COMBATING GENDER STEREOTYPING IN THE SCIENCE AND TECHNOLOGY CLASSROOMS OF A PRIMARY SCHOOL

by

LORNA VAN DER MERWE-MULLER

Submitted in accordance with the requirements for the degree of

MASTER OF EDUCATION

in the subject

COMPARATIVE EDUCATION

at the

UNIVERSITY OF SOUTH AFRICA

SUPERVISOR: PROF MP VAN NIEKERK

November 2010

Declaration

Student Number: 37364022

I declare that **COMBATING GENDER STEREOTYPING IN THE SCIENCE AND TECHNOLOGY CLASSROOMS OF A PRIMARY SCHOOL** is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____

Lorna van der Merwe-Muller November 2010

Abstract

Gender stereotyping is a phenomenon found in all spheres of life. School children often have to bear the brunt of these prescribed roles and stereotypes. This study includes a literature review of the characteristics of a professional educator as well as the theoretical background on gender issues. It employed Participatory Action Research as a strategy with the aim to empower teachers to improve their classroom practice, and ultimately, to improve the teaching-learning dynamics for learners in the science and technology classrooms. The participants, who are science and technology teachers, are vastly different people whose one common goal it was to empower themselves and to change their classroom practice on a continuous basis. The study looks at some of the beliefs these teachers now hold after the intervention for promoting gender equality in the classroom. Science and technology are the domains of historically male-dominated fields, and by means of this study I aim to equalise the learning opportunities for both boys and girls.

Key Terms

Value transmission

Stereotypes

Gender roles

Gender

Combating gender stereotyping

Gender equality

Science and technology as subjects

Classrooms and schools

The classroom environment

Participatory Action Research

Acknowledgements

Thank you to my God for holding my hand.

My thanks are owed to my dear husband Karl Muller for hours of talking, listening and laughing. I am privileged that we can ponder this world and the next together. To my dear parents, Zakkie and Lorna van der Merwe, thank you for always believing in me and supporting me on this life journey. My brother Stephan van der Merwe, you are the best brother a sister could ever ask for. Thank you to my supervisor, Professor M.P van Niekerk, for all her guidance and wisdom. Thank you to Professor K. le Roux for her final editing of this manuscript. To the participants of this study, thank you for giving me the opportunity to observe your worlds.

"Don't give in to your fears," said the alchemist, in a strangely gentle voice. "If you do, you won't be able to talk to your heart". "But I have no idea how to turn myself into the wind". "If a person is living out his destiny, he knows everything he needs to know. There is only one thing that makes a dream impossible to achieve: the fear of failure".

The Alchemist, speaking to Santiago in the desert. Paulo Coelho- The Alchemist.

"He who pities woman depreciates her. He who attributes to her the evils of society oppresses her. He who thinks her goodness is of his goodness and her evil of his evil is shameless in his pretensions. But he who accepts her as God made her does her justice".

Kahlil Gibran.

"Freedom cannot be achieved unless women have been emancipated from all forms of oppression".

Nelson Mandela

She looked over his shoulder and in her eyes, for just a moment, yet an eternity, she was completely fearless.

LvdMM

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION AND BACKGROUND TO THE STUDY

1.1	INTRODUCTION	1
1.2	MOTIVATION FOR THE RESEARCH	2
1.3	PROBLEM STATEMENT	7
1.3.1	Sub-problems	7
1.4	THE AIM OF THE RESEARCH	8
1.5	THE RELEVANCE OF THE STUDY	8
1.5.1	Introduction	8
1.5.2	The contribution of the study	9
1.5.3	The expected results	9
1.5.4	Limitation of the study (also see 4.8)	9
1.6	THE RESEARCH METHODS	10
1.7	AN EXPLANATION OF THE CONCEPTS	10
1.8	CHAPTER DIVISION	11
1.9	CONCLUSION	11

CHAPTER 2

LITERATURE REVIEW OF POLICY AND LAW ON TEACHERS' PROFESSIONAL CONDUCT, WITH SPECIAL REFERENCE TO GENDER ISSUES

2.1	INTRODUCTION	13
2.2	THE SOUTH AFRICAN COUNCIL FOR EDUCATORS (SACE)	13
2.2.1	The SACE Code of Professional Ethics	14
2.2.2	The educator and the learner	15
2.2.3	The educator and the parent	16
2.2.4	The educator and the community	17
2.2.5	The educator and his/her colleagues	17
2.2.6	The educator and the profession	18
2.2.7	The educator and the employer	19

2.2.8	The educator and the South African Council for Educators	19
2.2.9	Highlighting the professional conduct of teachers as prescribed in the SACE Code of Professional Ethics with regard to upholding gender equality	20
2.2.10	The legality of the SACE Code of Professional Ethics	22
2.3	LEGISLATION IN RESPECT OF THE PROFESSIONAL CONDUCT OF TEACHERS	22
2.3.1	The Constitution of the Republic of South Africa: the rights of the educator and the employee	23
2.3.2	The Constitution of the Republic of South Africa: with rights come responsibilities	24
2.3.3	The Employment of Educators Act, Act 76 of 1998	25
2.3.4	Legislation on gender equality in education: South Africa	25
2.3.5	The Department of Education	27
2.4	VALUES AND ETHICS AT THE HEART OF IT ALL	30
2.5	CONCLUSION	33

