization of social inputs. More importantly is the fact that women's role in development was practically ignored. Brett Alexandra Wallance (1991) documents that in the 1950s and 60s, women's interests in development were subsumed under the concerns of human rights and women were viewed as objects to protect rather than consult. Through the 1970s, women's key positions in the development process became more apparent, especially in the realm of population and food. In this paradigm, women emerged as useful resources to integrate into the development process. Since the 1980s, women have been progressively viewed not just as relevant players, but also as key agents and beneficiaries in all sectors and at all levels of the development process. These changes have occurred with the growth of a better understanding of gender roles. Similarly, the perception of the relationship between gender and the environment have also evolved. Traditionally, women have been portrayed paradoxically as one with nature, close to nature and at conflict with nature. These views have had both negative and positive implications. In many cases, women's socially constructed female roles have brought them in direct conflict with the environment and earned them blame for improper use of the same. According to Sontheinier (1991), persistent images of women carrying heavy loads on their heads, cultivating on sloppy terrain, harvesting various products and trading on forest products have served to reinforce already existing gender inequalities and stereotypes that do not favor women and their inclusion in environmental management programmes. Thus, the relationship between gender, environment and sustainable development can be said to be one ridden with dichotomous dimensions and complexities.

These dimensions center on among others. The fact that men and women have divergent roles in society, which dictate their patterns of the use of the environment; women and men's control over resources especially in Africa varies with women being constrained in different ways so as to emerge as an ecologically marginalized group; female and male participation in development and environmental management is not equally acknowledged; women as opposed to men are disadvantaged in the provision of ecological management training; and lastly, environmental policies often tend to subsume women and men under one group. This assumes similar effects on them, which is not really the case. As such, opportunities for the formulation of sound environmental and development policies are often lost, which translates into continued women marginalization and feminization of poverty (Sontheimer, 1991). In the -conceptualization of gender and its import, various scholars have dichotomized the sexes by building meanings into the respective differential characteristic of each gender and extending these to the arena of roles, capabilities and domains of interest. A recurrent assertion is the association of women with nature and men with culture. Explained, these notions imply that women are passive entities having a special harmony with the natural world and the earth by extension while men are rational beings engaged in the field of creativity and science (Hekman, 1990). Further, it is claimed that closeness to nature is intricately tied to female roles of reproduction and nurturing. These notions are further interpreted to mean that women can only excel in roles aligned to nurturing and sustaining. On the contrary, men are depicted as rational, scientific and affable beings with the ability to go beyond the immediate loci of nature, as it were, to the manipulation and re-ordering of the same by their superior intellect. The sexes have also been dichotomized on the basis of their areas of operation, dominance and relevance. Women have been depicted as private beings, while men are perceived as public. The spatial division between the public world of men and the private world of women literary means, that for women, their most relevant sphere is the domestic arena and that the neighborhood and community (where women often find expression) are both extensions of the domestic. For men, it is the public world of politics that utilizes their capabilities more efficiently. These two traditional views of the sexes have been subjects of wide and often confusing debate beyond the focus of this paper. It is adequate to say that the conceptions of women as natural, private and domestic beings have in part informed the prevailing notions about their harmony (and disharmony) with the environment and their perceived roles in its exploitation and conservation. This could brought to light by Moser

(1993)with the view that women are depicted as the primary users of the environment in that they depend more on wood, water and soil for daily survival even though their practical needs are not recognized by those who utilize the environment as a productive resource (Moser, 1993). Perhaps the same ideologies are partially responsible for the general marginalization of women at most levels of development and decision-making. This has further implications on both environmental management and sustainable development (Waswa, 2004).

2.1.3 CONNECTIONS BETWEEN WOMEN AND NATURE.

Ecofeminism basic premises are of the ideologies which authorizes oppression such as race, class and gender. The physical abilities and species is the same ideologies which sanction the oppression of nature. Women and nature are the two things that have been unjustifiably exploited and dominated. Due to this history of women of colour experiencing economic disadvantage, they suffer the most. The misuse of natural resources has had a negative impact on women and nature. Ecofeminists argue to have set the picture that there are important connections between the domination and oppression of women and the domination and exploitation of nature. In patriarchal thinking, women are identified as being closer to nature and men being closer to culture, hence women are seen as inferior to men (Agarwal, 1992). The ecofeminist's arguments about women and nature proves that the connection between the domination of women and that of nature is basically seen as ideologically rooted in a system of ideas and representative values and beliefs that places women and nature hierarchically below men (Agarwal, 1992).

Ecofeminism believes that patriarchal society is built on four interlocking pillars; sexism, racism, class exploitation and environmental destruction. Ecofeminist analysis reveals that it is not only women who are portrayed as being 'closer to nature'; oppressed races and social classes have also been closely associated with nature. Most forms of ecofeminism rely on a historical analysis of ideology. According to this analysis, the oppression of nature and women emerged with a Western ideology called patriarchy which arose roughly 5,000 years ago,

Western patriarchal thinking is based on 'dualism', a world view that orders the world by dividing it into opposing pairs of concepts: Mind is split from body, spirit from matter, male from female, culture from nature. One concept in each pair is deemed superior to the other. This 'other' is sometimes diminished and always discriminated against. Concepts on both sides are bound into complex relationships which become mutually reinforcing. Groups that are oppressed

in our society are often associated with the body rather than the mind and may be portrayed as intuitive but overemotional.

The patriarchal belief system encourages 'male' qualities of reason and analysis which can be characterized as intuitive. The emotional 'female' qualities are seen as passive, weak and irrational and therefore inferior. Qualities such as passivity, weakness and irrationality are not in themselves bad, but they are within the ideology of Patriarchal dualism. It could be educational to note our own feelings about such qualities. Some theorists have suggested that this degrading of the 'other' is driven by fear of nature and mortality, and, because of their biological connection with birth women are a constant reminder of death. According to Rosemary Radford Reuther (2012), it was the invention of the concepts of 'nature' and 'culture' that allowed man to degrade the former. "It defines nature as a reality below and separated from 'man', rather than one nexus in which humanity it is inseparably embedded"(Reuther,2012:33).

Ecofeminism demands a radical critique of the categories of 'nature' and 'culture' together with an affirmation of the degraded partner in all the patriarchal dualities. 'Female' qualities such as co-operation, nurturing, being supportive, nonviolent and sensual are especially appropriate for creating an environmentally aware society. Some Ecofeminists believe that traditional 'male' qualities like competitiveness, individuality, assertiveness, leadership, and intellectualism, are valuable in appropriate contexts and should be integrated with 'female' qualities in a balanced person.

The feminist critique of patriarchy is not just an intellectual attack on men. Most feminists, though not all, do not see men as 'the enemy'. Patriarchy is a particular way of thinking which can be used by any gender and ecofeminism can be a common ground for both sexes.

Ecofeminism emphasizes the interdependence of all life, humanity's role as part of the earth's ecosystem and the non-hierarchical nature of a system in which all parts affect each other are emphasized to counteract relationships dominated by values of control and oppression Ecofeminism is linked to this study because of how women are closely linked to nature and how the historical background of women reveal the issues of oppression they are subjected to due to their gender.

2.2 Women in science in Africa.

Female scientists have a critical role to play in Africa's development, including pushing the envelope on gender equality, one of the seventeen Sustainable Development Goals (SDGs). Young women pursuing careers in science are all too aware, persisting gender inequality often severely limits them from achieving their potential and effectively contributing to development challenges. Although significant progress has been made globally in closing the gender gap in primary School enrollment, gender inequality prevails elsewhere. This includes in science, where women remain heavily underrepresented. Recent data from UNESCO indicates that only 28% of researchers employed in research and development (R&D) are globally women. This level varies across regions. In 2013, only 30% of the sub-Saharan women were part of the scientific research. Major gender disparities between female and male research scientists are also evident in places of work and in their levels of responsibility. Female scientists primarily work with academic and government institutions, while their male counterparts are engaged more in the private sector, where they enjoy better pay and opportunities (UNESCO Institute for Statistics, 2015). In addition, female scientists are often concentrated in the lower echelons of responsibility and decision-making with limited leadership opportunities. In academia, for example, women scientists are often lecturers and assistant researchers and very few are professors, while in research institutions, women are rarely researched directors or principal investigators in major studies.

Indeed, women's under-representation in science not only has consequences for development, but also for research. In the area of infectious diseases of poverty, for example, the dearth of women scientists often means a lack of diverse perspectives essential to addressing the gender dimensions and the burden of infectious diseases, which often disproportionately affect women. Moreover, with few women occupying decision-making positions in academic and research institutions, their scientific role in prioritizing research agendas is severely circumscribed. This has potentially adverse implications for addressing and eliminating disease. Female under-representation in science in sub-Saharan Africa Policy, reveal that institutional and individual factors contribute to this severe under-representation in science. While many countries in sub-Saharan Africa have enacted Science, Technology &Innovation (ST&I) policies, some of which have gender-related objectives aimed at promoting women's participation in science, they are rarely implemented. In many African countries, University departments, research institutes are often led by men who also occupy key leadership positions of responsibility. Persisting gender

biases and stereotypes embedded within these institutions create an often-challenging work environment for female scientists. Moreover, lack of programmes to recruit women scientists, coupled with an undefined career path, and the absence of mentoring programmes within institutions to provide professional support, tend to make it difficult to attract and retain female scientists.

Lack of gender-friendly policy frameworks, such as, the provision of child care facilities in the workplace or the lack of career re-entry programmes to encourage women scientists to resume their careers after taking a break to start a family, contribute to female scientists abandoning the science profession, ultimately widening the gender gap in health research.

This is reinforced by the failure to implement gender-sensitive promotion policies to ensure that women can advance in their careers. Although such approaches do not discourage many from pursuing long-term careers in science, it results in women leaving the profession to pursue other endeavours. Individual factors also influence the decision of women to pursue careers in science. Lack of career support, such as mentors, networks and professional development opportunities, along with societal expectations such as, raising a family over pursuing a career, dissuades many from seeking a future in science. Frameworks and actions to promote female participation in science thus recognizing the challenges that women face. Further, efforts are being undertaken to promote their participation in science. At the international level, the UN Economic and Social Council's Resolution 2011/17 on Science and Technology (S&T) supports the role of women and girls seeking science careers through education, training and S&T.

Several United Nations (UN) agencies have undertaken activities to specifically bolster women in science, including initiating programmes and frameworks that actively promote their participation and leadership science. Increasingly, actions are being taken across the continent to promote female participation and leadership in science. Therefore, female participation is recognized in key drivers of Africa's growth and development in science, technology and innovation. The African Union (AU) declared 2015 as the 'Year of Women's Empowerment and Development Towards Africa Agenda 2063', and adopted the Science, Technology and Innovation Strategy for Africa – 2024 (STISA 2024).

Several regional organizations in sub-Saharan Africa have also taken steps to promote women's participation in science. The East African Community (EAC), for instance, has adopted Gender

&STI Frameworks that promote gender mainstreaming and gender equity in STI, entrepreneurship training and education. Similarly, the Southern Africa Development Community (SADCs) Gender Policy, which supports equal access for girls and boys to science and mathematics education, as well as access for women and girls to tertiary education in non-traditional subject areas, is encouraging women's involvement in science. In addition, the Economic Community for West African States (ECOWAS) recognizes the contributions of women in STI in ECOWAS member countries through the African Union.

African women come from varied racial and cultural backgrounds and with several barriers to overcome in order to succeed in the science environment. These were in varied degrees and included the challenges of patriarchy and apartheid. The education systems in Africa forced girls to only participate in education that only prepared them to run homes, school, and clinics. This education structure only allowed women to do structured occupations which did not provide them with the platform to explore the different opportunities available (Clary, 2013). The cultural systems in Africa had a further disadvantage for women in Africa where women were subjected to certain obstacles and the colonial systems further disadvantaged the women in various ways. Women in Africa spoke about the differences they were challenged with and how family, teachers and other women encouraged and inspired them to challenge the science sector regardless of the various challenges that they were faced with (Kola, 2011).

2.3 Women in science in South Africa

Looking back into the early years, women were affected by the Bantu education that produced ethically and culturally, a preserved labor market. The Bantu education systems secured unskilled labour for black learners, especially women who were also under the cultural oppression that further limited them to undergo school education (Jewison, 2008). This system was installed in order to make sure that white people remained superior and were equipped with education which would give them a better position in the labour market (Jewison, 2008). Baukari (2005) highlights that one of the most important issues for black women has always been that of poverty. In the early 1980s and 1990, black women were forced into the rural areas to live off the land without opportunities and choices which would allow them to build decent lives for themselves.

According to the South African poverty and development article in (2016) -after twenty-two years into the new democratic South Africa with its transformed educational policy- certain issues that need addressing are emerging. Although more black females have access to formal education, the quality of the education varies significantly, often due to gender inequality. A very worrying issue is that of sexual abuse against girls by male teachers and male students. This places girls and their education and development at a disadvantaged position as they often have to relocate to another school, or hide the fact that they were abused for fear of victimization. Apart from the negative impact this has on the girls' academic performance, they are at risk from contracting STD's and falling pregnant. It is interesting to note that, despite this, and the fact that the primary school enrollment figure for boys is higher than that of girls, more girls matriculate than boys.

The South African development article in 2016 also notes that female students have been the majority in Universities since 1995 but remain a minority in Technicon's. Although there has since been an increase in women entering vocational fields, they remain under-represented in certain areas - for example the STEM field. Women are also under-represented in the higher qualification levels, such as a Master's and Doctoral levels. Despite more women entering the environmental science faculty at higher education institutions, women are still under-represented in the higher ranks of faculty and in fields of study other than those traditionally associated with women.

According to a survey done by the Department of Education (DOE), in the Grade 12 Senior Certificate Examination and assessments, females seem to be doing better on key competency tests. More black females participate in higher education. At higher education institutions, the female share of enrollment has increased over the years from 44.1% in 1993 to 51% in 1999 and to about 54% in 2001. Participation in mathematics, science and technology for female learners has also improved (Department of education, 2016)

Even though there has been much improvement in rural areas, social and cultural patterns combined with the relatively poor quality of schooling placed black females and their education and development in a disadvantaged position. One major challenge is the unacceptable rate of violence and harassment against girls, who are often still excluded from mathematics, science,

engineering, environmental science technology and from prestigious leadership positions such as school prefects, class leaders at the Varsity level and leaders of a science or environmental science faculties. Black females and their education are also disproportionately affected by cultural and economic issues like domestic duties, transportation, and school fees (Department of education, 2016).

According to the Human Science Research (HSRC), 50% of mathematics candidates constituted of blacks' candidates 30% Kahn (2002). 30% of the study asserts that gender inequality in mathematics and science is real and persistent. It states that girls are under-enrolled and constantly under-performing. Kahn brings to attention some pattern that is occurring in science, with gender disparity being statistically significant.

The United Nations Children's Fund (UNICEF) are working with partners such as the South African Girl Child Alliance and the Girls Education Movement (GEM) to advocate the development of a national policy and legislation on violence against women and children. At community level, it cooperates with organizations like CRISP (Crime Reduction in the Schools Project) to facilitate community action in reducing violence and to declare 200 schools as "Safe Schools" for boys and girls. In addition, a UNICEF supported program to train girls in critical life skills is underway in KwaZulu-Natal, Eastern Cape and Limpopo provinces (DOE, 2016).

Another issue is the decline of females' school attendance. In a survey conducted by the Department of education in 2003 on the issue of males ' versus females' attendance at schools, the results were as follows: there were more females enrolled in schools than males, a continuing trend in South African schools, despite the fact that in the early grades, males make up the majority of enrollments (51-52% in grades one to four). In grade five, males constitute 50.5% of enrollment, but thereafter, females outnumber males who, in grade twelve make up 45% enrollment. Gross enrollment since 1991 in primary schools has improved over the last decade, moving closer to 100 per cent. Despite this general positive situation, however, the drop-out rate among females is on the increase.

Black women have been found to have higher levels of academic performance in desegregated schools than black males (Crain, 1978). However, black female performance is lower than white students (Crain, 1978). According to a study done of desegregated high schools, it found that black girl's academic performance was diminished, less by school climates unfavorable to blacks

than that of males. The study also shows that black women are more socially isolated- and are desegregated classes -than black males. Studies show that black females tend to receive less teacher and peer attention. Hare (1978) found that black female fourth graders in desegregated classrooms had lower self-estimations of academic skills than the black males, despite their higher performance.

Studies done to compare the percentage pass rate among students proved that black women are more likely to be below average when compared to other children from different races (Grant, 2016) South Africa has made huge progress towards achieving gender equality in the workplace. It seems that the Government and state-owned enterprises are taking the lead, with the private sector following suit. As mentioned earlier, women remain under-represented in certain fields such as science and technology. Surveys have also shown that, despite an increase in the representation of women on 'boards' and in key 'executive' and 'leadership' positions', they are still under-represented in these management levels. A very encouraging fact is that South Africa has the third highest proportion of companies with women in senior management in the world, as reported in the Grant Thornton International Business Owners Survey of 2004. It also reports that South Africa is in the eighth position globally of the percentage of women in senior management posts. One can say that while South Africa still has a long way to go, it is well on the way to leading the world in workplace gender equality (Fry, 2003).