CHAPTER 3

LITERATURE REVIEW AND THEORETICAL BACKGROUND ON GENDER ISSUES AND TEACHING IN SCHOOLS

3.1	INTRODUCTION	35
3.2	GENDER AS A SOCIAL CONSTRUCT	35
3.3	THE INEQUALITY AND VULNERABILITY OF FEMALES AND GENDER ROLES: A BRIEF DESCRIPTION OF THE HISTORY CONCERNING GENDER INEQUALITY AND EDUCATION	39
3.3.1	Women and education: gender vulnerability in SADC countries	41
3.3.2	Girls and their performance at school level	41
3.3.3	A brief description of gender inequality and education in the Western World, specifically in North America	42
3.4	TEACHING AND THE CLASSROOM	43
3.4.1	Schools and gender role transmission	43
3.4.2	Factors affecting girls' educational achievement	44
3.4.3	Educators are major role-players in the lives of girls	45
3.4.4	The classroom environment and career choices: what can be done to improve the future for girl learners?	47

3.5 ROLE-MODELS FOR GIRLS AND WOMEN IN RESPECT OF SCIENCE AND TECHNOLOGY 54

3.5.1 Marie Curie: A historic Western role-model for girls and women 55
3.5.2 Mamphela Ramphele: A role-model for girls in South Africa 56

3.6 CONCLUSION 58

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

4.1 INTRODUCTION 59

4.1.1 Methodology employed in this study: Participatory Action Research 62
4.1.2 Theoretical framework 63

4.2 AIMS OF THE STUDY AND PROBLEM FORMULATION 63
4.3 DATA COLLECTION TECHNIQUES AND RESEARCH METHODS 66

4.3.1 Focus groups as part of Participatory Action Research 67
4.3.2 Mind maps 68
4.3.2.1 The participants develop their own strategy of intervention 68

4.3.2.2 The participants implement their own strategy 69

4.3.3 Research journals 70
4.3.4 Interviews after the intervention 70
4.3.5 Observations after the intervention 71

4.4. ETHICAL CONSIDERATIONS 72
4.5 THE TRUSTWORTHINESS OF THE RESEARCH 73
4.6 THE TIME FRAME 75
4.7 THE PARTICIPANTS 75
4.8 LIMITATION OF THE STUDY AND BARRIERS TO DATA COLLECTION 76
4.9 DATA PROCESSING AND ANALYSIS 76
4.10 THE ROLE OF THE RESEARCHER AS PARTICIPANT OBSERVER: FACTORS INFLUENCING THE RESEARCH 77
4.11 REFLECTING ON MY OWN GENDER SENSITIVITY 78
4.12 CONCLUSION 79

CHAPTER 5

DISCUSSION OF THE ANALYSIS OF THE DATA AND THE PRELIMINARY FINDINGS

5.1	**INTRODUCTION**	**80**
5.2	**THE CONTEXT OF THE STUDY**	**81**
5.3	**THE DATA-GATHERING PROCESS**	**83**
5.3.1	**Criteria for selecting the site and the participants**	**83**
5.3.2	**Focus group discussions**	**84**
5.3.3	**The participants' own research journals**	**86**
5.3.4	**Semi-structured interviews**	**86**
5.3.5	**Classroom observations**	**87**
5.3.6	**My own observations about the process and some conflicting data**	**87**
5.4	**THE PROCESS OF DATA ANALYSIS**	**88**
5.5	**EMERGING CATEGORIES AND THEMES FROM THE DIFFERENT METHODS OF DATA COLLECTION**	**89**
5.5.1	**The focus group discussions**	**89**
5.5.1.1	Socio-economic factors influencing the learners	90
5.5.1.2	A classroom environment conducive to gender equality	90
5.5.2	**The mind maps during the focus group discussion 1**	**92**
5.5.2.1	Gender equality determined by fairness and equal treatment	93
5.5.2.2	A professional educator will be sensitive to gender issues	94
5.5.3	**The research journals**	**96**
5.5.3.1	Women as role-models	97
5.5.3.2	Girls need more support and encouragement in science and technology	98
5.5.3.3	Make women role-models more visible with visual aids	99
5.6	**INTERVENTIONS**	**102**
5.7	**OBSERVATIONS AFTER THE INTERVENTIONS**	**102**
5.7.1	**Messages from the educators which motivated and inspired the learners**	**103**
5.7.1.1	Become anything you want to be	103
5.7.1.2	Self-acknowledgement	103

5.7.2 Verbal and non-verbal communication 104
5.7.3 Comparing past situations with present ones 105

5.7.3.1 Open discussions create opportunities for empowerment 105
5.7.3.2 Role-play to enhance learning for all 106
5.7.3.3 Visible resources in the classroom to enhance learning opportunities for all 107