It was not until the introduction of the Bill of Rights 1997 that all women in the country received formal recognition as equal citizens. Black women under the social and even legal control of their fathers or husbands - were second-class citizens for many years (Goldstone, 1997). Black women were obviously doubly disadvantaged as a result of their race and their gender. The law, in various forms, has had a significant role in this prejudice. Customary law, for instance, gives black women the status of minors and excludes them from rights regarding children and property (Goldstone, 1997). South Africa's common law deprived white women of guardianship and various economic rights. Nowadays, Black women are still economically disadvantaged, they make up a disproportionate section of the unemployed and tend to occupy more of the lower-paid jobs, as domestic and farm laborers. Black women often earn less than men for the same tasks (Kitwana, 2008).

The most prominent problem in black females being exposed to other careers is that black students are a product of an educational system that is infested with inequalities in delivering information about the wide range of occupations one can follow (William, 2001). Most non-multiracial schools lack the extensive background of sciences contributing to black female students only progressing in female dominant fields (Gilligan, 1982). A study done by Cloete (1981) has proved that most blacks who have attained something career based are normally found in nursing and social work.

Watson Foxcroft (2009) also gave evidence that supports Cloete (2006) and said that it is proven that black students are more likely to choose careers in the humanities faculty, avoiding the technical, scientific field. Black females are fighting an endless battle with a series of challenges and disadvantages. Their group comes from a disadvantaged educational background and social values imposed onto them. It is very important to always note that black women have various issues that they face including issues of stereotypes. A study conducted in South Africa by Jeff Jawitz, Jennifer Case and Matseliso Tshabalala (2002) at the University of Cape Town (UCT), reveals the process of career choice amongst South African female students. This has suggested that the students' make their career choice based on the relative values of the career choice and their beliefs about themselves. According to research their beliefs about themselves are formed from their interpretation of past experiences and perceptions of the attitudes and expectations of others, such as teachers and parents (Dick, 1991). This study also strongly confirms that most black students that go into the STEM fields,enter into it for different reasons,most black students enter these fields ,because they were motivated by the opening of opportunities to serve their community and prove themselves in a career previously dominated by whites expecially white males (Case, 1998).South African enrollment of females in the higher education has increase over the years. The   enrollment of female students in public higher education by qualification level from 2010 to 2012 has incresead drastically to 61% Undergraduate, 64 Postgraduate, 48% Masters and 43% Doctoral.

According to the status of women in the economy report of 2012 women were 49, 08 % dominant in the STEM field, that is almost half of the stem field were dominated by women. According to a study done by Vuyiswa Nothuthuzelo Xoliswa Foster (2005), career aspirations of female engineering at a Further Education and Training institution in the Johannesburg

region, is clear that more and more women, especially black females in South Africa and the African continent have broken the barriers of stereotypes and oppression and are dominating the stem fields . This study's main purpose was to describe factors that influence black female who choose an engineering career. This study, clearly transpired the factors of the environment, role models, self-efficacy and socialization as important factors that are influential in attracting females into fields of science and engineering studies. The study made it clear that family members, female role members and confidence levels in mathematics and science were factors that cause females in the engineering group to choose it as a career. The findings also reveal that gender stereotypes as well as the previous education system did not deter them from choosing engineering and that they were content with their career choice. The South African education system has evolved into new frontlines and different arguments exist within the educational system.

2.3.1 The historical background of education in South Africa.

The Apartheid's view of South African educational developments broadly accepted by the liberal academics. For some time, this has come to be seen as inadequate. Not only does this new school argue for the use of the tools of political economy; `additionally, it maintains that those social scientists of the early 1970s who pioneered this approach in the broader fields of history and sociology, have either neglected education or have examined it solely in relation to the economy. Thus, the new school of thought within educational studies can, at the same time, be seen as a 'revisionist front' of the early political economy tradition in South African studies (Kallaway, 1984). The education system in South Africa has faced various challenges of colonial power and oppression whilst teaching Africans in a European manner which is not relevant to the South African's context. The education systems seems to have been very challenging in terms of the medium of instruction, due to the apartheid laws and government policies, Afrikaans was nationalized to be a medium of instruction giving the second language or non-Afrikaans speakers a challenge in terms of learning thus making it even harder for black women to study or do mathematical subjects, in a language that they partially and in some instances did not understand at all. Furthermore some theorists such as, Coetzee(1983) criticized the education system on a number on grounds by arguing that the education system of South Africa burdens students with irrelevant facts that has no utility for either the present or the future (Coetzee, 1983). Not only

was the language barrier the least of the education systems problems, issues of women being undermined in certain areas of study emerged and women, particularly the black disadvantage women fall prone to this situation of being undermined. Women were only encouraged to enroll in the more theoretical areas of study which did not require mathematics. This is because the education system was put in place to only accommodate women as commercial subjects and males in mathematical subjects (Eiselen, 2008). The Bantu education was then introduced, the Bantu education entailed an integral part of a carefully planned policy of segregated socio-economic development for black people. Above all, this education system emphasized the functional value of the school as an institution for the transmission and development of black cultural heritage. Also, this e system benefited black people because black languages were introduced in all black schools eliminating the Afrikaans system making it easy for black people in South Africa to become academically involved (Eiselen, 2008). The various changes that have occurred and the system of Bantu education which were introduced over the last 20 plus years of democracy education has taken a new direction. This is to say that the education system and environmental science faculty has taken a new direction and are more accommodating to the previously disadvantage black women of Africa (Obakeng, 2001).

Tradition and black culture has played a significant role in black women not fully embracing their rightful opportunities. The historical background and Traditional gender roles suppressed Black women for a very long time. These traditional gender roles have over the years only allowed women to partake in certain careers because other careers like the sciences, were deemed as only male appropriate because males are more 'capable'. Females have been for the longest time been undermined but now women are not afraid to break into different challenging fields. Women also went against traditions, which believes women should be more nurturing and available to practice more domesticated activities. The interviewed women in this study say that they agree that times have changed, but because most of them are from rural backgrounds, they feel like their background oppresses them as women were limited to certain activities.

2.3.2 The experiences of black women in High School.

Many female learners receive very little to no career counseling regarding the STEM field career paths. The lack of technical experience and application outside female learner's school environments (home) made it difficult for these learners to have a clear insight into technical

careers which would suite them. Some girls reported that they were discouraged from taking scientific education (Silverman, 1996). In the researcher's school; the technical subjects are separated into class sizes for each technical subject. These technical and scientific subjects can vary from school to school within the district. In grade 8 and grade 9, each learner has the opportunity to experience the theoretical as well as the practical side of a technical subject such as Mechanical Technology, Civil Technology and Electrical Technology.

Female learners who decide to study in a technology or scientific related career discard the stereotype that these careers are masculine and reserved for their male counterparts. These female learners see themselves as "path breakers" who are capable of succeeding in this non-traditionally apparent innovative and career. Female learners are frequently unwilling to take subjects where there are limited female learners. Some female learners find it unbefitting to imagine themselves in non-traditional 'female' careers. Many female learners fail to recognize their abilities as their self-confidence is hampered by their peer and relatives' possible reactions. The high risk combined with the physical burden of their career choice, the fear of not being able to move or lift heavy objects and possible injury limits their career choice.

The historical discrimination against women in scientific careers does not encourage female learners to select scientific career subjects from as early as high school. Their monetary reality of underpaid female technical and scientific careers places another limitation on the career choice. Female learners seemed unaware of salary or promotion prospects of traditional careers. They are less concerned with economic realities than male learners. Female learners have misconceptions about the extended period.

Croll (2007) explains that the concentrated prejudice against female learners became a focal point in 1990 when many attempts were made to focus awareness to the extent of discrimination. Croll continued to state that a generation division amongst women is one of the causes why the amplified interests to the rights of women were not as effective. Although education is a right to female learners, it also enables these learners to access enhanced wellbeing, monetary outcomes and potential opportunities (Mango, 2008). In response to multiple factors, male and female learners create their own identity (Warrington, 2011). A phase shift in developing learners to become dedicated to society and taking accountability for themselves has become an expectation in schools (Skelton, 2010). Male and female learners construct and negotiate their identities in

response to a whole host of factors (Warrington, 2011). Skelton continues to state the irony of this is the social constraints that are still evident when female learners try to choose nontraditional career paths.

Many female learners augmented ambition regarding prospective careers. This has been related to materialism and realism (Francis, 2010). Constrained by gender, many ordinary and underperforming female learners aspire to superior living standards (Skelton, 2009). In many cases, poverty and gratitude becomes the lumber of these female learners (Croll, 2006). Families place pressure on the female learners to contribute and these female learners feel that they are indebted to their family. Hence, many female learners who attain academically tend to leave their residence which leads to a belief of seclusion and depressingly affected interaction with their families and acquaintances (Shurchkov, 2012). Croll (2007) also stated that families hold different valued approaches to a daughter as opposed to added members such as a daughter-in-law or wives.

While participation rates for girls in technology subjects are low, having traditionally been identified as "masculine" subjects, the teaching methods and classroom atmosphere in technology education differ significantly from math and science classes (Silverman, 1996). Excluding theoretical instruction, the practical part of 'Technology' is taught in a workshop and with very hands-on projects in terms of learners using tools, machinery, equipment and raw material. Depending on the task that has been set out, learners work independently or in groups to complete a project. Female learners portray 'technical' career barriers as being historically sexist. Schools need to provide female role models as well encourage educators to conquer stereotyping technical subjects, so that more female learners would be able to foresee themselves working in technical careers. Female learners feel that the male learners are given the opportunity to be "technical" from an early age and that it is socially acceptable. Very few women are portrayed in technical careers. This is to say that technology seems to attract very few women. Some of the female learners felt that within a cultural context, technology is still seen as a non-traditional career for women. Although many female learners feel that they have no prior experience of technology, due to urbanization, many female learners who live in flats in the city, lack technological experience. The female learners do not spend lots of time with their fathers

who would have been able in assisting the female learners to learn more assumed masculine skills like changing a tyre or using any tools. Therefore, a lot of African female learner's lack confidence in their abilities to take part in sciences practical's.

Female learners see science as "dirty" careers as the technical career entails hard labour and getting dirty and "working with their hands". Female learners are not aware of what scientific careers entail. During a Work Experience programme that the school from previously disadvantaged communities introduced for the grade eleven's in the early 2000, they were expected to find a technical subject related to a part time job at a company. The learners work there for a time period of a week and management has to forward a rating document to the school regarding the learner's work ethic. Due to numerous problems like transport and safety, many of the female learners failed to complete the technical work experience. Female learners who decide to study in a science related career discard the stereotype that these careers are masculine and reserved for their male counterparts. These female learners see themselves as "path breakers" and that they are as capable of succeeding in this non-traditionally apparent innovative and career.

2.3.3. The experiences of black women at tertiary institutions.

South African women face a lot of challenges in tertiary institutions. Racial and gender grouping under the policy of apartheid profoundly shaped South African society and resulted in rampant inequalities. Black women suffered the most, compared to other races. Black women were limited to certain career fields (Johnson, 2012). Issues of financial and social environment is also a significant problem to women especially black women at tertiary environment. These problems hindered black women from pursuing their desired career paths because they limit them to certain fields. This is because the society has constructed them to be good or their economic situation limits them. Women in South African institutions of higher education, is still an enormous challenge. The work demonstrates the pervasive presence of unequal and discriminatory practices in higher education and the need for a truly inclusive and equitable working environment (Mabokela, 2002:204). Universities across the world are a product of their national and societal contexts. Under apartheid, racism in

South Africa was institutionalized and higher education reflected the racial division. In a report by the National Commission of Higher Education (1996), it was revealed that, in 1993, women occupied 32% of the total research and teaching positions. The report also held that the majority of women were employed at the level of junior lecturer or lecturer. The same report also stated that woman at some historically white Universities in South Africa, held all of the positions below the rank of junior lecturer, 89% of women held the position of junior lecturer and 45% held the position of lecturer. Less than 3% of women held the position of professor and 8% held the position of associate professor (Mabokela 2002:185-186). Blacks were conspicuously absent or under-represented and black women in particular were grossly under-represented. Scholars of the day attributed much of the quandary of higher education to patriarchy. McIntosh (1995:76-78) asserted that predominantly white male institutions and disciplines exposed the interlocking nature of race and gender oppression. She claimed that white male privilege was held up by an invisible hand of support, prestige and advocacy which gave male academics access to valuable information and opportunities, thus ensuring their success. Conversely, female academics who managed to obtain positions in the academia were without this invisible hand of support. This meant that these women simply did not have access to the resources they needed. Moreover, in such a context, white male privilege was the lens through which the experiences of women were re-interpreted and dismissed. In addition to this, black women, being at the bottom of the rung in the racial/gender hierarchy of apartheid were not only subjected to race, class and gender discrimination, but also experienced discrimination from within the ranks of women themselves, women who served to reinforce paternalism and the marginalized position of black women.

The journey of black African women academics, with particular focus to environmental science, has been a very difficult journey. Racial and gender grouping under the policy of apartheid shaped South Africa society which resulted in rampant inequalities. Black women suffered the most from these oppressive dynamics. Empirical research has revealed disturbing subtexts of racism, classism and sexism within the academy and endemic structures that marginalized women. In the new democratic dispensation, the embedded social inequalities under apartheid prompted an extensive range of transformation orientated initiatives in order to address the situation in higher institutions. In a study done by Mazibuko (2006: 111), she acknowledged that there are governmental policies and the Universities in South Africa were committed to adopt and enhance gender equity promotion programme. However, she asserted that governance and

management within higher education had to contend with multiple sources of control, competing missions, decentralized structures and constrained resources. Centers of power included schools within institutions, faculties, colleges, executive management, senates and councils. The policies seem to be well in progress and more and more faculties especially the previously male dominated fields which are open to women entering them (Mazibuko, 2006).

The rates of science and engineering course occupied by black women shift at the undergraduate level and gender disparities begin to emerge, especially for minority women (NSF, Science & Engineering Indicators, 2016). Women earned 57.3% of bachelor's degrees in all fields in 2013 and 50.3% of science and engineering bachelor's degrees. However, female participation in science and engineering at the undergraduate level significantly differs from a specific field of study. While women receive over half of bachelor's degrees awarded in the biological sciences, they receive far fewer in the computer sciences (17.9%), engineering (19.3%), physical sciences (39%) and mathematics (43.1%) (Board, 2002)

In 2012, 11.2% of bachelor's degrees in science and engineering, 8.2% of master's degrees in science and engineering, and 4.1% of doctorate degrees in science and engineering were awarded to minority women (NSF, Women, Minorities, and People with Disabilities in Science and Engineering, 2015).

According to an article written by the National Science Foundation in (2015) statistics that were found In 2012, show that 3.1% of bachelor's degrees in engineering, 6.5% of bachelor's degrees in physical sciences, 5.4% of bachelor's degrees in mathematics and statistics, 4.8% of bachelor's degrees in computer sciences, 9.7% of bachelor's degrees in biological sciences, and 14.2% of bachelor's degrees in social sciences were awarded to minority women (NSF, Women, Minorities, and People with Disabilities in Science and Engineering, 2015).

2.3.4 The contemporary context of black women in the education sector.

Black women have faced several challenges in the education sector, from being allowed or encouraged to partake in social science subjects in high school and also encouraged by society and families to participate or only engage in women friendly fields at the higher institution level. But women of today have broken the chain and are partaking in the previously male appropriate

field of study. Women today are making an increasing important contribution to the STEM fields, women are moving into professions which were, in the past regarded as a 'man's' world. Women are contributing formally and professionally in careers that are outside the prescribed limit.

Black women in the education sector are still questioned about their capabilities, despite the concerted efforts of women around the world, the question still arises if women are more capable as men at doing environmental science. In an article- in association for women in science newsletter-various theories answered the question with an unequivocal 'yes', the cast of scientist around the globe have joined together and created initiatives to assure the opportunity to demonstrate the capabilities. Around the 1990s, encouraged by the vitality of feminism was encouraged, yet discouraged by their previous experiences in the education sector, several women became active participants of the education sector especially the sciences (Anne, 2005).

Black women in South Africa are exposed to dual discrimination because they are both female and black, yet in recent years many have moved upwards in the previously white male dominated educational fields, steadily but barely noticed women are dominating the academic field, particularly in the sciences a rapidly growing number of black women are proving that diligence, drive and determination can do much to counter disadvantages of discrimination. They have become indispensable, particularly in the STEM field and professional workforce (Lessing, 1994). Women of the twenty first century have shifted the education fields in a way that has never been done before. These women have shown courage to oppose inequality challenging the fields that were largely white male dominated fields (Anne, 2005).

2.3.5 Black women in Science in the contemporary South Africa.

The challenges that black women experience in science, environmental science, mathematics and engineering fields have fascinated college presidents and researchers alike (Ceci, 2007). These challenges include a greater male aptitude for certain math skills (Hedges & Nowell, 1995). The double discrimination of black women and previous disadvantages. Further, in another light see Hyde, Lindberg, Linn, Ellis, & Williams, 2008) and women's preference to study people as opposed to male preference to study things (Lippa, 2005). Other challenges women face stems from structural features in science and engineering fields, especially the low numerical representation of women. Being a numerical minority in work settings can activate gender

stereotypes. Sex is one of the most visible social categories at work (Eagly, 2008). Also it becomes perceptually salient and is used in social categorization, especially when one sex is in the numerical minority in a group (Kanter, 1977). A numerical minority position, by activating gender stereotypes, poses a particular threat to the identity of women scientists and engineers because it highlights expectations of males performances advantages in a culturally masculine domain (Eagly, 2008).

Female scientists and engineers, in trying to grapple with the negative stereotype about their social identity, experience a situational burden that interferes with their performance. In fact, numerical distinctiveness is a common manipulation in experiments to activate stereotypical performance expectations and thus stereotypes are seen as a threat (Steele, 1997). For example, women performed worse on a difficult math test when they were the sole female in a group of men (Benz-Zeev, 2005). This performance deficit was not found when sex ratios were more favorable to women or when the test assessed verbal skills (Chatman, 2008). Even anticipating, being a token, woman in a workgroup can induce negative expectations about the experience (Cohen, 1995). In essence, the threat to self-integrity experienced by many women engineers stems from a state of cognitive imbalance in which the female concept of self and expectations for successful conflict with prime social stereotypes are of low competence in relevant tasks (Schmader, 2008). This means that female scientists and engineers are faced with the cognitive imbalance from the following propositions: Women generally are not skilled at math and science. This state of imbalance is a stressor that impairs performance by activating physiological markers of stress, cognitive deficits, negative effect, and efforts to cope with these aversive experiences (Lord &Saenz, 1985). Thus, female numerical minority status in traditionally masculine fields is a structural barrier that activates gender stereotypes and thereby poses a social identity threat. Some women resolve this imbalance by accepting that they are not skilled and do not belong in the relevant work setting. This is to say that women could limit their participation in these fields, especially in settings that precipitate threat. For example, female undergraduate mathematics, science, and engineering majors expressed less desire to attend a professional conference depicted with more men than women than a conference with an equal sex ratio. Nonetheless, some women become successful in these fields. These individuals are the focus of the present research. We seek to understand how these successful women reduce the experience of social identity threat.

Studies have demonstrated that even when background factors are accounted for, women still advance slower and are paid less than men. An experimental study concerning this issue shows that there where biases are examined in a laboratory setting, often involving University students. Students who are taking part in the study, including both men and women are most likely to exhibit biased behavior against women in leadership (Eagly, 2008). A very clear example of prejudiced behavior towards women is in the area of negotiation, women are not expected to be aggressive or to ask for things: this means that women often lose out in situations where men would negotiate higher salary, start-up packages, bonuses, or resources (Babcock, 2003). Women are still being bullied into believing that the sciences can only offer them space in the academic space and not the more practical field opportunities, women's rights are violated and made to believe that certain aspects of the field still belong to the males who are physically believed to be built stronger than females (Babcock, 2003).

According to Sells (1992), it is clear that the method which black females and black males are taught -in the sciences field- has an impact on their performance. The method of teaching, especially the weeding out teaching style is one of the methods that has a negative impact on black females. Women are prone to self-esteem issues that negatively affect their performance and sometimes are very discouraging to the point where they choose to leave the field. The different teaching methods might have an impact how the students' perform, especially females' process the information. Further, the teacher-centered method is a method whereby the student simply obtains information from the teacher without building any form of engagement level (Boud, 1999). The teacher centered approach is mostly recommended for theoretical and memorizing which does not necessarily work for science because it is mostly calculating. Also this teaching method limits student to the information given by the teacher not allowing students to explore other sources of information that could enriched their knowledge (Teo, 2000).

The disruption caused by career breaks for having children and the lack of support for returners, the failure to tackle long hours and work-life balance issues and male hostility are several subtler factors which can also   have a significant impact on how much female scientist are seen as belonging. This has a huge impact on whether women stay or choose to live this career (Faulkner, 2006).

The societal patriarchal mode of thinking once viewed women who enter into previously male dominated fields as very tough. Entering environmental science or any other science related field only became easy and accepted during this era. But it was not easy entering the field a few decades ago. Stereotypes have been and always will be influences that are placed on women. The society views women who are breaking barriers of the past as new leaders and women who are not afraid to stand their ground and dream beyond expectations (Beede, 2011). Women are motivated and care neither less about society, discrimination. This especially occurs within the cultural society with regards to women of the 21st century, they are making their mark and breaking walls that were only subjected to a minority of male's specifically white males (Beede, 2011).

The social identity of women, particularly previously disadvantaged women, are complicated by various aspects such as gender roles, the potential for sexual attraction and the possibility that the one who is not the dominant party could be viewed as possessing sexist attitudes. These aspects may arise during interactions that take place in domains in which females are subjected to an unwelcoming environment, such as, sciences fields women are over powered by males and the dominant positions that they occupy leading women to be the target of negative stereotypes that allege their relative incompetence. Research done has concluded that males who hold sexist attitudes create a threatening environment by displaying their sexiest attitudes in a subtle way. As such, classmate or colleagues with whom they interact (Wolfe, 2016).

This behavior has a negative impact; it undermines female's ability to succeed in the science field environment. According to (Wolfe, 2016), a person with various identities may be in jeopardy of being devalued if there are faced with various discrimination around them, especially in a work environment. The consequences that a woman's identity undergoes after being treated with disrespect at work may cause immense damage to her self-esteem and work ethic. This behavior can be immense, so much so that it could also affect the women who work. According to a study done by Grant (1997), women are seen as socially mature by their male counterparts, but they are not seen as academically mature to handle the challenges and responsibilities that go with the scientific field particularly the Environmental science field. But the perspective of men has not hindered women to break ground and make names for themselves in vocational fields such as, the Environmental science field. Presently a lot has shifted for women in such a way

that regardless of still being faced with discrimination from males, women are taken more seriously than before (Wolfe, 2016).

The study and work sector of science, agriculture, and engineering has shown immense growth over the past years because black women have not allowed themselves to be victims of oppression. Rather, they break grounds and enter the male dominated field. Black women have been a great example of breaking barriers and entering a field of study that was predominately white male dominated. Black women have moved away from previous discrimination and have made their mark in the sciences field. Women such as Mea Jemison an American physician and NASA astronauts known for being the first black woman to travel space, Marie Maynard Daly the first black woman to earn a PhD in chemistry and Patricia Bath an American ophthalmologist and an inventor known for being the first African American female doctor to receive a patent for a medical invention were one of the first women who broke the barriers of social construction and made it into the science field. These are one of the first black women to break the barriers, inspiring other black women to do the same (Clarke, 2014).The women named above are part of the women in history that have given black females of the 21st century encouragement to change the STEM field more than the previous generation of inspirational women.

2.4 Women in Science at the workplace

Women remain under-represented in the science and engineering workforce, although to a lesser degree than in the past, with the greatest disparities occurring in engineering, computer science, and the physical sciences (NSF, Science & Engineering Indicators, 2016). Payment, in terms of inequality remains a problem, black women battle pay against discrimination, black women are usually at the bottom end of payment and sales. Besides being demotivating and undermining self-esteem, low pay also affects these women in various other ways. Studies have demonstrated that even when background factors are accounted for, women still advance slower and slower. An experimental study concerning this issue revealed where bias is examined in a laboratory setting, involving University students. Students who are taking part in the study, both men and women are most likely to exhibit biased behavior against women in leadership (Eagly, 2008). A very clear example of prejudiced behavior towards women is in the area of negotiation, women are not expected to be aggressive or ask for things: this means that women often lose out in

situations where men would negotiate higher salary, start-up packages, bonuses, or resources (Babcook, 2003). Women are still being bullied into believing that the science can only offer them a space in the academic realm and not the practical field opportunities. Also, women's rights are violated and made to believe that certain aspects of the field still belongs to the males who are physically believed to be built stronger than females (Babcoach, 2003)

Women in the workplace are also placed in lower positions than their male counterparts (Lessing, 1994). Women continue to be overrepresented in services professions and pink collar work, while they are dramatically under-represented in areas such as, mathematics, computer science, and engineering and the hard sciences and environmental science (Thompson, 2003). However, scholars such as Rowena, Martineau (1998) have been concerned about the low representation of black women in the agriculture, sciences and engineering profession, particularly the low number of graduates.

Women make up half of the total U.S. college-educated workforce but only 29% of the science and engineering workforce. Female scientists and engineers are concentrated in different occupations than men, with relatively high shares of women in the social sciences (62%) and biological, agricultural, and environmental life sciences (48%) and relatively low shares in engineering (15%) and computer and mathematical sciences (25%).For example 35.2% of chemists are women,11.1% of physicists and astronomers are women,33.8% of environmental engineers are women,22.7% of chemical engineers are women,17.5% of civil, architectural, and sanitary engineers are women,17.1% of industrial engineers are women,10.7% of electrical or computer hardware engineers are women; and 7.9% of mechanical engineers are women (Weisgram, 2006) .

Race and ethnicity are the salient factors in rates of participation in the science and engineering workforce (NSF, Science & Engineering Indicators, 2016). The U.S. science and engineering workforce has become more diverse but several racial and ethnic minority groups continue to be significantly underrepresented.

In 2013, 70% of workers in science and engineering occupations were white, which is close to the proportion in the U.S. working age population. Hispanics, Blacks, and American Indians/Alaska Natives make up a smaller share of the science and engineering workforce (11%) than their proportion in the general population (27% of the U.S. working age population).

Asians work in science and engineering occupations at higher rates (17%) than their representation in the U.S. working-age population (5%). Asians are particularly highly concentrated in computer and information science occupations. The increase in female participation in science and engineering over the past two decades includes increasing participation by members of all racial and ethnic groups, especially Hispanic and Asian women. Minority women comprise less than one in ten employed scientists and engineers (NSF, Women, Minorities, and People with Disabilities in Science and Engineering, 2015).

According to the National science foundation (NSF, 2015), the Senegalese government's rural development agency aims to organize village women and involve them more actively in the development process. Women play a prominent role in village health committees and prenatal and postnatal programs. In urban areas, cultural change has led to women entering the labour market as office and retail clerks, domestic workers and unskilled workers in textile mills and tuna-canning factories. Non-government organizations are also active in promoting women's economic opportunities in Senegal. Micro-financing loans for women's businesses have improved the economic situation of many.

2.4.1 South African women at the workplace.

Though the work force and perceptions have changed dramatically over the years and many employers prefer female managers, there are still a number of disparities that remain between the sexes. According to Lyndy van den Barselaar (2012) there are still certain corporate cultures and structures that pose barriers to the advancement of women in the form of out dated policy regarding part time work, flexi- work and job sharing. The idea is still common that a women's personal life and family terms will affect her work performance.

There are still some gaps in the work place because some women are still earning less than their male counterparts holding the same position. The glass ceiling also still holds true in many sectors regardless of a women's level of skill or talent. It is very clear that there are a few organizations that support women (Barselaar, 2012). Another common perception we come across in the workplace is the assumption that women are not able to handle stress as well as their male counterparts or that women are not educated enough in order to climb the corporate ladder and that the boardroom is for males and women belong in the kitchen (Barselaar, 2012).

The new equality environment has also brought on new challenges though these additional challenges to certain races are promoted above their racial counterparts. We no longer have women competing to go ahead in a men's world, and there are now faced with inter-racial competition. Black women will have an advantage because it shows that women are willing to improve themselves in terms of education and skills to ensure that they are able to compete fairly against all components. The results to this competition is that we end up with a very skilled workforce (Barselaar, 2012).

2.4.2 The context of women in Science at the University of KwaZulu-Natal

When exploring, the literature relating to barriers to women in leadership, one sees a remarkably similar theme to what one finds with women in STEM (Science, technology, engineering and mathematics). Researchers such as Eagly and Carli (2007) discuss what hinders women's leadership potential. They argue that the glass ceiling is no longer of proper similarity. Women have broken through and are in a position of power: the barriers are not impenetrable. Nor is it transparent. Instead, they propose the idea that there are many possible routes and many dead ends. Wrong turns and backtracking are likely common, yet there is a successful path to a worthwhile leadership. (Crawford, 1994).

According to the college of agriculture, sciences and engineering, where an environmental science degree is offered, women have slowly advanced in the environmental science field at the University of KwaZulu-Natal. Statics from 2012 to 2016 show that more and more women are breaking the barrier and entering into environmental science. Statistics also show that more and more black women than white women have entered the environmental science field in the year 2012 only 58 female students were registered for the Environmental science program from first year to 2014. However, that number changed over the years more and more women have started to enroll in the program and in 2016 women have dominated the Environmental science program. There are 151 females enrolled for their Environmental Science degree at third year level. These numbers show that every year since 2012, more and more women have broken the barrier of environmental science being a male dominant field. Also, more women than men have had an interest in studying environmental science and more black women have actually enrolled for this programme. Males from different races have had a very slow pace in entering the

environmental science programme at the University of KwaZulu-Natal. The numbers of the previously male dominated field of science has changed over the years and more and more women are progressing in the field. The high number of African female students in the environmental science program are very impressive and shows that there is room for growth within black women in the environmental science field.

2.5 The significance of the study.

The significance of this study is to show how black women have evolved over the years and have made a name for themselves in the academic and corporate world. Black women have broken the barriers of culture and tradition and have become a part of a much broader spectrum of the previous male dominant career worlds. Women have left the nurturing world and are challenging sectors such as the science world where they have come to make a name for themselves. This study is significant because it does not only look at the science world but it is more specific in the experience of black females in environmental science thus making it more informative. It also closes the gaps in literature, not only in the commonly researched STEM fields but also looking at the environmental science field- which is scarcely looked at.

It is very important for Africans' to do more research on issues of education concerning black women in environmental science and how these black women have evolved and how they are negotiating their space in such areas of the sciences. It is also important that African's conduct their own research and become more informative about the lives and experiences of their people and not always having to relay of international sources for information. There is very limited information regarding African black women in the environmental science field in Universities from Africa, most of the studies are done internationally looking at African women internationally which is much different than looking at African women in Africa. This is because these groups of women have different challenges and life experiences. Therefore it is very significant that such studies are conducted in the African context.

It is significant because if studies exist and are done in Africa by African women on African women there are a lot of factors that these women can relate with one another. This gives Africans, research studies that are relatable to their people. It is also important for Africans to

conduct studies among their own people because it gives the next generation historical background of the issues that African women were subjected to and if there has been improvement or not.

2.6 THEORECTICAL FRAMEWORK.

2.6.1 Feminist standpoint theory.

Feminist standpoint, which is a postmodern method for analyzing inter-subjective discourses, is a theory which concerns the way that authority is engrained in individual's knowledge, perspective and the power that such authority exerts. The theory states that most valuable concepts are gained from an individual's own perspective which is shaped by their own social and political experiences). Standpoint theory emphasizes the utility of a naturalistic or everyday experimental concepts of epistemology. Standpoint theory supports what feminist theorist Sandra Harding (1998) calls strong objective, or the notion that the perspective of marginalized and or oppressed individuals can help to create more objective accounts of the world. Though the outside within phenomenon, these individuals are placed in a unique position to point to patterns of behavior that those immersed in the dominate group culture are unable to recognize (Brenda, 1996). Standpoint theory gives voice to the marginalized groups by allowing them to challenge the status quo as the outsider within. Further, the status quo representing the dominant white male position of privilege (Buzzanell, 2003).

Standpoint theory is more like the creation of a group's consciousness and not about shifts in the consciousness of the individual. It places relations between political and social, power and knowledge as the center stage. Both the political and social theories that standpoint theory places emphasis of relation on, being both normative and descriptive- includes describing and analyzing the general effects of power structures on knowledge while advocating a specific route for inquiry, a route that begins from a standpoint emerging shared political struggles within marginalized lives

Standpoint theory shows the effects of group experiences in the natural sciences without committing "externalism" or an "excessive constructionism", both of which appear to leave nature's order significant role production and the legitimization of knowledge claims. Standpoint theory promotes what would be thought of as constructionist materialism (Buzzanell, 2003). The feminist standpoint theory was a theory that I used to investigate the black female students of the University of KwaZulu-Natal looking at how their female's personal experiences and knowledge has been shaped by their social and political experience. It is clear that social and political experiences of these women have a vital role in how they view the world around them. Many scientists have argued that the environment has more influence on a human and that the environment you come from has a huge effect on shaping who you become (Robledo, 2014).

2.6.2 Feminist intersectionality.

Intersectionality which is the mutually constructive relation among social identities, has become a central tenet of feminist thinking (McCall, 2005). Intersectional perspective reveals that the individual's social identities profoundly influence one's beliefs about and experiences of gender. Intersectionality is an important paradigm in academic scholarship and broader contexts such as social justice work or demography. Difficulties arise due to the many complexities involved in making "multidimensional conceptualizations" that explain the way in which socially constructed categories of differentiation interact to create a social hierarchy. For example, intersectionality holds that there is no singular experience of an identity (Brown, 2003). Intersectionality provides a complex ontology of "really useful knowledge," which systemically reveals the everyday lives of black and ethnized women who are simultaneously positioned in multiple structures of dominance and power as gendered, raced and classed. Intersectionality signaled a move away from the inadequate additive models of double or triple jeopardy and the seemingly meaningless listing of never-ending hierarchies of multiple social positions and identities. Black and ethicized women, of different ages, with various or without citizenship and human rights, live in the dominant modalities of race, class and gender (Brah, 2004).