5.8 THE INTERVIEWS AFTER THE INTERVENTIONS: WHAT HAS CHANGED? 108

5.8.1 Igniting a spark 109
5.8.2 A change in attitude, behaviour and methods of instruction 110
5.8.3 Creating awareness 111
5.8.4 Gender sensitivity 112
5.8.5 Seeds of greatness 113

5.9 RECURRING THEMES WITHIN THE CATEGORISED DATA: PRELIMINARY FINDINGS 115

5.9.1 A classroom environment conducive to gender equality 117
5.9.2 Particular methods of instruction can combat gender stereotyping 117
5.9.3 Learners are special people 118

5.10 CONCLUSION 118

CHAPTER 6

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION 122
6.2 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS 125

6.2.1 Underpinning values and signals send influential messages to learners 125
6.2.2 A classroom environment conducive to gender equality 125
6.2.3 Particular methods of instruction can combat gender stereotyping 127
6.2.4 Learners are special human beings 128

6.3 LIMITATIONS OF THE STUDY 130
6.4 RECOMMENDATIONS FOR FURTHER RESEARCH 130
6.5 CONCLUSION 131

BIBLIOGRAPHY **134**
APPENDIX A: INTERVIEW SCHEDULE **144**
APPENDIX B: LETTERS OF CONSENT **145**
APPENDIX C: EXAMPLE OF FOCUS GROUP DISCUSSION **151**
APPENDIX D: EXAMPLE OF A RESEARCH JOURNAL **152**
APPENDIX E: EXAMPLES OF THEMES IN AN INTERVIEW **153**

FIGURE 4.1: Characteristics of action research **61**
FIGURE 5.1: Recurring themes from data **115**

CHAPTER 1

INTRODUCTION AND BACKGROUND TO THE STUDY

1.1 INTRODUCTION

According to Steyn, Wolhuter, De Wet, Berkhout and De Waal (2003:310), Comparative Education plays an important part in assisting the educator in his or her professional role and responsibilities.

Two critical outcomes from SAQA (the South African Qualifications Authority) can be realised in the field of Comparative Education, namely

- to identify and solve problems in which responses display that responsible decisions using critical and creative thinking have been made; and
- to demonstrate an understanding of the world as a set of related systems by recognising that problem-solving contexts do not exist in isolation. (Steyn, *et al.* 2003: 310).

Social scientists have re-evaluated the task played by schools in shaping the position of women. (Lemmer 1993 8-9). This task usually falls on the shoulders of teachers and thus the reason to investigate gender in primary schools by means of teachers and their behaviour.

Lemmer (1993: 9) argues “Thus there is a need for an analysis of what happens in school which goes far beyond the official curriculum as embodied in syllabuses and policy statement.” Any teacher will be able to explain that a school is more than its written policies. This project will aim to investigate gender equality and inequality in the schooling system of a primary school.

This research will investigate, specifically in the primary school classroom, the transmission of gender stereotypical roles, and the prevention thereof by the educator in his or her professional capacity.

1.2 MOTIVATION FOR THE RESEARCH

Every human being, family, society and even country is fuelled by values and beliefs. Sometimes people are incapable of explaining what these values are or where they originated from. At other times it can be answered with ease. Nyberg (1990:595) argues that we cannot prevent ourselves and evade teaching values. “Moreover, even young children observe and internalise adults’ tacit values”, according to Van Niekerk (1999: 8).

As a teacher at a primary school I come into daily contact with a large number of learners who all have their own values and perceptions of life. These values are reflected in what they say or what they do not say, and in what they do or do not do.

I have been teaching languages, geography and technology in the intermediate phase (grades 4 to 6) for a number of years. I observed, as a teacher of technology, that many girls were hesitant taking on an assignment in the technology class, especially when they had to build models and use the Lego kits. The Lego kits consist of hundreds of pieces that are used by the teacher and learners to interact during the learning process. The boys generally are much more confident tackling these assignments. Where the girls are apprehensive towards the learning area even before knowing its content, the boys cannot control their excitement.

The study will consist of an action research study, to be done within the framework of the science and technology classrooms in a primary school in South Africa. The detailed accounts of the school will be analyzed and interpreted.

Teachers are continuously transmitting values and, according to Nyberg (1990:595), this is what they will do, by means of overt or by deliberate teaching, but also through covert communication, that is, by the things they do or say without thinking about it.

This study will investigate how the conduct of teachers can combat stereotypical gender role transmission. The study can also exist within realm of gender studies, but with a clear application to education.

Because this study makes explicit assumptions that teachers are the transmitters of values in the classroom and that their professional conduct is a pre-requisite to the combating of stereotyping and gender roles, in the classroom, chapter 2 will be devoted to the professional conduct of teachers. Chapter 3 will deal with gender issues and teaching.

The research will attempt to address questions in regard of the school, as well as the relations between the school and society.

Husen and Poslethwaite (1994:xi-xiii) refer to major themes and sub-themes in national and international context. This research can be categorised under the theme 'human development'.