Theoretical foundation of intersectionality.

A fundamental assumption in every influential theoretical formulation of intersectionality is that intersectional identities are defined in relation to one another (Spelman, 1988). Since the 1980s, feminist critique of essentialist assumptions about gender increasingly has employed an

intersectionality perspective to understand gender in relation to other social identities, such as: class, ethnicity and race. In contrast to models that suggest for each minority status there is a simple accumulation of disadvantage such as, the black women is doubly disadvantaged compared to the black man and the intersectionality framework emphasizes the qualitative differences amongst different intersectional positions (Mullings, 2006).

The intellectual and moral imperative of intersectionality notwithstanding, the prevailing approach to understanding the individual context of the group is to focus on comparison of group identities and similarities (Hare -Mustin, 1988).

Intersectionality from fact of identity to theory.

Intersectionality reflects the reality of lives, the facts of our lives reveal that there is no single identity category that satisfactorily describes how we respond to our social movement- or are responded to by others (Creshaw, 2004).

The theory of intersectionality also suggests that the seemingly discrete forms and expressions of oppression are shaped by one another (mutually co-constitutive).Thus, in order to fully understand the racialization of oppressed groups, one must investigate the ways in which racializing structures, social processes and social representations (or ideas purporting to represent groups and group members in society) are shaped by gender, class and ethnicity .The intersectionality theory will be a platform on which the study will explore how African females are influenced by their gender, class and ethnicity in the academic field of environmental science. Further, gender norms can influence personality by emphasizing different traits between different genders (Rubin, 1993).

Feminist intersectionality is significant to the study because it clearly highlights the factors that influences a person's identity, beliefs and gender. This theory is suitable because it helps me to better understand why certain women with their certain beliefs system experience the environmental science program in a particular manner.

2.6.3 Social learning theory

Social learning theory posits that learning is a cognitive process that takes place in social context and can occur purely through observation or direct instruction, even in the absence of motor reproduction or direct reinforcement. The theory also expands on the traditional behavioral theory, in which behavior is governed solely by reinforcement, by placing important roles in various internal processes in the learning of an individual. Social learning theory draws heavily on the concept of modeling or learning by observing behavior.

Social learning theory explains human behavior in terms of continuous reciprocal interaction between cognitive, behavioral and environmental influence. Social learning theory encompasses attention, memory and motivation, it spans both cognitive and behavioral frameworks (Bandura, 1997). People are highly influenced by observational learning and they organize and rehearse through modeled behavior (Bandura, 1997). Krumboltz (2008) added on the social learning theory when he included social learning theory in terms of making career decisions and learning theory through career counseling. The social learning theory of career decision making is influenced by factors such as, genetic endowment (race and sex), environmental conditions and events, instrumental and, associative learning and, task approach. Thus, the social learning theory will be a platform in which the study will explore the African female students' experiences of observational learning and how it influences career choice Krumboltz (2008). Some theorist believe that role models play a vital role in children modeling- behavior is an important trigger.

2.7 CONCLUSION.

This chapter has outlined the literature of women within the science field. The chapter has looked at African women and science from a global perspective and an African perspective. The literature also looked at how women exist in their work environment, the challenges that they are faced with, the schooling environment and how these women have overcome all the challenges and broken barriers to enter what was previously viewed as a white male dominated study field.

The interesting aspect about the literature review is how African women have evolved over the years, how these women have fought for their spaces in the STEM fields, how these women are oppressed and discriminated against and given lower positions, lower wages and so forth. The

Highlight of all the challenges that women are faced with is how they overcome and break barriers to show that there are as capable to occupy the environmental science fields. The growing number of women who graduated within the STEM field is a clear indication that women are black women have arrived and they are taking over the STEM field

CHAPTER 3:

RESEARCH METHODOLOGY AND METHODS.

3. Introduction.

Research methodology and methods are different aspects of the research project, whereas methodology is a general principle to guide your research, methods are the tools that are used for the purpose of data gathering, such tools include interviews, surveys, observations etc. In this chapter, I will illustrate and explain how the research methodology has been implemented. The necessity for this study was delineated in the opening chapter. This chapter discusses the nature of the research and the resources of organizing the quality of the study delineated. This type of research is concerned with understanding social phenomena from the participant's point of view which is understood to be experience as unified. All procedures used for data gathering are identified and the data analysis methods are distinctive. Exploration into factors influencing the career choices female learners make has been done before and the researcher's specific involvement as a technically qualified female educator is the reason why this research is grounded in her individual and empathetic concern for these female learners.

3.1. Research design.

Qualitative research is research that is completed through creating an interactive relationship between people, spaces and objects (Ezzy, 2002). The qualitative approach is the most suitable approach for this study because it has methods that are specified on interpreting people's feelings and experiences rather than using an approach that uses quantification and measurement (Terre Blance, Durkheim& Painter, 2006).

The point of enquiry for this study is on African female students in the environmental science field. Specifically, the researcher intended to explore the experiences of African female students in the environmental science. African female students have broken barriers and entered the environmental science field which was previously a white male dominated field. This study is narrowed down to African women at the University of KwaZulu-Natal Pietermaritzburg and Westville campuses.

Qualitative research is more suitable approach for this research because it has methods that are specified on interpreting people's feelings and experiences rather than quantification and measurement quantitative.

The research design and methodology are employed for the purpose of generating evidence in order to qualify the hypothesis as being valid. Findings generated will, therefore, lead to the generation of problems that may be discovered, alternatives and solutions with respect to the phenomenon being studied. It may be characterized as such because it is an empirical study in nature which uses the combination of fieldwork and desk top research in order to seek answers for the research question. In-depth Interviews were with conducted with 30 black females- 3rd year environmental science students at the University KwaZulu-Natal.

3.2 In-depth interviews.

The interviews and discussions took place at the University of Kwazulu-Natal Pietermaritzburg and Westville campuses. This school is not community based and the learners originate from around different cities in South Africa and Africa. I have utilized the library, participants' residence and my own residence to ensure a relaxed atmosphere- secure and conducive location that would be helpful in allowing participants to relax and be comfortable (Cohen, Manion& Morrison, 2011). The learners represent a mixed cultural and ethnic learner combination. The participants represented the environmental sciences very well.

 It was also explained to them that the interviews would be conducted in a comfortable environment and that the participant's identity would be kept confidential and that pseudonyms would be used. I informed all the African female students doing third year environmental science that participation would be voluntary and that the interviews would be recorded and transcribed. I also explained that data would be kept safely and out of reach for people. Qualitative research is designed to understand people and the social and cultural contexts within which they live (Michael, 1997).

The data was collected at the University of KwaZulu-Natal through a series of in-depth interviews with participants. In-depth interviews are defined as person-to- person interaction between two or more individuals. The in-depth face- to- face interviews that I conducted have been indispensable since the interviews have been directed at understanding the experiences of

participants (Kumar, 1996). The interaction between me the researcher and the participants enabled me to gain deep understanding of the experiences of black female students in the environmental science field and the challenges that these black women have come across throughout their academic career in the environmental science field. Some of the answers were answered in IsiZulu as a way for the participant to better express themselves. The responses from the participant have been recorded and were later transcribed in English. The isiZulu responses were translated and analyzed according to the major themes and patterns of the study. The data was separated into individual recorded tapes and written information for a specific interview. The audio data was then transcribed according to the transcription of data steps that were suggested in order to correctly transcribe audio data (Emily, 2015).

The aim of the series of in-depth interviews was to find out how African female students in their final year in environmental science experience the field and the factors that influence them, the interview was also emplaced to find out how these female students negotiated gender roles and family life and also find out what their future career aspirations were.

3.3 Research settings.

The researcher was based at UKZN's Pietermaritzburg and Westville campuses, Ultimately Pietermaritzburg was the setting of the study. However, even though Pietermaritzburg campus was the setting of this study, raw data was collected on two campuses of UKZN, namely: Pietermaritzburg and Westville campuses. The dissertation was compiled and submitted on Pietermaritzburg campus.

3.4 Study population.

The study population in research is said to be a subset of theoretical population. In this population, the researcher can apply their conclusions, it is also important to point out that this population is accessible to the researcher. This research population is specific with respects to the selection criteria in terms of traits or attributes. For example, demographics such as gender, age etc. This population must be accessible for the study (Gliner & Morgan, 2000).

The study population for this research undertook third year student in the environmental science field at the University of KwaZulu-Natal in 2016. Therefore, the female black women will be accounted for, the environment science class consisted of two hundred and nineteen students

including males and females. There were fifty six African female students in both campuses. The researcher had planned to interview forty students but due to unforeseen circumstances of the 'fees must fall' protest actions only thirty students were interviewed.

3.5 Sampling Methods and sampling size.

For the purpose of this study, purposive sampling was employed to determine participants for data collection. Therefore, this non-random sampling gives a researcher room for deciding which criteria are important for the study and then target only those people who possess such characteristics (Benard, 2002). For this research, the researcher targeted the students who were African female   third year students enrolled for an environmental science degree at the University of KwaZulu-Natal (UKZN). This being a feminist grounded research, the issue of gender and racial representation was of paramount importance. It is for this reason that in this research African females in environmental science were targeted for participation. This is a reasonable proportion given that African women make up a quarter of the population in the environmental sciences. Therefore, the reason for the purposive sampling is stated by the above demographics.

Purposive sampling was used to select the representative sample from both campuses. Purposive sampling was very suitable to use in this study because it saves time and makes it easy for the researcher to reach a targeted sample quickly. It is very easy to get a sample of the subject with specific characteristics. The primary objective of this type of non-probability sample is to produce a sample that is representative of the sample that the researcher has chosen. Thirty 3rd year environmental science students were interviewed at the University of KwaZulu-Natal.

I chose third year students due to the assumption that they are more experienced in their field of study and because they were at they were at a level of completing their degrees. Therefore, they are at a better level to talk about their experiences. The study was formed by local African females, regardless of their ethnicity.

The study has already mentioned that it will be done at the University of KwaZulu-Natal comprising of participants who are black females in their third and final year in environmental science. The researcher represents the personal demographic of the participant such as their age, gender, religion, occupation and level of education. Each of these factors are considered as the measure which the respondents experience about the environmental field. This is deeply rooted from a total of thirty participants were interviewed and were eighteen years and older with four of them being married. Five were strong believes' of tradition and actually strong participants in traditional and cultural rituals while the others did believe in tradition. They were living a more modern township life and some aspects of tradition do not hold as much value because of their social circumstances which are more modernized than rural.

Most of the participants interviewed were Christians and only two stated that they believed in ancestors who were their driving force in life. All of the participant were unemployed because they were full time students doing a full-time degree and at their final stages of completing the degree. Data obtained revealed that women from different spectrums of life can relate and have similar experiences within the career field that they have chosen. The information also replicated that we could be from different spectrums but we could have the same driving force and influences that have driven us to particular career and, we could face the same challenges within that specific career. It is very important to highlight the different aspects of the female's lives because their beliefs have a strong influence on their experiences

3.6 Demographic details about participants/respondents

Pseudonyms have been used to protect student's confidentiality.

Charmain: Born in KwaZulu-Natal in a township in Durban, Umlazi Township. She is the elders' daughter. She is a Christian who is very family oriented. Chaimain is twenty years old. She enrolled for this programme the year 2014.

Martha: born in Eastern Cape and raised in KwaZulu-Natal in the coastal area in Port Shepstone. She is a Christian and very passionate about women initiatives. She is twenty years old, and enrolled for this programme 2014.

Vuyiswa: she was born in KwaZulu-Natal in Vryheid she has a very rural upbringing and believes in ancestors, cultural and traditional activities. She is twenty-five years old. She enrolled for the programme 2013.

Betty: She was born in KwaZulu-Natal in Pietermaritzburg in a township called Mbali. She is very religious and takes religion very serious, she is twenty-one years old. She enrolled for the programme 2014.

Gloria: She was born in Pietermaritzburg and she was raised in the townships and is very modern, she is married with children and lives at home with her family. She is thirty-five years old. She enrolled in for the programme the year 2012.

Kelly: She was born in KwaZulu-Natal in Richards's bay, she is a Christian and is married with children. She is forty-one years old. She enrolled for this programme the year 2014.

Hellen: She was born in Mpumalanga in a township called KaMagugu. She is very modern and is a Christian. She is enrolled for this programme 2013, she is twenty years old.

Joyce: She was born in KwaZulu-Natal Durban, Newcastle she is from a very traditional family. She enrolled for this programme 2014.she is twenty-one years old.

Joy: She is from KwaZulu-Natal Mpangeni, she is a Christian and very passionate about nature and the sustenance of our environment. She is twenty-three years old. She enrolled for this programme in 2014.

Jane: Born in KwaZulu-Natal, Pongola she is from a traditional background and believes in tradition. She is very passionate about nature. She is currently a final year student in Environmental science at the University of KwaZulu-Natal. She enrolled for the programme in 2014.She is twenty-three years old.

Thalitha: She was born in KwaZulu-Natal, Pietermaritzburg in Elandskop. She is a very respectful young woman who strongly obeys cultural rules and beliefs. She is twenty-two years old. She enrolled for this programme in 2012.

Bongi: She was born in KwaZulu-Natal, Durban. She is a passionate young lady who dreams of one day becoming one of the women who will be honored for their contribution in science. She is twenty-one years old. She enrolled for this programme 2014.

Sally: She was born in KwaZulu-Natal, New Castle, she loves science with all her heart. She strongly believes in breaking barriers and making a name for herself by self-motivating other young people from her community. She is twenty-three years old. She enrolled for this programme 2014.

Kate: She was born in KwaZulu-Natal, Pietermaritzburg Mbali, she is very family oriented and cares a lot about the opinion of her family. She loves science and geography. She is twenty years old. She enrolled for this programme 2014.

Kim: She is from Eastern Cape, Matatiyela. She is a Christian and very passionate about nature she is part of a nature preservation group and plans to one day introduce more initiatives to save the nature and empower women of all races. She is twenty years old. She enrolled for this programme in 2013.

Katlyn: She was born in Johannesburg, Kempton pack. She is a Christian and a lover of all things scientific and environmental. She is twenty-one years old. She enrolled for this programme in 2014.

Grace: She is born in KwaZulu-Natal Durban; she is a Christian and believes in preserving nature for future generations. She is career driven and wants to live a legacy in the environmental science field. Grace is twenty-four years old. She enrolled for this programme 2014.

Chantel: She is born in KwaZulu-Natal Durban. She is from a very traditional family who are strong believers of tradition. She is twenty-one years old. She enrolled for this programme in 2014.

Charlotte: She is born in KwaZulu-Natal, Escourt. She is from a family that is very involved in agriculture and sciences. She is a Christian and has fallen in love with environmental science through her family. She is twenty-one years old. She enrolled for this programme 2013.

Chane: She is born in Free-state in a village called QwaQwa but grow up in KwaZulu-Natal in a small town of Paul Pietersburg, she is a Christian and loves anything and everything that has to do with nature and the environment she is very passionate about science and always joining environment sustainability projects. She is twenty-one years old. She enrolled for this programme 2013.

Jacky: She is born in Johannesburg but has lived in both Johannesburg and KwaZulu-Natal, she is from a family of teachers, and she is a Christian and loves giving back to her community. She is twenty-one years old. She enrolled for this programme in 2014.

Jamie: Born in North West, she is very passionate about science and the future of black women in science. She is a hard worker and an achiever. She is twenty-three years old. She enrolled for this programme in 2013.

Julia: She is from KwaZulu-Natal; she is a Christian. She is part of a project called the 'green campaign' that raises awareness of nature sustainability. She is twenty-two years old. She enrolled for this programme in 2013.

Julian: She is born in KwaZulu-Natal; she is a Christian. She is totally in love with science. She is part of a going green and safe the environment initiative. She is twenty years old. She enrolled for this programme in 2014.

Jessica: She is born in KwaZulu-Natal. She is a Christian. She is married without children. She has loved science from a very young age. She plans on one day going back to her community and teaching them the importance of saving our natural resources and how that would help with global warming issues. She is twenty-one years old. She enrolled for this programme for this programme 2014.

Thabby: Born in KwaZulu-Natal, raised by a Christian and remains a Christian herself. She started university doing a Bcom Accounting with a geography elective. She fell in love with geography and changed degrees to an Environmental science degree. She is twenty-two years old. She enrolled for this programme in 2014.

Jennifer: Born and raised in KwaZulu-Natal has always loved geography and science. She is a Christian. She is very driven and very passionate about her career field. She is twenty years old. She enrolled for this programme 2014.