In the International Encyclopaedia of Education - Human Development Overview, Weinert (1994: 2663-2664) states in the conclusion, 'Development and Education' that

> *"…if one defines psychological development as those changes in individual patterns of behaviour that occur over the life course, then the concept of education refers both to those socio-cultural conditions and interventions that are explicitly directed to foster desired behaviour and inhibit or correct undesired behaviour (intentional education) as well as to those behaviours and events in the child's environment that have the effect of strengthening or inhibiting behaviour, but that are not planned or intentionally presented (functional education). The boundaries between unplanned socialization and planned educational interventions are fluid and cannot be sharply distinguished".*

So, clearly the context, as well as persons, will expose the child or learner to explicit and implicit knowledge and values.

The following aspects will be focused on during the course of this study:

- the necessity of technology and science as learning areas in the National Curriculum and schools, and its role in schools;
- the existence of stereotypical gender roles and expectations in society, and in specific learning areas like science and technology;
- teachers as important role-players in conveying values to the learners;
- the professional conduct of teachers;
- how teachers can prevent the transmission of the stereotypical gender roles by means of their professional conduct; and
- the promotion of sound gender values by the teachers.

The specific focus will be on investigating the conduct of teachers in preventing gender stereotyping and on the promotion of sound gender beliefs in the science and technology classrooms of a primary school. Learners spend a lot of time in the classrooms, thus in the presence of teachers. Just as the learners bring with them their experiences and beliefs, so also does the teacher. This study will look at the actions the teachers take to prevent the transmission of gender roles, but also at their promotion of sound gender beliefs.

The Revised National Curriculum Statement for Technology Grades R-9 refers to socio-economics and social stereotypes as follows:

> *South Africa needs to develop its skills-base in the realm of technological careers. The employment opportunities and national economic needs in the manufacturing and industrial sectors far exceed those of academic professions. Our unskilled labour market is over-supplied and we must expand the training of technologically orientated workers. As a developing nation, the only way we can achieve growth in the gross domestic product (GDP) of the country is by increasing the number of primary and*

> *secondary producers. Hence, the nation needs more learners to enter this vital sector of the economy. Historically girls have tended to shy away from the scientific and technical sectors. Pressure from society militated against involvement of girls in what was perceived as a 'man's world'. Certain cultural and racial groupings have also historically been discouraged from gaining access to technical careers. Learners experiencing 'barriers to learning' are also those who have been stereotyped as unable to achieve anything but practical skills*. (Department of Education, Revised National Curriculum Statement Grades R-9 Technology, 2003:33).

I agree with the fact that in the past girls/women in South Africa has not had the opportunities and chances that boys/men had in relation to education, more specifically, in the fields of technology and science. Women who achieve in science and technology are frequently seen as "rare specimens". As a woman and a teacher of technology, I believe that girls who would want to study science and technology should be able to do this on grounds of their aptitude or interest, and not because of privileges created for them based on gender. In the classroom I am often asked the question: "M'am, do you like being a teacher?"

This question prompted me to examine the role of the teacher in the classroom. This means that I am confronted with the fact that the learners actively think about her role in the classroom, the school and even in society. At a stage learners become aware of the fact that their presence and behaviour influence the teacher, and that what the teacher is doing or saying will inevitably influence them.

As a teacher I do not only teach, but also listen, give advice, learn, observe, discipline, wonder, consult, inspire, believe, worry and care.

Clearly, I am not "just" a teacher…

The former Minister of Education (29 April 2004 to 10 May 2009), Ms Naledi Pandor, on opening a new school building, praised the role professional teachers play in providing quality education to learners.

> She said, *"Teaching is the most demanding of all the professions. But more than that, teachers must be able to motivate and keep interested energetic and challenging human beings whose spiritual, emotional, intellectual and creative development is in their trust. Teachers are people who delight in seeing children discover their talents and grow into their potential. Teaching requires above all enormous reserves of energy and patience. It is physically, intellectually and emotionally demanding. The maintenance of order and classroom discipline, while fostering a culture of cooperation and learning, especially in this day and age, is not easy. It requires dedication and integrity. Teachers are, next to parents, the most important adult role models in children's lives. Education is fundamentally a character forming and developmental process. The values expressed and the values promoted are central to and underlie outcomes, teaching methods and assessment. They also reflect the authority relationships in the classroom".* (Department of Education, Speeches and Press Releases: "Minister Pandor praises role of teachers" 2004).

On a daily basis learners are confronted with different teachers, teaching styles and personalities. The teaching force is unique and diverse, bringing with it its own challenges. Teachers are all individuals with personal traits, values and experiences.

The learners in the classroom are subjected to all of the above. In a country like South Africa, the Constitution is manifested in policies concerned with equality in respect of religion, language and gender. Teachers have the responsibility of upholding these stipulations of the Constitution.

Furthermore, certain learning areas like science and technology are, to this day, still viewed by many people as a man's domain. The National Curriculum, however, encourages both boys and girls to demonstrate an interest in the fields of science and technology. (Department of Education, Revised National Curriculum Statement Grades R-9 Technology, 2003).

Learners in South Africa are fortunate to have a National Curriculum that looks after the rights of girls and boys with regards to gender issues.

This study will investigate how teachers can prevent the stereotypical gender role and the transmission of values through their professional conduct in the science and technology classrooms.

1.3 PROBLEM STATEMENT

How can the professional conduct of a teacher prevent the transmission of the stereotypical gender role in the science and technology classes in a primary school?

1.3.1 Sub-problems

- Why are the learning areas technology and science necessary in the National Curriculum?
- Do stereotypical gender roles/expectations exist in our society, and especially in some learning areas at school (*e.g.,* technology and science)?
- What values do the teachers convey to the learners, specifically in respect of stereotypical gender roles?
- What constitutes professional conduct in respect of the prevention of stereotypical gender role transmission?

The main problem can also be formulated as follows:

What can educators do in respect of their own behaviour, values, and professional conduct to prevent transmitting stereotypical gender roles in the technology and science classes of a primary school?

1.4 THE AIM OF THE RESEARCH

The aim of the research is to investigate the professional conduct of teachers, that is, their behaviour, their verbal and non-verbal communication, and how this conduct may prevent the transmitting of values concerning stereotypical gender roles. By means of this study I hope to sensitise the teachers in respect of the many stereotypes they believe in, to ensure gender equality. The overall aim is to present all learners with equal educational opportunities for future career choices. It is important to start this process early in the primary school as young learners hardly ever voice their feelings about inequality. Moreover, this study aims to encourage teachers to pay attention to the needs of every individual learner in the classroom.

The investigation will be done in the technology and science classrooms of a primary school. It ought to give teachers ample opportunity to identify the specific values they transmit as far as their gender beliefs, roles and stereotypes are concerned.

1.5 THE RELEVANCE OF THE STUDY

1.5.1 Introduction

It is important that teachers should create an atmosphere of learning, empowering both girls and boys to learn. According to Sheffield (2004:191), “Girls, no matter what their specific interests, require the positive reinforcement that teachers can provide to establish their own self-esteem and self-confidence”. Teachers need to monitor the negative behaviour and attitudes of other children that may cause a learner to question her or his scientific ability or self-worth. Educators have the power to question

stereotypical perceptions about gender and gender roles, and both educators and learners are in a position to question stereotypical gender roles in the technology and science classes. These classrooms have historically been seen as a man's world, but the teachers are in the position to apply certain skills and knowledge to change these perceptions.

1.5.2 The contribution of the study

The research results will be made available to universities or other institutions where teachers are trained. Students can subsequently be taught the skills, knowledge and attitudes to combat behaviour that discriminates between genders. This research may also make a contribution to the teaching expertise of teachers already teaching, and especially to those teachers wanting to improve the quality of their teaching.

1.5.3 The expected results

The expected results would include the teachers' behaviour, attitudes and professional conduct in order to combat the transmission of stereotypical gender roles, as seen by other teachers teaching technology and science. This professional conduct will be manifested by means of their verbal and non-verbal communication.

1.5.4 Limitation of the study (also see 4.8)

This study would be conducted only in the technology and science classrooms of one school. More detailed information could possibly be obtained by collecting information in a variety of schools. The learning areas of science and technology were chosen because they are historically known as being male-dominated.

1.6 THE RESEARCH METHODS

A qualitative research approach will be used, namely the Participatory Action Research (PAR) design, consisting of participants in the technology and science classes of a primary school. Data collection methods will include focus group discussions, mind maps, observations, interviews and log journals. The Participatory Action Research design is chosen for this study because it empowers the participants to voice their opinions and ideas concerning the research project.

The data collection site is a higher income area in Johannesburg.

1.7 AN EXPLANATION OF THE CONCEPTS

Values: Hill (1991, in: Ling 1998:3), states that, "When people speak of values they are usually referring to those beliefs held by individuals to which they attach special priority or worth, and by which they tend to order their lives. A value is, therefore, more than a belief; but also more than a feeling". Ling (1998:4) also refers to moral and ethical values.

Gender: Oakley (1995, in: Colebrook, 2004:9) contends that, "There are today, in general, two competing accounts of gender. The first is the explanation from sexuality. There are two types of biological body – male and female – that are then socialised and represented through certain stereotypes or images: gender is the social construction of sex. Sex is a word that refers to the biological differences between male and female: the visible difference in genitalia, the related difference in procreative function. 'Gender', however, is a matter of culture: it refers to the social classification into 'masculine' and 'feminine'".

Stereotype: "A stereotype is a perceptual generalisation about a group of people or things. It applies the presumed characteristics of the group to an individual member of the group, without taking into account the unique

characteristics of the individual member," according to Du Plooy-Cilliers and Louw (2003: 52).

Social role: According to Du Plooy-Cilliers and Louw (2003:51), a 'social role' "…is the relationship from which you communicate with another person, for example as friend, parent, patients, colleague, and it carries certain expectations according to which you should behave".

1.8 CHAPTER DIVISION

Chapter 1: Introduction and background, problem statement, aim, methods of investigation, and an explanation of the concepts.
Chapter 2: A literature review of policy and law with regard to teachers' professional conduct in South Africa, with specific reference to gender issues.

Chapter 3: A literature review and the theoretical background on gender issues and teaching in schools

Chapter 4: The research design and data collection methods.

Chapter 5: A discussion of the analysis of the data and preliminary findings. This chapter will explain the context where the study will take place, including the social and historical background of the school.