Zoe: She is born in KwaZulu-Natal, she started her study field doing an arts degree which she completed and soon after completing that degree she enrolled for an environmental science degree because of her undying love for science. She is twenty-five years old. She enrolled for this programme the year 2014.

Zonke: She is born on Eastern Cape, Port Edward. She loves environmental science and was enrolled at Rhodes before coming to UKZN while doing her second year. She is twenty-one years old. She enrolled for this programme in 2013.

Zola: She is born in KwaZulu-Natal; she is a Christian. She strongly believes in women scientist and that they will bring change to the world. She is a feminist and is twenty-one years old. She enrolled for this programme in 2014.

3.7 Data analysis.

The primary stage of the data analysis of open-coding took place concurrently with the process of data collection. It was expected before that in-depth interviews could result in large quantities of narrative data; therefore preparations to handle this on a daily basis were done from the beginning of the study. The focus was to have as much credibility, dependability, transferability and conformity of the results obtained (Hammersley, 1990).I utilized the narrative and meaning approach for analyzing my data. A researcher by the name of Punch (1998) applauded the technique as an advantageous way of studying lives and lived experiences saying "contemporary anthropology and feminism often emphasize the study of lives from the narrator's viewpoint, with data seen as shared production with the researcher. I therefore used verbatim wording from the participant coupled with my interpretation grounded in the theoretical frameworks used in chapter two.

According to Bryman and Burgess (1999) even the transcript from the tape recording might not be able to capture the emotional context. In order to fulfill this, notes were added to the transcription to provide for this. This included the intonation of voice, pauses and other emotional expression such as laughter and exclamation. The analysis included, critically examining the collected data coding, identifying emerging issues and summarizing the data regarding the added notes on emotions. Follow up on themes, questions and issues that emerged from the data were done. Assessment of both the quality of collected data was done on an ongoing basis to identify information categories and recurrent thematic patterns. Thematic analysis was used as a tool to organise the data and a discourse analytic approach was taken with respect to data analysis (Braun & Clarke 2006).

Thematic analysis was used as a method to identify and report patterns of talk in the data; it achieves this by arranging and describing data in rich details. This works by helping qualitative analysis gain its thick descriptions (Clarke, 2006). Thematic analysis ties into discourse analysis well as it provides a way to organise data and is assumption by freely allowing for a constructionist stance to be taken (Clarke 2006).The presentation of the themes was the purpose of thematic analysis but more importantly exploring the effects of the subjects and objects constructed in the text (Durkheim, 2006).

Recurrent themes and emerging issues have been considered with major importance and constitute the major element of the data discussion and recommendations. Convergence, divergence and inconsistence between data from different sources were noted. This was done by getting submerged in data which involved devoting a lot of time to repeatedly reading data, going over every word, phrase, sentence, paragraph and noting the added non-verbal communication that was jotted down during data collection (Burnard, 1991).

The following steps were taken with the data analysis process:

Step 1: Data was recorded onto different audio's each audio tape representing a single interview.

Step 2. I immersed myself with the data by listening and re-listening to each and every interview.

Step 3: I wrote down the student's response from the interviews and also used the notes that I had taken from the different interviews, the notes included their personal biography, their emotions when asked the interview questions.

3.8 Data capturing

 Most of the interviews were recorded via the voice recorder because participants agreed to be recorded and they felt like their identity will not be compromised because of the voice recording that they agreed upon. The few that did not agree to be recorded, in this case, responses were hand written, typed and saved into the computer. The recordings were transcribed and saved on the computer.

3.9 Trustworthiness

Trustworthiness in a qualitative study is essential to establish if the study findings are credible, transferable, confirmable and dependable. Qualitative research tends to make use of small

samples to refrain from generalizing claims about the findings (Creswell, 1998). Rather, qualitative research attempts to magnify detailed perspectives about specific elements which may establish cases which emerge within the wider universe (Manson as cited in Silverman, 2010. The interviews were use as my sample records. I then compared my findings with previous studies on women lives to see if there is an improvement or of the experiences from previous years are still experiences by women today. Thus, the research does not aim to be statistically generalizable. Instead it points out repetitive discourse and specific practices in this context which could be employed by others to accomplish goals other than women detraction. I demonstrate discourses specific to this context and interactions that may be present in the less radical group interactions. We looked at discursive resources and the way in which people used these resources in a context. These discourses exist in the broader social arena and can be used by anyone. That language and discourse are a global phenomenon means that our findings could apply to cases other than the one studied here.

3.10 Ethical considerations

There was no risk involved in participating in this study; the sample is from female students doing their third and final year in environmental science at the University of KwaZulu-Natal. Voice recording was used to collect the data, keeping each and every participant's identity confidential. Participants will be referred to as participant one, two etc. The results are respected by using participants' own words and not improvising to make it sound better or worse. All aspects in terms of ethical considerations were adhered to. Ethical clearance was given by the research Office at (UKZN). Gate Keepers letter was also obtained from the UKZN registrar. All participants were given informed consent forms that clearly stated their rights and explained how the information given by them would be preserved. This also allowed them a chance to choose if they preferred being video recorded, voice recorded or neither of the above. The consent form also stated that participants' names would not be used but rather that pseudonyms would be used to protect the participants 'identity. All ethical facets were cautiously observed. Participants were assured of their right to withdraw at any time and that their participation was voluntary. All participants' identities were to be kept confidential and pseudonyms were used. Data would be kept safely in a high security safe out of reach from people.

3.11 Limitations during data collection.

Due to the 2016 protest action of the "Fees must fall" , I had barriers in finding students as some interviews would be interrupted while in progress due to the ongoing protest action at the time. In this case, the interview would be rescheduled or get other safe alternative places to conduct the interviews which were costly and hindered the pace of the interview period that I had set for myself. It was very challenging to get hold of students because of the protest actions but I managed to keep my schedule going by getting students contact details and communicating our meeting times via social media such as WhatsApp and Facebook.

3.12 Conclusion

In conclusion, it is clear from the above that the researcher designed the research methodology that was suitable for the project. However, time was of essence and it is from this that a major challenge emanated. Research is a timeouts process. Therefore, certain occurrences frustrated the time plan of the researcher to the point that the data collection process began after the time that the initial plan prescribed. Secondly such factors also tempered with the composition of the study population and the researcher was compelled to devise a strategy as a way of improvising. This of course has impact on the findings, but the researcher tried to manage the situation in order to keep such impacts to the minimum unless they add value to the study.

The findings of the study are presented in the next two chapters under the following themes:

- The choice of and experience in the environmental science program.
- The impact of career choice on family life and future career aspirations.

CHAPTER 4

THE CHOICE OF AND EXPERIENCE IN THE ENVIRONMENTAL SCIENCE PROGRAM

4.1 Introduction.

This chapter discusses factors that led the participants to choose a degree in Environmental Sciences as well as their experiences in the programme. Some of the findings on the factors influencing participants' choice of environmental science were, the desire to go against traditional gender roles, the passion for science subjects, choosing environmental science as a second option and the experiences they have in the environmental sciences.

4.2. Factors influencing the participant's choice of environmental science.

Career choice and development is a lifelong process of engaging the work through choosing amongst employment opportunities made available by the chosen career. Everyone undertaking the process is usually influenced by a series of factors, including the context in which they live, personal aptitudes, role models and educational attainment (Bandura B. C., 2001). Career choices are influenced by various factors such as family, high school teachers and former school mates.

"Black Women have traditionally played a crucial role in the progress of their families but are now pushing for a level platform by breaking taboos and inspiring others to do the same" (Wilson, 2006) -Executive Director, Panos London.

In January 2005, Harvard President Larry Summers galvanized the field of women and science by suggesting that the lack of participation of women was partially due to the fact that women were not interested in working longer hours, for example working up to 80 hours a week and spending half their lives at the lab or away on field work. A book was written by Xie and Shaumn (2003) where women in science discussed and examined the different factors that are purported to hinder women. This researcher dismissed several factors namely; research productivity, marriage, deficient backgrounds, among others. It showed rather that career paths are affected by choice, constrained or not affected by career choice constrains. Societal restrictions can and most of the time is the leading factors that force women to make 'choices

'that often leads them away from the STEM careers. Women who get married and have children find themselves experiencing disadvantaged with less career mobility and less chances of getting promoted, with a lower likelihood of being in a STEM career.

According to UNESCO 2016, the lack of education from family members and partners has a significant impact on how a female will be able to succeed in STEM fields. Most uneducated parents or partners sometimes do not understand the time that goes in to STEM and gradually expect females to spend most of their time at home fulfilling socially constructed female roles such as being home, cooking cleaning and doing what is expected of them. Such instances of lack of education and support for females have a negative impact on their success. According to Professor Laurence Steinberg an American professor who specializes in child adolescent psychological development (1996), parental involvement is very crucial to a child's success in education. Evidence strongly indicates that the problem of poor academic achievement is genuine, substantial and pervasive across ethnic, socioeconomic and age gap. The lack of interest and support has been evenly the course of under achievement in female students who are particularly involved in STEM fields which require lots of time and a good supportive background towards your education. It is very important to get parental support in this field because research concludes that parents are the first and foremost influences on their child, or children's development and success in education. When parents are more involved towards a female child's education it improves their progress and has a positive impact on their success in the field (Steinberg, 1996). The lack of female models and support with similar attributes to black females has been another source that discourages black women in sciences fields (Ingram, 2009).

4.2.1. FAMILY AND PEOPLE AROUND YOU INFLUENCING YOUR CAREER CHOICE.

It is often said that career choice is sometimes influenced by the people around you, for example, the parents, an older siblings or close relatives and other peers within their communities. The participants from the interviews made it clear that their career choices were influenced by people around them who they saw as role models. In this case since science was something not common among black women, male role models played a huge impact on the career choice. The responses to this question are proving that the study done by Nothuthuzelo Xolelwa Voster (2005) about

career aspiration and role models being influential in students choosing a career field is indeed accurate and can been seen in the participants' responses in this study.

Career choice is strongly influenced by your parents and community members and role models. According to an article done by different professors from the University of Cape Town, it is clear that students are influenced by the people around them when it comes to career choice. Parents and role models play a significant part in influencing one's career choice (Case, 1998).

There is evidence which shows that gender attributes play an important role in career choice (Hotchkiss, 1990) . These dictate the subject choice of female students. Females are more likely to have their choices compromised and restricted. For instance, the traditionally prestigious subjects in the "academic field" have always included the domain of males and have always been accorded a prestigious status because of their theoretical and abstract subject matter. This is because of their association with higher achievement and objectivity, while the "non-academic" fields have always been accorded lower status because of their practically oriented and utilitarian nature. These less objective types of subjects are stereotypically "feminine" and are associated with lower achievement (McRae, 1990).

This was confirmed in the following relevant excerpts.

> *Kelly: "I chose this field because my husband also did environmental science degree and is now doing his postgraduate degree in environmental science and he is always telling me how interesting his academic career is and how much he has learned about the environment, sciences so that influenced me from my first year till now I have learned so much and I am grateful I enrolled in this field because I am absolutely in love with the field and I want to learn more especially the practical aspects of experiments and everything I absolutely love that".*

> *Hellen: "I chose this field because I have a cousin who did this field and I was interested. She is always travelling and learning new things so I also wanted to be like her".*

> *Kate: "I was influenced by my biology teacher in high school she was the one that taught me about the different fields that science had to offer because I am someone that loves nature I chose environmental science".*

Charmaine:" I chose environmental sciences because my father is a science teacher and he has influenced me with his love for nature. I look up to my father and I have always wanted to make him proud so I chose environmental science because he has always told me that there are so many opportunities in science".

Chantel:'' I was influenced by a fellow school mate who did environmental science. She used to come to school and tell us about varsity life and her experiences and she would also information about her degree. My school mate always had so much passion and was very enthusiastic about her environmental science field, she got me interested to learn more about the field once I did.   I fell in love with it then ended up doing it".

Julia: "I was mostly influenced by my geography teacher who taught me about the environment, my teacher was the one that introduced me to this degree and gave me information that was very interesting to me because apart from the scientific aspects I will also be able to do electives such as geography and environmental management science that taught me more about the environment which I am very passionate about."

Katlyn: "My brother was doing an environmental science degree he saw that I love science and I do well in it so influenced me to also do an environmental science degree".

Jennifer: "Okay, it is so interesting, my older brother who is an environmental specialist now was doing an environmental science degree and I look up to him, he is my role model so much so that I also ended up doing the same degree as him"

Charmian: "Well to be honest I chose environmental science because I neighbors son was doing environmental science and I would always ask him questions about the sort of degree this is and what opportunities it could bring me. I got really

interested after he explained everything to me after matric I decided to enroll in an environmental science degree and I have fallen in love".

Different participants shared their different stories on how they ended up doing environmental science and it is clear that each and every woman has had individuals or an individual in their lives that played a significant role in influencing them to do an environmental science degree and be happy with the choice that they have made. Gender, culture, previous experiences, interest and personality type, life roles, socio-economic conditions and childhood fantasies shapes an individual's career choice. These aspects of the participants play a significant role in giving them voice and choices about their career choice. The participants spoke about their childhood fantasies and personalities as factors that influenced them in their career choice. The people around the participants and the above mentioned factors have been a significant influence that has driven these black women to engage in a field that was previously limited to a selected population. Analysing the responses, it is clear that society members such as family, former schoolmates and teachers are among those that contribute the most to one's career choice. The feminist standpoint theory is most appropriate because it enables me to understand the student's experiences and the factors that influences them, their identity and influences of gender. This theory gives me a better understanding of the participant's responses to the environmental science career choice.

4 .2.2 Desire to go against traditional gender norms.

Traditional gender norms define what society considers male and female behavior. This leads to the formation of gender roles, which are the roles males and females are expected to take in society. This, as you might surmise, has changed significantly over the years and they continues to evolve (David, 2006). Gender roles and gender norms are formed very early in a child's development through a child's interaction with parents, teachers and his peers. Once a child tries to deviate from it, he/she is most likely to experience peer pressure, which reinforces the gender norms. Gender norms put pressure on people to act in a certain way in which they have to get into a certain academic field in order to get a certain job. Some individuals are not comfortable with the gender role society places on them because of their sex. For example, the stereotypes that women undergo for choosing an academic field that is seen as only suitable for men. The

predominant traditional gender norms have dictated that certain occupations and study fields are suitable for males. For example, males are seen to be more masculine and more capable to be in the agriculture, sciences and engineering, and all the white-collar occupations, women are only considered to be suitable for study fields that are related to social science (Trask, 2006). Despite the increasing numbers of women being enrolled in universities, traditional gender norms remain a challenge to women thus limiting them when it comes towards making career choices to enter the previous male dominated academic fields (Koberg, 1991).

Women challenging traditional gender roles and carrying out unique process of transition and change in their traditional patriarchal society are bravely paving a new route compatible with their desires. There are various challenges that these women face because of their decision. These women do not only face disparity between their communities and families but also between attitudes and deeds, between the will to comply, to set an example and the wish of expressing individualistic ideals and thoughts. Here are some of the women's voices about going against traditional norms and fulfilling their personal desires and wishes.

> Zonke: Well it is quite funny my family actually believes that women belong in the kitchen doing household chores but I believed in much more than those traditional gender roles and traditional gender occupations I wanted to go against those beliefs and challenge a field that is male dominated so I choose environmental science.

> Sally: "Well I got into the field because I really wanted to do something that has to do with science and I wanted to change the perceptions of the people from my village's perceptions of women only occupying teaching and admin positions."

> Grace: "I went against tradition and chose environmental science because I want to challenge tradition that places women in a certain category and women have to abide to those roles I wanted to be different do a degree that is different so because initially I had loved nature from a very young age I chose environmental science because it relates a lot to nature and to something that I am passionate about

> Gloria: "Well I chose environmental science because I wanted to do something out of the ordinary something different. I come from a family of nurses, police man and teachers and I did not want to end up in either of those careers so I thought to myself let me go

into the sciences and environmental science was my first option and I have not regretted that decision I am in my final year in the field and I absolutely love this career"

Charlotte: ehm yabona (you see) I am someone who from a young age was very aware of the inequalities that women have at school and tertiary level so I worked really hard and I have a very strong background in science subjects. I didn't want all my hard work to go to waste by doing a teaching degree or something in humanities, (laughing) not that humanities is easy but for me it was always about science and being among the best in a field that only men succeeded. I have always been a threat to men from my primary throughout my high school till university. And I am still working very hard to open doors for myself in the top academic achievement categories that have always been occupied by men. I am a black woman on a mission to break the traditional beliefs that men are better in science than women.