Chapter 6: A summary of the findings, conclusions and recommendations.

1.9 CONCLUSION

The aim of this chapter was to examine and explain the relationship between the professional teacher, and his or her conduct in preventing the stereotypical gender role transmission. It was indicated that this study would be undertaken in the technology and science classrooms of a primary school. This chapter also examined some of the past inequalities with regards to gender and certain fields of study. More specifically, the area of science has

always been a male-dominated field of study. This study will try to find ways of making sure that girls will not be discriminated against should they wish to become involved in the fields of science or technology.

In this study the focus will be on gender issues in the teachings in school, as well as the teachers' professional conduct and their role as conveyers of values. Specific research methods will be used to investigate the stated phenomenon.

In the next chapter an investigation will be launched into the educators' professionalism. What constitutes a professional educator? Policies and laws on professionalism and gender equality will be examined.

CHAPTER 2

LITERATURE REVIEW OF POLICY AND LAW ON TEACHERS' PROFESSIONAL CONDUCT, WITH SPECIAL REFERENCE TO GENDER ISSUES

2.1 INTRODUCTION

When asked why they teach, most teachers will answer that they felt it was something they were called to do. Teaching is seen by many as a noble profession, even a calling. Teachers are accountable for what they do and say. They are responsible for themselves, as well as for every learner in their care. The professional educator, or teacher, is held in high esteem in many societies around the world. The law and policies give clear guidelines in respect of their conduct, responsibility and accountability. These laws and policies should be seen as a protective mechanism for both teachers and their learners.

2.2 THE SOUTH AFRICAN COUNCIL FOR EDUCATORS (SACE)

The role of the South African Council for Educators is specified in section 12(5) (a) (xiv) of the Education Labour Relations Act of 1993, and is taken up in the Educators' Employment Act of 1994. It includes, among others, "…the registration of professional educators, and the keeping of a register roll of such educators for the purpose of regulating qualifications, standards and professional discipline of teachers, and their admission to the education profession".

According to Parker (2002:9), the SACE's functions include "…the professional development of educators" and "…the ethical dimensions of professionalism".

Joubert and Prinsloo (2001:150) indicate that 'professionalism' refers to "…the qualities or typical features of a profession or of professionals, especially

competence, skills, *etc.*". They (2001:49) define a 'professional person' as "…a person who belongs to or is associated with a profession who has or manifests the skills of professional competence, and who conducts him- or herself in a professional manner".

2.2.1 The SACE Code of Professional Ethics

Parker (2002:17) states as follows,

"The educators who are registered with SACE are entrusted to uphold the following:

- *acknowledge the noble calling of their profession to educate and train the learners of our country;*
- *acknowledge that the attitude, dedication, self-discipline, ideals, training and conduct of the teaching profession determine the quality of education in this country;*
- *acknowledge, uphold and promote basic human rights, as embodied in the Constitution of South Africa;*
- *commit themselves to do all within their power, in the exercising of their professional duties, to act in accordance with the ideals of their profession as expressed in this code; and*
- *act in a proper and becoming way such that their behaviour does not bring the teaching profession into disrepute".*

When investigating the above I came to the conclusion that teachers are people with very specific powers and responsibilities. They are in a position of trust which they should live up to. This indicates the importance of the SACE Code of Professional Ethics for every educator. This Code gives each educator very clear directives as how to act in a proper and professional manner.

Teachers should exhibit specialized skills and knowledge and be sensitive to the way they speak to and treat their learners (Joubert and Prinsloo

2001:149). On the other hand, Oosthuizen (2004:25) argues that "…there is no single satisfactory description or definition of a professional but rather certain universal characteristics of a profession. These significant characteristics are a commitment to service, sanctioning by the community, specialised knowledge and continuous research and the honouring of an ethical code".

The following relevant characteristics of an educator will be discussed against the background of the SACE Code of Professional Ethics:

2.2.2 The educator and the learner

The following authors, Bertram, Mattson, Parker (2002: 133-151) also Oosthuizen, Rossouw, De Wet (2004: 25-29) gives a comprehensive list of the ideal conduct a teachers should demonstrate towards learners.
An educator

- respects the dignity, beliefs and constitutional rights of learners and in particular of children, which includes the right to privacy and confidentiality;
- acknowledges the uniqueness, individuality, and specific needs of each learner, guiding and encouraging each to realise his or her potentialities;
- strives to enable learners to develop a set of values consistent with those upheld in the Bill of Rights as contained in the Constitution of South Africa;
- exercises authority with compassion;
- avoids any form of humiliation, and refrains from any form of child abuse, physical or psychological;
- promotes gender equality and refrains from any form of sexual relationship with, or sexual harassment (physical or otherwise) of learners;
- uses appropriate language and behaviour in his or her interaction with learners, and acts in such a way as to elicit respect from the learner;

- takes reasonable steps to ensure the safety of the learner;
- does not abuse the position he or she holds for financial, political or personal gain;
- is not negligent or indolent in the performance of his or her professional duties; and
- recognises, where appropriate, learners as partners in education.