These excerpts clearly indicate that women are challenging their traditional gender roles and are becoming the generation of black women who are part of an academic field that was previously designed for white privilege excluding black people especially black women. Other feminist women and feminist organisations such as Betty Friedan, a group of women from the National organization for women and the Women foundation also strongly believe and encourage that women have more to offer than being the care givers in the house and taking care of the children while men go out and pursue careers in different fields and earn a living enough to provide for their families. This generation of African females has broken the barriers of submission, oppression and limitations. These women are not part of the so-called 'men's world', rather they are making decision for themselves that will enable them to provide financially for their families-which was seen as a men's job (Wolfe, 2016). There are various theories that can inform the decisions that these black women have made to become part of the environmental science field. These theories together with the changing onset of tradition and women work well together. The feminist standpoint theory is well informed in the responses for the decision to go against tradition. This is because of these group of women who have had different influences, their social their political experiences are not influenced by their societies but by other societies that give different views and a voices on different issues of gender preferences. These different influences have given the women motivation and encouragement to be different. The feminist

intersectionality informs the participants' responses of their desire to go against traditional norms. These women and their social identities have shaped their belief system. These women have shown to be open minded and view traditional norms differently causing them to experience their given environment differently. Also, the influences and experiences of these women show a different side to black women. This shows that black women are aware of the inequalities that they have been subjected to and they want to change that and show people that women are capable of being part of male dominated careers/fields- and succeeding in them.

4.2.3 Passion for science subjects.

Different people need a certain level of influences and passion to be a part of a certain field of study. The different women that were interviewed spoke out that their personal love, nature and strong academic performance were some of the motivations and influence that lead them to pursue an environmental science degree. These women have become passionate about STEM fields subjects and they are not afraid to excel within those fields.

It is also very clear that family members or people around these women have had a significant role in these black women being passionate to do an environmental science degree. Dick and Rallis' (1991) model of reviewing factors influencing career choice in the Stem field found that students make their choice based on relative values of the career and beliefs about themselves. The relative value of a career relates to both intrinsic factors such as intellectual interest as well as extrinsic factors such as expected salary and the length of study. According to the model by Dick and Rallis (1991) students' beliefs about themselves are formed from their interpretation of past experiences and perception of the attitude and expectations of others such as, teachers and family (Dick, 1991). Listening to the different responses from the interviewed African female student studying environmental science, it is clear that there are different factors and influences leading to these female students to study environmental science at the University of KwaZulu-Natal.

Here are a few of excerpts gathered from the interviews that justify the student's passion for the environmental science programme:

Betty: I choose this field because I love science from a very young age at primary level my absolute favorite school subjects was natural science and I excelled in it which encouraged me . I went on to high school and I still excelled and was still very much in love with the science field., I then decided that I wanted to make a name for myself in the science field that's why I am here and I believe that there is still much more great things that I will achieve within the environmental science field".

Joyce: "I chose this field because I am in love with science and I performed very well in science. I came to the University of KwaZulu-Natal there were various STEM fields that I had to choose from so I choose environmental sciences, because I heard it deals with science and geography I have not regretted my decision ever since I love this field".

Joy: "From a very young age I was very passionate about the environment I am all for sustaining the environment and keeping is sustained for the future generations so my love for the environment drove me into an environmental science degree."

Jane:" I was very passionate about nature and science and I definitely did not want to a humanities degree not that I am undermining the humanities or anything (laughing) so I choose environmental science and, I think I made the best decision about my future because I am doing something that I am passionate about and always willing to go the extra mile for".

Jacky: "I am generally someone who loves sciences and in high school we would go to science exhibitions and learn more about the different fields. I was so in love with environmental science so I chose it and I am hoping to make a name for myself in this field".

Jamie: "I chose an environmental science degree because from a very young age in my high school, I have always loved science and I have always been good at it so much so that I felt that I should pursue a career in the sciences ".

Jessica: "well as a young child I have always loved the environment. I was always helping my grandfather at the farm , planting and taking care of plants, learning about the different soils , the different soil fertilizers and that inspired me a lot and I saw that I was really good at doing that sort of thing, so I decided at a very young age that when I

finish high school I want to do something that will give more academic insight on something that I really love that is how I ended up doing environmental science and I must say I have fallen completely in love with this degree and I cannot wait to finish to get a job and practice everything I have learned during my academic years".

Analyzing the responses from the different individuals interviewed, the responses that were gathered demonstrated love for the science field. Also, a sort of passion and enthusiasm about something can work   as a driving force that can initiate a person to follow their passion and become part of a field sectors that are believed to be out of their standards because of the race that they belong to but, love and passion for nature has made them follow what they love regardless of the circumstances that there are faced with in that environment. It is also important to note that there are different paradigms that influence women in having passion over environmental science. The different theories that inform this sort of passion for a career field can be informed in the different theories that inform the study. The feminist intersectionality informs this sort of passion by viewing the participant's social environment and how that social environment has influenced these women's belief systems and the experiences that these women have experienced in their academic life. The standpoint theory informs the responses regarding passion for science subjects because these female perspective are shaped by different social and political experiences that have influence the passion to be better candidates within subjects that were predominately male subjects. The social learning theory informs the responses for this passion because observation of other women breaking barriers and becoming something in science has influenced these women to observe and imitate the good behavior.

4.2.4 Environmental science as a second option.

Analysing the data obtained I have gathered that a number of students choose environmental science as a second option after starting their university academic years with a different degree and majored with an environmental science elective only to realise that they are more drawn to that certain elective leading to changing of a degree. For example, a known scientists Kolh went into science through spending her life uncovering scientific potential in unexpected places.

Kohl is one of the well-known documented proof that there is room for second chances in science. She first did a medical degree but after obtaining it she went into science. Kohl says

that she is very much happy with the career decision (Woolston, 2004). The interviewed participants also had a lot to say about environmental science as a second choice.

Bongi: "it's funny because initially I wanted to do medicine but because of the lack of knowledge on the application process of medicine I was unable to get into medicine I had good matric results and there was still space for late applications at the college of Agriculture, science and engineering. I applied and I was accepted into environmental science and I believe it was God's plan because I am so in love with this field and I ended up not going to medicine I continued with environmental science and I see a bright future for me in this field."

Chane: "I am from the villages and we do not get enough information in high school about the different fields I came to varsity to do engineering but when I got here I learned about the different fields that science has to offer and because of my love for nature I choose environmental science."

Thabby: "since grade ten I was in an environmental club in high school so I have always wanted to do environmental sciences, but at first year I did not get to environmental science I was doing economics, I actually thought economics would be good, I had a male relative doing a science degree, he actually influenced me a lot so much so that after my first semester in varsity I had decided to change degrees and enrolled into an environmental science degree and from that day I have been very happy with my decision"

Jacky: yazini (you know what) I actually applied to do an engineering degree and got accepted. I did my first year in chemical engineering but, after that I really felt like engineering was not really my thing. I needed something different so I went on and decided to change my degree and, still remain in science field but, I was not sure what I could change to so I did some research and learned more about other science fields. I saw environmental science as interesting so I decided to do it and I was hooked ever since. I like the aspect of this degree were I learn about nature, the soil, animals and everything that involves the environment with its different living components. I am completely happy with the decision I made because, I am doing something that I find very interesting and it is something I can recommend to other individuals who want to learn

more about our environment and conserving it. Ngiyithanda kakhulu ienvironmental
*science * I really love environmental science.*

Smyth (2009) states that gender disparities with regard to subject choices are seen as mirroring the diverse stages of interests and apparent abilities within specific science subject areas. Smyth continues that the historical inheritance of female education and gender stereotyped subjects have been one of the reasons why single-sex girls' schools do not offer STEM fields appropriate subjects. Female learners taking technology subjects are seen to be taking on a masculine identity due to the language and expressions used in engineering (Walker, 2001). When children hear, and see specific gendered behavior they tend to reflect the stereotyped notions by acting in a male or female notion (Smyth, 2009). Both male and female learners enjoy technology subjects and can be fascinated by them due to the practical, creative and self-regulating assessment processes that embrace this subject (Zuga, 1999). When female learners do not take part in technology subjects, they lack developing and processing skills which could be of benefit to them later in their lives.

Interacting with the different individuals that started off with a different degree because of circumstances such as lack of information of the different fields that the University of KwaZulu-Natal has to offer, lack of information on the opportunities that environmental science has to offer and lack of career guidelines that assist in career choice. The lack of information and knowledge of different careers is well researched and represented in an article by Lea and Street (2006) who clearly state that black women lack the knowledge of the different academic programmes that the University has to offer. The teachers from rural schools are also are not well equipped with relevant information that would help their students to making career decision at an earlier stage (Mary, 2006). The study supported Mary and Brian's statement of the lack of information which hinders female students with knowledge of the variety of options that they can choose in the academic environment. It is interesting to learn that these women enrolled for a different degree and were then informed about environmental science enabling them to change their minds about what they were enrolled to study. They have fallen in love with the degree after they had learned about the opportunities that it entails and the kind of opportunities that it will open for them. The feminist standpoint theory analysis in terms of the responses gathered

about these women showed that they were reconsidering their first choice of study field and choosing this field as a second option. It is very clear that their disadvantaged background about the different academic fields had hindered them from knowledge. However, this was due to the different experiences at University level around sciences and the different career fields in science. These were a revised and then considered as their first option. They were able to voice out what they wanted for themselves and went on to do it.

4.2.5 Strength in science subjects in high school.

Students sometimes have a strong academic performance in school subjects related to the sciences, such as mathematics, physical science and natural science. This kind of positive aspect encourages students to study environmental science and be passionate about certain subjects than others. According to the ofsted[1]survey report, taken from June 2007 to March 2010, the strength in science is greatly encouraged and obtained when practical science is enforced. The enforcement of this teaching technique encourages student's engagement within the subject and it also encourages students to be more involved. This kind of method encourages students' performance to excel.

Thalitha: "I was very good in physical science and mathematics in high school, and it was quite interesting because my teachers always believed only males excel in those subjects and they always encouraged me to carry on with the sciences subjects because, clearly I am really good at them. I took it upon me to do something that involves the sciences and here I am doing environmental science and I really do love it (giggles) not forgetting the part that I am good at it."

Charlotte: "I was naturally very strong in mathematics and science because my family believed that mathematics and science have more opportunities than the other fields so, I choose to do environmental science because of the influences to go into science".

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[1]**The office for standards in Education**, **Children's Services and Skills is a non- ministerial department of the UK government, reporting to Parliament**

Kim: "I have always had the love for science and I have always known that I one day want to pursue a study career in science. Yo! but environmental science has an interesting factor to it and that what makes me stay motivated. I am currently doing very well and in second year I received a best achievement in one of the electives name ENVS 203 which is one of the more complicated environmental science modules , because I love science it was like a walk in the park for me. I am working on doing very well this semester to earn myself another environmental science award".

Kelly: "Well not to brag, but from a very young age I have always done exceptionally well with my academics I have always excelled in school especially subjects that included mathematics, physical science and life science, I was also the chairperson of our school green living campaign which taught me so much about the nature and how to conserve it so I wanted to do something at university that would keep me in that sector that how I choose it and I am really grateful I did. I have learned so much throughout my degree and when I go home during the holidays I always go back to my high school and teach them other aspects of the environment that there are no aware of. I am also inspiring young gals from my community to follow in my footsteps".

Analysis of the responses strongly indicates that women have broken the barriers that have been, for a very long time being related with women not being competent enough in studies of science, physical science and mathematics. Women were seen as strong competitors in subjects commonly known as 'common subjects'. This included subjects which entailed theoretical work and notes unlike mathematics, physical science and science that challenge the brain in an in-depth. The analysis demolishes the notion that science is more compatible to males because males are more capable to think and deal with the science field more efficiently than women. It is clear that times and the academic systems have changed significantly. Black Women no longer conform to the norms of the previous education system in fact there are making their mark and 'out-shining' their male counterparts in the sciences.

It is evident in the female choice responses in terms of the career choice; the women are strongly influenced by the society, which in this case, are the different people that have introduced environmental science to them. The experiences of the society also play a vital role in the choice because their specific environment has driven the different women into pursuing a career in a

previously male dominated field- and each and every woman wants to make a name for themselves in the field. The feminist standpoint theory has given these women voice which is evident in the responses of choices that they have made to be part of the field. It is clear that the history of the country and the different experiences that women have in their education career has driven these women to be part of environmental science. The continuous reciprocal interaction is a clear factor when looking at the different models and environmental factors that have influenced these women to be part of the environmental science program at the University of KwaZulu-Natal.

Looking at the responses that these women have shared during the interview that they are strongly influenced by people around them to pursue careers in environmental science. This response also shows that people around us and the people we look up to, strongly influence us much more than we realize. The feminist intersectionality theory is directly evident in this because responses show that an individual's social identity is profoundly influenced by our beliefs about and experiences of gender. In this case the female environments are very influential in the career choice. Feminist standpoint dynamics of authority is being engrained in individual's knowledge, perspective and the power. Such authority exerts within the women in this study. Further, knowledge and experiences of the world of academics has given them voice to have authority to partake in an educational field that suited their choice and had a much better experience when it came to it. The social learning theory is well highlighted in the observational aspects that the different women might have to encounter and have also went through to environmental science field because what was replicated to them by other individuals in the field was visually attractive and they also wanted to be part of such a field.

The feminist intersectionality theory is evident in the female student's responses to the perspective of the environmental science and the different experiences of the environmental science field. Female social identity has largely influenced their thinking and how they view the world around them. The social identities have had an influence of being a black female in a field that was white male dominated and their personal space as black women has influences their perspectives of this field. Intersectionality which is mutually constructive among social identities has become a central tenet of feminist thinking because these women are largely influenced by

their societies and their environment around them to make a choice of partaking in the environmental science filed.

The feminist standpoint theory informs their responses about their experience because, being from a disadvantage background, their experience is clearly defined from their background, the social circumstances that they come from and the political experiences where women are slowly breaking through barriers in the social and political grounds to make a name for themselves. These women want their voices to be heard within the environmental science field.

4.3 Experiences of the environmental science programme.

The Environmental science programme is within the natural sciences. Environmental science is very much a generalist degree, focusing primarily on both the understanding of our natural and man-made environments, environmental science degrees draw from diverse fields of studies and require a strong background in the more traditional sciences: biology, physics, chemistry, geography, ecology, and even biotechnology. In addition, environmental science degrees also draw heavily from the social sciences, such as economics, business, or sociology. The degree to which any of these fields of study becomes prevalent within an environmental science education largely depends on the specialization one chooses. Due to the fact that environmental science is a generalist degree, students often complete specializations within a more select area, i.e. energy, sustainability, conservation, etc. True to most science degrees, environmental science programs often require significant field work, laboratory work, or other data-oriented work (Eddy, 2008).

The environmental science programme is a study field that was previously white- male dominated, most whites and Indians would enroll for this programme. The historical tertiary education of black people is not one that was very motivational because black people, especially women were left behind in the education system. Only women that belonged to the privilege races where allowed in the science field But throughout the years the education system has changed and black women have broken barriers and entered the previously male dominated fields such as environmental science and science (King, 2014). Significant progress has been made in many fields but, much still needs to be achieved. Although many women have succeeded in breaking the barrier of prejudice and exercise professions considered to be typically male, they still face many difficulties and this constant challenge seems to be the incentive that drives most women to prove that yes, they are able to perform any occupation.

There are courageous professional women who are part of the minority to occupy roles traditionally performed by men, despite still being the exception to the rule. Furthermore, they become examples so girls of all ages increasingly tread these paths and can also break gender barriers. There is another point linked to the rise of women in professions that were predominantly male, which has to do with the status that they have achieved in the consumption chain (Monteiro, 2015).

The experiences that women encounter in the science field seem to have various challenges. Hunt (1995), highlighted that men feel entitled and are most likely to be chauvinist towards women. Powell (2015) also affirms that women are still subjected to disparity and are challenged within their environmental science field.

Here are some of the themes of challenges that the women in environmental science are faced with.

Racial discrimination

The belief in the superiority of one race over another which often result in discrimination and prejudice towards people based on their race or ethnicity (Newman, 2012). Belief that humans are subdivided into distinct groups that are different in their social behavior and innate capacities and that can be ranked as superior or inferior (Newman, 2012).The women in the environmental science have experience a great deal of racial discrimination within the environmental science field. These black women in environmental science field were unfortunately still subjected with the challenge of being discriminated against because of their race and gender. The women being black and female subjected them to be inferior when compared to their other class mates from different races. Here is what some students had to say regarding the challenges of racial discrimination.

> *Jessica: Well my experience in the environmental science programme has been very challenging. I have faced a lot of racism during the course of my degree. The lectures are very bias in everything they do. They give preference to the Indians and white people before blacks. As a black students I do feel discriminated against because of my skin color and some of my black class mates can justify this, a lot of racism has not been left*

behind where it belongs, it is still evident within this institution especially in my field were majority of my lectures are taught by white lectures.

Jane: The experience within the environmental science field has not been so pleasant when it comes to being treated fairly as a black woman from my personal experiences I have experienced a great deal of racial discrimination within the environmental science field. I can recall a number of incidences were I felt that my other class mates were getting preferences and favors because of their race, but as a black girl I have always fought to gain access in spaces that are only seen as appropriate for whites and Indians. So you see I am here and a final year student (giggles) I told myself that no racism and discrimination will stand in the way of me achieving what I come to the UKZN to achieve.

Analyzing the responses from the interviewed participants it is clear that racial discrimination is still very evident in the sectors of tertiary institutions. Black women are still being subjected to racism within their chosen field of study. The females responses about the experiences of racial discrimination is evident the feminist intersectionality theory. Their experiences and perspectives of the world are influenced by their social identity. This has had a great influence on how they view the world around them.

High work load.

The women in the environmental sciences have also faced the challenge of high volumes of work to do under a short period of time. The high work load has been a problem because it causes stress and puts them under pressure in finishing all the given practical and theoretical task in the given time. This has been a challenge because as much as they want to get the tasks done they also want to do the task to the best of their abilities .Too much there of causes them to be under a lot of pressure. Some of the women discussed the challenges they faced because of the high work load.

Kate: Oh, I can say that my experience in this course would be that it is very challenging, the workload is very demanding and with the practical work, class assignments and test if feels like I am constantly drowning in a pool of school work but I believe it all will be worth it at the end of the day."

Kelly "Ehm, well this degree is very challenging and interesting at the same time. The work load is too much but because I love doing the practical field work I find it to be interesting and I put up with the theoretical work because I need both my practical's and theory to pass and finish my degree."

Gloria: "Environmental science is very challenging when it comes to the amount of work load that ne is given, I sometimes find myself having to stay up till early mornings and only getting three hours of sleep trying to finish my practical's preparations and going through readings. I seriously struggle to stay afloat especially when approaching exams and test (YOH) it really is challenging."

Analyzing the responses from the participants the feminist intersectionality theory is evident in their responses of how their social identity is influenced by the experiences that these women are exposed to. Their social identity largely influences their perspectives towards the world especially how they are treated because of their gender and race.

Unfair Assessment.

Some of the students experience unfair assessment from their various lectures and demonstrators. The students experience unfair assessment is due to their race and the low expectations that the lectures and demonstrators have associated with their race. This problem affects the students badly because most of the time all their hard work and long hours go unnoticed just because the belief is that they are under achievers and always being marked down in comparison to other students who belong to other races, for example White and Indians. The students spoke about how unfair they have been assessed and how they feel about the unfair assessment.

Kim: "Well the challenges that I have faced in this field is with our demonstrators and lectures. I feel like there are very bias and favor certain color students above others, but that has not stopped me from loving science , I find challenges as steeping stones and I use them to make me come out better at the other side, especially science I have proved to them that science is not about gender, race or cultural beliefs it is all about the love and the hard work that one's has for it and then no bias or discrimination can stand in your way to achieve your dreams".

Grace: I can say that the career field is okay, but there are various aspects that make it very challenging, such as the lectures that are very bias when marking and them favoring certain students over others.

Jacky: I have experienced a lot of challenges within the field, and unfair assessment is one of the challenges. The lectures have favorites and they give good mark to their favorite students.

Analysing the responses of the women talking about unfair assessment it is clear that these women are still being discriminated against because of their race and ethnic group. The responses show that these women are being assessed unfairly. Analyzing the responses the feminist intersectionality theory is evident in the responses of these women. Social identity has largely shaped how they view the world and how they experience certain things because of their gender.

Language barriers

Most of the female students are second language English speakers so they were faced with the challenge of failing to express themselves properly with English. This challenged affected them greatly because failure to express yourself means failing or getting way less. Sometimes the students experience marks being deducted because of incorrect spelling especially when naming things in test and exams. This has hindered most of them to achieve the best results in their exams and assignments.

Katlyn: well my experience in the environmental science field is that it is very challenging especially for an African female who is subjected to a lot of disadvantages within the tertiary institution. I am faced with issues of not being able to express myself the way I would wish I could when writing my school work or wanting to enquire about sections of my work I cannot understand.

Thalitha: "ehm with my experience I can say that this study field is very challenging and a lot of inequality is still evident in our lecture environment, I think maybe if we had African lectures I would experience this study filed differently".

Chaimain: ''well the environmental sciences field has both its positive and negative aspects and I have experienced both sides and I must say regardless of the negative aspects, I find the field to be very interesting and Educational in the sense that I have learned so much over a very short period of time and I am hoping to learn more when furthering the studies and going further in the academic institution''.

Language barriers seem to be very prominent among English second language speakers at the University of KwaZulu-Natal. African females seem to be subjected to failure to express themselves in English subjecting them to low marks and under performance. The feminist intersectionality best informs the responses to the challenges of language. Their multiple identities, example race, gender and class subjects them to experience certain things in a certain way.

Conclusion.

These chapter has given in-depth insightful responses about the influences that influenced the students to choose environmental science. It has also looked at the different factors that motivated these women to go against traditional norms and break barriers and enter a field that was previously white male dominated. It also looked at the students who from high school were passionate about science subjects. The student who choose environmental science as a second option, here, reasons were also looked at. The overall experiences of these women in environmental sciences was looked at and it is still shocking to find out that even after their attempts to equalize women and men in the STEM fields. Black women still have a long way to go to fully gain acceptance in this field. There are a lot of challenges that still need to be dealt with within the field regarding discrimination, unfair assessment, language barrier and high volume of work load that hinders the black women's growth within the environmental science field at the University of KwaZulu-Natal. The department of higher education in South Africa still has a lot to do in terms of making higher education fair and equal to people of different races, gender, ethnic groups and backgrounds.

CHAPTER 5:

THE IMPACT OF CAREER CHOICE ON FAMILY LIFE AND FUTURE CAREER ASPIRATIONS.

5. Introduction.

This chapter critically analyses the impact of career choice on the participant's family life and gender roles, how these participants negotiate their gender role and their career future career aspirations. The analysis will include the different theories that inform the study. This is to give a better understanding of the views of the women in environmental science field at the University of KwaZulu-Natal.

The importance here is to link career choice of environmental science and family life

5.1 The impacts of career choice of environmental science on family life and gender roles.

According to the World Health Organization (2015), gender roles can be described as the set of societal norms dictating the types of behavior which are generally considered acceptable, appropriate or desirable for people based on their actual or perspective sex or sexuality. Gender roles are usually centered on conceptions of femininity and masculinity although there are expectations and variations. The specifics regarding these gendered expectations may vary substantially among cultures while other characteristics may be common throughout a range of cultures.

Black people, especially women, are socially and culturally and socially expected to perform certain roles because it's believed that women have a certain role to fulfill within their respective households. For an African female, family life and gender roles play an integral part of who she is, her womanhood is strongly determined by the gender roles that society have associated with being an African women. African women have a lot of responsibilities towards their families and a lot of gender roles that there are expected to fulfill within their respected households and within their community at large. African women are more family orientated than their western making them always responsible for first, fulfilling their family needs before they are able to fulfill the needs of themselves (individual needs). Gender roles are the product of the interactions between individuals and their environment, and they give individuals cues about what sort of behavior is

believed to be appropriate for what sex (Blaisure, 1995). Gender roles are the roles that men and women are expected to occupy based on their sex. Traditionally, many Western and African societies have believed that women are more nurturing than men. Therefore, the traditional view of the feminine gender role prescribes that women should behave in ways that are nurturing. One way that a woman might engage in the traditional feminine gender role would be to nurture her family by working full-time within the home rather than taking employment outside of the home. Men, on the other hand, are presumed by traditional views of gender roles to be leaders (Lippa, 2002).The traditional view of the masculine gender role, therefore, suggests that men should be the heads of their households by providing financially for the family and making important family decisions. While these views remain dominant in many spheres of society, alternative perspectives on traditional beliefs about gender roles have gained increasing support in the twenty-first century.

Traditionally, gender norms only allowed women to pursue studies in the fields of social science where they would be flexible to study and still have time to fulfill their traditionally given gender roles and norms. Andres (2007), reported that despite increased university enrollment for females, female students remain widely segregated by fields of study. Women continue to be disadvantaged when compared to their male counterparts.

There has been consistent evidence that the societal and cultural beliefs that puts men at the head and dominant financial providers has influenced pay expectations of women and men that occupy the same positions at work. These do not only affect women in the workplace but in the academic study fields' males expect women to be victims of the patriarchal systems even in a class environment (Hogue, 2010).

Socially, women who have entered the science field after 1990 till today have reported less problems about being the minority. Issues that are evident in today's female students is the issue of being socially reticent, at least initially. A huge portion of the confidence problem is influenced by the fact that when female environmental science or science students arrive at different higher institutions the realization that although more females than males are enrolled for the program female experience the fall out of having made a career that counters the gender norm. Another widely acknowledged issue is that hands-on practical skills are often presumed and fewer women than men environmental science students possess this skill. Society believes

that more men are equipped with practical skills than most women who fear to exhibit practical skills in a male dominated fields (Blizzard, 2007).

The different participants that were interviewed came from different dynamics of family structure and different environments but, their responses to how their career choice has impacted their family life relates to each other. The black women are from different environments and different backgrounds, but they are able to relate to each other because of their historical background and gender.

The impacts that are brought forward are divided into two sections where we look at women who are married and those that are not married and still under their parent's supervision. The results are divided in that way to get a better understanding of how marriage and a career in environmental science and parental supervision impacts career choice and gender roles (Richard, 2002).

5.1.1 Married participants

Analyzing the different views that the married participants have regarding their career choice, how the career choice has impacted on their family life and gender roles. There are different responses given by participants that made it clear that they are less obligated to do the traditional roles that women from previous generations were obligated to do. These women showed that their families are more open to education of all fields and are a motivating and supporting system that is very helpful in their studies seeing that the degree that these women have undertaken is more time consuming and demands that you spend more hours attending doing practical and studying in order to make it. It was also interesting to learn on how supportive the husbands are towards their spouse's education. The kind of support and motivation that these women spoke about during the interviews shows that African women are going very far and African men have slowly changed their patriarchal thinking and are supporting the African women to become a well-educated individuals who is not oppressed to follow a certain field and be obligated to do certain roles because she is female. African's are moving forward and women in Africa show less oppression from their families to become someone or something that is viewed as gender appropriate or more convenient because it is less demanding.

The participant's responses that give a better idea of how this field has impacted on their family life and gender roles

> *Kelly: fortunately, my career choice has impacted my family life positively because my husband is very supportive of my academic career so much so that he goes an extra mile to ensure that I have enough time to prepare for practical, assignments and test. He is very helpful around the house and he is not someone that expects me to do chores and all that because he knows that university is very demanding especially environmental science so I am very grateful for his understanding*

> *Jessica: You would be surprise to know that my family, husband and my husband family are very supportive of my career choice and they are not people who are oppressive about a woman must do certain duties because those are her gender roles. They understand that I need education to be able to make it in the world we live in. The countless amount of work that we are supposed to do does interfere with my family life and gender roles because I am unable to do all the female gender roles that are expected of me, like washing and cleaning. Those roles then fall over to my helper because most of the time I have practical's to prepare for test and assignment limiting me from being able to perform my gender roles.*

5.1.2 Parental supervised participants.

The parental supervised participant also had interesting things to say of how their career choice influenced their family lives and gender roles. Analyzing the despondence of the participants it becomes clear that families or parents are becoming an important influence in a young black girl's life to strive for better and become whatever she aspires to be. The participants highlighted that gender roles do not challenge them as much because the world we live in has evolved and more and more males are doing roles that were previously female roles and vice versa. The participants showed that their choice of environmental science has had positive impact on them, their family life and gender roles. This kind of positive response towards the girl child fulfilling an academic career in environmental science shows growth and it shows that parents are moving away from the patriarchal thinking that places a female child in certain career fields because of her gender and the gender roles that they need to fulfill as black females.

Joyce: This career choice has had a positive impact on me and my family, there are very supportive of me and they inspire me to study harder, my family does not force gender roles upon me because they know that the world we live in has evolve to the point that certain roles do not apply to a specific gender everyone is allowed to do whatever roles they feel suits them.

Katlyn: "coming from a rural background my parents are not educated so there are not familiar with the different academic fields but that does not limit them in terms of giving me support towards my academics and motivating me to be anything I wish to be, also my gender roles are not affected because I am not a believer in that certain roles are only meant for certain gender"

Grace: "would say the impact of my career choice towards my family life and gender roles has been positive because at how it's believed a girl child is only able to certain things and not others but I have changed that perspective and now my parents and family are more open to the twenty first century and the difference in gender roles"

Kim: "well surprising enough my career choice has had a positive influence on my gender role has had a great influence on my family life and gender roles. My parents have who are uneducated have found what I do to be very interesting especially because I now have more knowledge about issues that involve the natural environment which I share with my parents and educate them , this career choice has not had a negative impact on me and parents because my parents understand that I am not subjected to performing all the female gender roles, the chores of the house are divided equally between me and my brothers not subjecting certain chores to me because I am female".

These women have challenged gender norms by entering the environmental science field and are coming out to be successful, they have also challenged the family systems and gender roles putting the roles into question and are becoming aware of the perception that certain roles are better or only can be performed by a certain gender. This women have challenged the system and gone into a field that was seen as an appropriate field for White males. These women in the environmental science field are a good example in showing that women are capable of studying

academic fields   that were previously only suitable for males (Wolfe, 2016). These women also challenge the gender roles by taking part in roles that are aligned with males (Wolfe, 2016). Using the feminist standpoint theory the experience of these women are highlighted in the aspects of career choice influencing their family life and gender roles. Their experiences within society has influenced their career choice, family life and gender roles.

5.2 Negotiation of Gender roles and Career Aspirations

Environmental science field has been white male dominated for several years especially during the apartheid era and the oppression that black women in South Africa have faced. But times have changed. women have negotiated their gender roles in such a way that it becomes versatile, these women are not pressured or obligated to perform gender roles that are socially constructed as female roles, these women do roles that were previously socially constructed to belong to males and because of the physical strength that the roles entails only males were able to do it. Times have changed women have negotiated their spaces in a male environment and these women are outshining the males in all aspects. The women in the environmental science field are showing so much courage by getting into a male dominated field and making a mark for themselves. These women have also challenged traditional gender roles, there are not afraid of being out in the education environment and studying for a degree that does not match their social constructed gender roles. These women have introduced a new way of doing things and are allowing themselves and the people around them to execute roles that were previously only suitable males or for females. These women are challenging the concept that women belong only in the household and are only responsible for nurturing (Richard, 2002).

Future career aspirations

Environmental sciences have a lot of careers to offer graduates with an environmental science degree. According to the environmental science degree organization, here are some of the occupations one can follow within the environmental science degree. These environmental sciences include the list of careers that the women in environmental science aspired to become after completing their degrees Environmental consultant, Environmental

education officer, Environmental manager, Nature conservation, Recycle officer, Sustainability consultant, Waste management officer and Water quality scientist.

Other opportunities where an environmental science degree is found useful if individual studies further than an undergrad degree. These are some of the job aspirations of some of the students who want to go further than just a degree in the environmental science. The occupations are Environmental health practitioner, Landscape architect, Townplanner,Toxicologist and Transport planner.

There are various opportunities for graduates with an environmental science degree and more doors open for those to go further and study further, but not only studying, also getting involved in environmental projects that give them experiences in a practical aspect. The different interviewed women were so inspired and did not want to end with an undergraduate degree. They wanted to study further and become ultimate achievers in the field. I found out the interviewed women are very passionate about the environment and want to learn more about it. The interviewed participant clearly indicated that this field is very competitive and you need to work very hard to be able to be accepted to study further, but fortunately enough most of them said they have done their best to achieve good grades to be able to further their studies in the environmental science honors degree going further to masters and PHD.

Most of the women wanted to continue to study and reach masters level in the field but they did not want to just become academics, they wanted more than that. These women wanted to become environmental specialists and managers clearly much everything besides becoming teachers or academics, these women felt that they wanted to be out on the field travelling doing practical activities not teaching permanently and limiting your exposure only to theory. It is also very clear that the women in environmental science are working very hard and are putting in the effort and are willing to compromise the expected gender roles from females to make a mark for themselves in the world of science.

> *Thalitha" My future aspiration is to study further and achieve my master's degree in the field and to achieve that I am willing to put in all the work needed because one day I see myself travelling the world doing more and more practical work around the globe".*

Betty: "My goal is one day to become a top achiever in the environmental sciences I want to show people from my village that there are so many opportunities that people can grab with their hands and make it happen, the sky is the limited I am coming for them, black girl magic"

Vuyiswa: I am a third year this is my final year, so I want to do honors next year but not at the University of KwaZulu-Natal because I want to do it part time. I want to get a job and be able to provide financially for my own studies while being able to earn a living and getting more exposure about the field through practical work and environmental science workshops across the globe".

Chantel: Okay, fortunately enough, I want to study till my PhD or things like that so I can maybe be a lecturer if not, then I am also doing soil sciences as other modules so, if not that then I will be going into the field maybe helping with like mixing environmental sciences with soil sciences and maybe coming up with some way of yeah so. It is going out to the field basically.

Many women during past centuries never had the opportunity to choose what they would like to do for a career. Women were automatically homemakers and stayed at home with the children.

The interviewed women have shown that things have changed, these women have shown a growing generation of educated women who are part of previously male dominated areas of work The black female students doing their final year in environmental science have shown that, they are able to actually have a career and choose what they would like to do for a living. Women are even able to hold jobs that only men could have. Women during this century are entering into career branches that have never been done by women before such as, being on the front lines in the STEM fields. The career choices that women have during this time are multiplied, just as they always have been for men Women are Equal (Lawrence, 2004).