The findings of various authors are in agreement with these stipulations, for example, Bertram, Mattson, Parker (2002:133-151), and Oosthuizen, Rossouw, De Wet (2004: 25-29).

Thus it can be said that a teacher has the responsibility of always envisaging only the best (academically, and in all spheres of life) for his/her learners. More importantly, teachers should consciously strive to accomplish their responsibilities.

2.2.3 The educator and the parent

An educator

- recognises the parents as partners in education, and promotes a harmonious relationship with them; and
- does what is practically possible to keep parents adequately and timeously informed about the well-being and progress of the learner.

The above-mentioned authors agree to these stipulations.

In any newspaper or magazine, or even online, one every day reads about the economic crises worldwide. South Africa is not left out of this very grey picture. Parents work long hours to be able to make ends meet. Children and their parents are spending less time together, and time is considered an expensive commodity. Educators are expected to play the dual role of parent and teacher. The parent or guardian places his or her trust in the teacher.

Consequently, teachers should do their best to establish and maintain a positive partnership with the parents and guardians.

2.2.4 The educator and the community

An educator recognises that an educational institution serves the community, and therefore acknowledges that customs, codes and beliefs will differ in the community.

Bertram, *et al.*, (2002:133-151) and Oosthuizen, *et al.* (2004: 25-29) are in agreement with the above.

In every community the members inevitably have different values, norms and viewpoints. They may be common values that the individuals ascribe to, or they may differ significantly. Schools as organisations that deliver a service, and educators as instruments thereof, have the important role to play of combining values and viewpoints into a system of consensus that is in agreement with the Constitution (Bertram, *et al.* 2002: 146)

2.2.5 The educator and his/her colleagues

An educator

- refrains from undermining the status and authority of his or her colleagues;
- respects the various responsibilities assigned to colleagues and the authority that arises there from, to ensure the smooth running of the educational institution;
- uses proper procedures to address issues of professional incompetence or misbehaviour;
- promotes gender equality and refrains from sexual harassment (physical or otherwise) of his or her colleagues;

- uses appropriate language and behaviour in his or her interaction with colleagues; and
- avoids any form of humiliation, and refrains from any form of abuse (physical or otherwise) towards colleagues.

Refer to the convictions of Bertram, *et al.* (2002:133-151) and Oosthuizen, *et al.* (2004: 25-29) in respect of the above.

As far as this stipulation is concerned, teachers worldwide speak the same "language". A lack of resources, problems with discipline, management, unions, *etc*. are just a few issues that touch the lives of teachers on a daily basis. Open and ongoing dialogue should exist among colleagues in order to achieve the vision, mission and the goals of the organisation.

2.2.6 The educator and the profession

An educator

- acknowledges that the exercising of his or her professional duties occurs within a context requiring co-operation with and support of colleagues, and therefore behaves in such a way as to enhance the dignity and status of the profession;
- keeps abreast of educational trends and developments;
- promotes the ongoing development of teaching as a profession; and
- accepts that he or she has a professional obligation towards the education and induction into the profession of new members of the teaching profession.

Bertram, *et al.* (2002:133-151) and Oosthuizen *et al.* (2004: 25-29) subscribe to the above.

Teaching is often referred to as "the mother of all professions". On leaving university or teachers' training college, the newly-qualified teacher still has a

lot to learn. They should, however, put in a lot of time and effort to continually improve their skills and knowledge. It is not expected from teachers to know everything or to even to pretend to know everything, but rather, they should demonstrate their inclination to increase their knowledge. Learners would eagerly emulate this example set by their teacher/s.

2.2.7 The educator and the employer

An educator

- recognises the employer as a partner in education;
- acknowledges that certain responsibilities and authorities are vested in the employer through legislation, and serves his or her employer to the best of his or her ability; and
- refrains from discussing confidential and official matters with unauthorised persons.

The findings of other authors such as Bertram, Mattson and Parker (2002:133-151) and Oosthuizen, Rossouw and De Wet (2004: 25-29) are in accordance with the above.

Whether the state, the government or the governing body is the employer, it is expected from educators to perform their duties within certain boundaries. It is imperative that the educator performs these duties to the best of his or her ability, because the employer is in a position to take legal action if it does not happen.

2.2.8 The educator and the South African Council for Educators

An educator

- complies with the provisions of this Code;
- discloses all relevant information to the Council;

- co-operates with the South African Council for Educators to the best of his or her ability; and
- accepts and complies with the procedures and requirements of the Council, including but not limited to the registration procedures, the disciplinary procedures of the Council and the payment of compulsory fees (Bertram, *et al.* 2002:151).

The acknowledgment of learners, parents, the community, colleagues and the employer as partners and equal contributors to education, is merely a step in acknowledging that many people are responsible for the wellbeing of learners and their education. The role players in education can add to the learner's success. The relationship between them can be used to predict the success of a school, and even of the education process itself. By taking heed of the stipulations as contained in the SACE Code of Professional Ethics, teachers can determine their professionalism, and also use it as a tool for learning or for self-improvement. The difference between a good teacher and a great teacher lies in an attitude of continued learning and academic improvement.