There have been many strides made in the area of gender equality. Many of the restrictions that were placed on women during past centuries are being lifted which gives women a more equal opportunity within the world. There is even an equal opportunity law that states the employers cannot discriminate based on sex (Kennedy, 2005).

The analysis of the interviewed participant illustrated black women's independence when compared to historical times because they can do what they want to do. The interviewed black female students enjoy having their independence and opportunity to do what they love, even after marriage and having children, to feel like they still know who they are and they do not let their personal life interfere with the science career that they want to pursue. The independence that the black female students in environmental science had, is the kind that women of the early 80's only imagined because of the political and economic factors that challenged them. Women in the 21st century are independent in terms of doing things for themselves, like working and or furthering their education. A woman's independence is very important to her these days.

These women have negotiated their space in the study field and they have found themselves room to grown and do better. These female students are constantly looking and thinking of ideas to better themselves. These students are looking into studying further and becoming academics and occupying various environmental science jobs that the field has to offer. The black African students doing environmental science have definitely made their mark and are moving forward in a very prosperous direction in the environmental science. Here are some insights on how women have negotiated their space in the environmental science. According to UNESCO, (2015) in 2013, women accounted for 53% of the world's graduates at the bachelor's and master's level and 43% of successful PhD candidates but just 28% of researchers. Women graduates are consistently highly represented in the life sciences, often at over 50%. However, their representation in the other fields is inconsistent. In North America and much of Europe, few women graduate in physics, mathematics and computer science but in other regions, the proportion of women may be close to parity in physics or mathematics. In engineering and computer sciences, women consistently trail men, a situation that is particularly acute in many high-income countries.

There has been a steady increase in female graduates in environmental sciences since the turn of the century. In Sub-Saharan Africa, for instance, numbers of female graduates in environmental science have been increasing steadily, with eight countries reporting a share of women graduates of 40% or more: Lesotho, Madagascar, Mozambique, Namibia, Sierra Leone, South Africa, Swaziland and Zimbabwe. The reasons for this surge is unclear although one explanation may lie in the growing emphasis on national food security and the food industry. Another possible

explanation is that women are highly represented in biotechnology. For example, in South Africa, women were underrepresented in engineering (16%) in 2004 and in 'natural scientific professions' (16%) in 2006 but made up 52% of employees working in biotechnology-related companies says the research done by (UNESCO, 2015).

5.3 Personal refection

As a young black woman in South Africa in the 21st century I can really support what research says about the historical women and women today, looking at and listening to women from the elder generation in my family I can clearly see that the world of women has come a long way and so much change has occurred during the past twenty to thirty years , I personally as a black women have so many opportunities that my grandmother , mother never had and I am able to do things and have opportunities in employment spaces that were previously only designated for males . I can see that the generation after me will have even more opportunities and maybe perhaps the world would have tried to further break away from the barriers that Black women went through. I am positive that slowly but surely we will break away from the socio-economic circumstances that have hindered Black for so long. The future generation will find more opportunities paved for them and most of the faced by women, will be minimised.

Analysing the student responses of career choice, the standpoint theory and feminist intersectionality best suits the gathered responses. The standpoint theory gives the participants a voice to highlight their experiences within the sectors of career choice, family life, gender roles and career aspirations including how the participants have said to experience these sectors. The feminist intersectionality is also well informed in the responses of participants about their family life and gender roles, their social identities profoundly influences ones beliefs about experiences of gender.

CHAPTER 6.

CONCLUSION AND RECOMMENDATIONS.

6.1 Introduction.

The study was aimed at exploring the experiences of Black female students at the University of KwaZulu-Natal. The study had various questions that broaden the term experience. I asked questions such as the influences that lead to the career choice, how negotiation impacted women's personal and work environment also looking at the challenges that the women in the field are faced with and the future career aspirations that these women have in the field of environmental science. The different experiences and dynamics of influence, negotiation, challenges and aspirations have been very informative and broaden the understanding of different experiences within the sciences. The experiences of Black female student in environmental science at the University of KwaZulu-Natal has shown that women have had different opportunities when compared to black women of the early 70s and 80s. After twenty-two years of democracy more Black females are breaking barriers of oppression, discrimination, poverty, social construction and economic barriers, and are marking their mark in a field that was previously dominated by white males. These women are not afraid to stand their ground in environmental science. Findings indicate that the Black female students doing their final year of environmental science in the year 2016 have shown so much passion and love for the academic field. Such women are eager to work extra hard to become something more than what society expects of them. These women are inspired by other women, they are inspired by the environment, nature and media to study and not end at undergraduate level, but study further to honors, masters, PHD and become something in the field of environmental sciences. The passion shown by the women over their academics is very inspiring.

Women have found ways to negotiate their space by working extra hard to reach their ultimate goal. These black women still face numerous challenges in and outside their study fields and it is absolutely humbling to have interacted with them sharing their stories about their experiences in the environmental science field at the University of KwaZulu-Natal. The fact that within the differences of them, women all of them have worked very hard to get to this point and all of

them are driven by a purpose to make something out of themselves, they all have goals and are striving towards achieving those goals within the environmental science academic field. As a black female in Africa I am very inspired by black women who are looking past our history and are challenging sectors and environments that were not challenged before. These women are showing so much growth and are not only opening doors for themselves but are ensuring that the future generation of black women do not have to go through the challenges that they are going through.

6.2 Summary of Findings.

The findings found in this study is that women are still faced with various challenges in the environmental science field. There are still a lot of barriers and inequalities within the STEM field and educational institutions. It is also clear from the findings that these women are passionate and have a desire to change the environmental science field. The findings also show that the career choice has had a great impact on their family life and gender roles. The findings also show that these women are very courageous and are striving to negotiate their gender roles even with the different challenges that there are faced with. This women show positive aspects of their career choice on their family life and gender roles. These women show strong passion about the environmental science and passion to extend their environmental knowledge into their families and communities. Findings also show a huge number of women that want to go further within the environmental science field.

6.3 Implications of study.

Given the experiences, the female black students are exposed to within the environmental science field, it is clear that there is still a long way to go regarding women in science but I see a brighter future for black women in science and that they are here to dominate and be the best they can ever be. The interviewed participants strongly show feminist advances in empowering women in that they are not intimidated by men in which they strongly believe gender equality. These women are definitely paving the way for the generations coming after them. The study clearly identifies the challenges that the women are faced with but given the challenges the positive features 'out-rule' the negatives.

6.4 Conclusion and Recommendations.

This study sets out to explore the experiences of female Black women in the environmental science field at the University of KwaZulu-Natal. The study used qualitative research methodology. In-depth interviews were used to gather data about the female experience in the environmental science. Purposive sampling was employed to determine participants for data collection. The thematic analysis was used as a method to identify and report the patterns of talk in the data. This was achieved by arranging and describing data in rich details.

The following are some of the key findings and recommendations of the study:

The education system lacks career awareness in science programs within Environmental sciences.

When considering the number of environmental science careers that one could follow, one see's that there is still a lot that needs to be done to make African women from disadvantaged schools aware of the different career paths that can be taken under science. The African families also need to get educated on the different career paths that are available at the tertiary institutions. The lack of education must also go out to the parents to make them aware of the different fields available for their children.

Discrimination in the lecture environment.

A discovery made during the process of this study was that since most environmental science modules are taught by white individuals, there is still a lot of racism taking place in the lecture environment. The University still has a lot to do to educate lectures about ethical conduct and non-discrimination towards the students with regards to race, gender and culture.

Recommendations

The environmental science field can be subjected to less racism and discrimination if more lecturers of different races were given the opportunity to teach. The university in the

environmental science program still needs to open lecturing opportunities to black lectures and the white lecturers should undergo ethical conduct on how to treat different students from different ethnic groups.

Women are challenging the gender norms and gender roles.

Women of this generation are going beyond their prescribe gender roles and gender norms. These women are entering spaces that were only designed for men. These women are pursuing career fields beyond the gender specifications. The women are challenging roles in their households there are breaking barriers and educating their families, spouses- that women are not only good enough around the household there are also good in academics and they are also suitable for the work areas that only men could enter during the oppression years. Women from the twenty first century are breaking barriers and moving away from women being the care givers while men go out and pursue careers that allow financial freedom. Women are also taking charge and pursuing careers that allow them financial freedom on their own (Wolfe, 2016).

Changing perspectives of families.

African families, spouses and male counterparts have changed how their perspectives on the issues of careers involving the female child. The families are becoming more and more aware of the changing times and the unlimited opportunities that the academic system has to offer for any gender of any race. It is so inspirational to see how the Black family situation has changed and evolved over time. Black family systems are becoming more supportive of the girl child's education and there are letting go of the previous norms or assumptions- that a female belongs to certain career environment and she is only allowed to be part of certain career fields because of her gender and ethnicity. Black parents are now encouraging their children especially female children to be part of the vast career fields that Universities and further education and training facilities offer. There are also programs and initiative that encourage science and the geographic environment issues in high school, especially among female students, which is one of the models of that encourage females to love science and strive to be a part of it.

CONCLUSION

The female students in the environmental science field are breaking barriers which had been previously put in place against black females. These women are now well informed about what

the environmental science field has to offer and there are working very hard to be able to make those dreams a reality. They have moved challenged discrimination and they are taking a stand within the STEM field, and they want more from their current degree that they are completing. Women are motivated and care less about society, discrimination, especially cultural society women of the 21st century are making their mark and breaking walls that were only subjected to a minority of male's specifically, white males. They intend to study further, join initiatives that will pave way for a bigger and brighter future. These women are inspired and they want the best that education can offer (Beede, 2011).

Further research in this area of black female's experiences in environmental sciences is required. There is a dramatic shift from previous years to now. It will be very interesting to further find out how women are progressing in environmental sciences. Future research could explore the dilemmas that women in the postgraduate studies face. It would be interesting to find out where most Black women end up in the environmental science field. It will also be interesting to include previously disadvantaged women to compare the statistics from the historical times to the 21st century. I would also like to see more South African women explore areas such as Earth sciences, Geology and other fields under the sciences that have the misfortune of always been categorized as science and not being investigated on its own as a field that can stand on its own, it would be very interesting to find out how Black women have entered such fields and the level of progress they are on. In years from today it would be very interesting to see Black women have their own book of the journey they have in the sciences -and the experiences that should be shared with future generations who are also interested in joining the STEM fields.

More research could be done focusing on environmental science, a field that can stand on its own. Other sectors of the environmental sciences field could be looked at, for example the looking at the experiences of black females who are working environmental science and the challenges that they face and how they overcome them. A follow up research on the women interviewed in 2016 would bring more information forward on how they have succeeded in 2017 and what there are busy with regarding their academic or professional life.

It is also very important to highlight that very few research is done on South African or African people it will be informative to see more and more people engaging in research to enrich enough

data of the South African women's history in the sciences. South African researchers can also make numerous efforts to close the gap in their research and be on the same level as other countries. I order for them to actively enrich and inform future generation about the history of women in environmental science where it all began and where the environmental science field will be ten to twenty years from now. With regards to faculty a lot of work still need to be done to break down the barriers of inequality and racism between students and lectures.

More initiatives should be put in place to support the African female field prior and during her University years. There is still a lot of information that is limited to them and that could be of better use before they are exposed to the University environment and to help them deal adapt to the different learning dynamics that the University requires in order to have an affluent academic career.

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APPENDICES

Appendix 1

Informed Consent Document

Dear Participant,

My name is Sindiswa Khoza (student no) 215064285. I am a Masters candidate studying at the University of KwaZulu-Natal, Pietermaritzburg Campus. The title of my research is: Exploring the experiences of female students in the Environmental science programme at the University of KwaZulu-Natal. The aim of the study is to highlight the experiences of black female students in the environmental science program. I am looking at black women from different ethnicities, cultural background and class. I am interested in interviewing you so as to share your experiences in the environmental science program.

Please note that:

•The information that you provide will be used for scholarly research only.

•Your participation is entirely voluntary. You have a choice to participate, not to participate or stop participating in the research. You will not be penalized for taking such an action.

•Your views in this interview will be presented anonymously. Neither your name nor identity will be disclosed in any form in the study.

•The interview will take about 30-45 minutes

•The record as well as other items associated with the interview will be held in a password-protected file accessible only to myself and my supervisors. After a period of 5 years, in line with the rules of the university, it will be disposed by shredding and burning.

•If you agree to participate please sign the declaration attached to this statement (a separate sheet will be provided for signatures)

I can be contacted at: School of Social Sciences, University of KwaZulu-Natal, Pietermaritzburg Campus, Scottsville, and Pietermaritzburg.

 Email: cindykhoza@gmail.com

OR 215064285@STU.UKZN.AC.Z

Cell: 0794167832

My supervisor is Dr.Muthuki who is located at the School of Social Sciences, Pietermaritzburg Campus University of KwaZulu-Natal.

Contact details: email: Muthuki@ukzn.ac.za

 Phone number: 0332606462

The Humanities and Social Sciences Research Ethics Committee contact details are as follows: Ms. PhumeleleXimba, University of KwaZulu-Natal, Research Office, Email: ximbap@ukzn.ac.za,Phone number +27312603587.

Thank you for your contribution to this research.

DECLARATION

I…………………………………………………………………… (Full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.

I understand that I am at liberty to withdraw from the project at any time, should I so desire. I understand the intention of the research. I hereby agree to participate.

YES   NO

I consent / do not consent to have this interview recorded or Video recorded

YES   NO

SIGNATURE OF PARTICIPANT   DATE

UNIVERSITY OF ™
KWAZULU-NATAL
INYUVESI
YAKWAZULU-NATALI

17 August 2016

Ms Sindiswa Yoland Khoza (SN 215056285)
School of Social Sciences
College of Humanities
Pietermaritzburg Campus
UKZN
Email: cindykhoza4@gmail.com

Dear Ms Khoza

RE: PERMISSION TO CONDUCT RESEARCH

Gatekeeper's permission is hereby granted for you to conduct research at the University of KwaZulu-Natal (UKZN), towards your postgraduate studies, provided Ethical clearance has been obtained. We note the title of your research project is:

"Exploring the experiences of female students in the Environmental science program on the UKZN Pietermaritzburg and Westville campus".

It is noted that you will be constituting your sample by performing interviews with black female students on the Pietermaritzburg and Westville campuses.

Please ensure that the following appears on your notice/questionnaire:
- Ethical clearance number;
- Research title and details of the research, the researcher and the supervisor;
- Consent form is attached to the notice/questionnaire and to be signed by user before he/she fills in questionnaire;
- gatekeepers approval by the Registrar.

You are not authorized to contact staff and students using 'Microsoft Outlook' address book.

Data collected must be treated with due confidentiality and anonymity.

Yours sincerely

MR SS MOKOENA
REGISTRAR

Office of the Registrar
Postal Address: Private Bag X54001, Durban, South Africa
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25 September 2016

Ms Sindiswa Y Khoza 215064285
School of Social Sciences
Pietermaritzuburg Campus

Dear Ms Khoza

Protocol reference number: HSS/1555/016M
Project title: Exploring the experiences of African female students in the Environmental science program at the
University of KwaZulu-Natal.

Expedited Approval

In response to your application dated 19 September 2016, the Humanities & Social Sciences Research Ethics
Committee has considered the abovementioned application and the protocol have been granted FULL APPROVAL.

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent
Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved
through the amendment/modification prior to its implementation. In case you have further queries, please quote
the above reference number. Please note: Research data should be securely stored in the discipline/department
for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter
Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

Dr Shenuka Singh (Chair)

/px

cc Supervisor: Dr Janaet Muthuki
cc Academic Leader Research: Professor M Naidu
cc School Administrator: Ms Lukong Shulika & Ms Nancy Mudau

Appendix 4

Interview schedule

How did you get into the environmental sciences field?

What personal factors influenced your choice of environmental sciences?

What external factors influenced your choice of environmental sciences?

How have you experienced learning at the environmental science program thus far?

What aspects of the learning experiences have you found to be the most valuable?

What are the ways in which environmental sciences has broadened your knowledge and understanding of environmental issues?

What learning challenges have you faced within the environmental science programme?

How have you negotiated your space within the environmental science programme?

How has your choice of environmental sciences impacted on your family life and gender roles?

Why do you think environmental sciences has had an impact on your family life and gender roles?

What are the ways in which being in the environmental sciences has enabled you to challenge traditional roles?

How do you think this negotiation will influence your future career aspirations within the field of environmental sciences?

What are your future career plans within the environmental science field? How do you plan to go about achieving your career goals within the environmental science program?

Sindiswa Yoland Khoza

Student no: 215064285

Research topic: Exploring the experiences of African female students in the Environmental Science program at the University of KwaZulu-Natal.

How will feedback be given to participate after the completion of study?

A result report will be given to the participants after completing the study. The study will also be made available to students at the University of KwaZulu-Natal library.

How will feedback be given to participant

The dissertation will be made available to the students at the University of KwaZulu-Natal Library for the participants and any other interested party. A formal report will be written and given to the participants that participated during the interview stage of the research.

Turnitin Originality Report

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Khoza

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