2.2.9 Highlighting the professional conduct of teachers as prescribed in the SACE Code of Professional Ethics with regard to upholding gender equality

In this chapter on law and policy in respect of the professional conduct of educators, the focus will be on three specific clauses in the SACE Code of Professional Ethics. As teacher of a subject where gender disparity can easily exist, these three clauses should be implemented in the classroom and the school to uphold gender equality. They include the following, namely the uniqueness and dignity of every child, sexual discrimination, and language.

- **Respect the uniqueness and dignity of every child.**

An educator

- *respects the dignity, beliefs and constitutional rights of learners, in particular children, which includes the right to privacy and confidentiality;*

- *acknowledges the uniqueness, individuality and specific needs of each learner, guiding and encouraging each to realise his or her potentialities.*
- (Bertram, *et al.* 2002: 134).

I believe that teachers should first acknowledge their own uniqueness and individuality, as this will make it easier for them to acknowledge it in others. Teachers should, in all situations, always keep this clause in mind.

- **Sexual discrimination.**

An educator

- *promotes gender equality;*

- *refrains from any form of sexual harassment (physical or otherwise) of learners; and*

- *refrains from any form of sexual relationship with learners at a school* (Bertram, *et al.* 2002: 137).

As the focus of this study is in the realm of gender issues it is noteworthy that the Code promotes gender equality. Teachers are, accordingly, responsible and accountable to uphold this clause.

- **Language.**

An educator

- *uses appropriate language and behaviour in his or her interaction with learners, and acts in such a way as to elicit respect from the learners* (Bertram, *et al.* 2002:139).

In the teaching and learning situation it is very easy to forget that the language that teachers use can have a major impact on the morale of learners. A teacher who uses reproachful language will no doubt receive negative feedback.

2.2.10 The legality of the SACE Code of Professional Ethics

Whether teachers agree with all the stipulations of the SACE Code of Professional Ethics or not, the Code is legally binding, according to Parker (2002:120), where he states that "…the Code has both moral and legal authority". The Code expects teachers to behave *ethically* correct, irrespective of what they consider *morally* or *religiously* correct. "The Code is underpinned by a Human rights approach", according to Parker (2002:120).

2.3 LEGISLATION IN RESPECT OF THE PROFESSIONAL CONDUCT OF TEACHERS

The Constitution of the Republic of South Africa incorporates the acknowledgement of human rights in the Bill of Rights.

This component of chapter 2 will look at professional conduct with reference to the Constitution of the Republic of South Africa.

The Constitution of the Republic of South Africa, Act 108 of 1996, (the Bill of Rights): Chapter 2, indicates the following in respect of equality, namely

The state may not unfairly discriminate directly or indirectly against anyone on one or more grounds, including race, gender, sex, pregnancy, marital status, ethnic or social origin, colour, sexual orientation, age, disability, religion, conscience, belief, culture, language and birth (Joubert and Prinsloo 2001: 220).

2.3.1 The Constitution of the Republic of South Africa: the rights of the educator and the employee

Joubert and Prinsloo (2001:146) indicate the following in respect of an educator's constitutional rights, namely

- everyone has inherent dignity and the right to have his or her dignity respected and protected (Section 10);
- everyone has the right to fair labour practices (Section 23(1);
- every employee has the right to strike (Section 23(2)(c);
- every employee has the right to assemble, demonstrate, picket and present petition, provided the activity takes place peacefully and those involved are unarmed (Section 17); and
- equality - an educator's right to equality is protected in the Employment Equity Act of 1998.

The purpose of this Act is to achieve equity in the workplace by promoting equal opportunity and fair treatment in employment by eliminating unfair discrimination and by implementing affirmative action measures (Squelch:1999, in: Joubert and Prinsloo 2001:146).

2.3.2 The Constitution of the Republic of South Africa: with rights come responsibilities

The teacher as a professional person has rights, but also responsibilities. The responsibilities of teachers are widespread for example lesson planning, administration in the classroom and handling behaviour problems of the learners etc.

Joubert and Prinsloo (2001:147) indicate the following duties that are essential in carrying out the teaching program of a school, namely

- the formulation of teaching outcomes;
- the careful planning and preparation of lessons;
- the ongoing assessment of learners to ensure that they are meeting the required standards;
- disciplinary conduct on his or her own part, and maintaining discipline and order in the school and classrooms to protect the learners' right to education (Section 29);
- the regular consultation with the learners' parents;
- seeing to the safety and well-being of the learners; and
- the execution of certain administrative tasks within their delegated powers.

Not only do teachers have *specific* responsibilities, but they may not act outside their powers.

Furthermore, Section 1 of the Constitution provides that:

The Republic of South Africa is a sovereign democratic state founded on the following values:

a. human dignity, the achievement of equality and the advancement of human rights and freedoms;
b. non-racialism and non-sexism;

c. supremacy of the Constitution and the rule of law;
d. universal adult suffrage, a national common voters roll, regular elections, and a multi-party system of democratic government, to ensure accountability, responsiveness and openness. (Nieuwenhuis, 2007: 176; and More, 2002:100).

2.3.3 The Employment of Educators Act, Act 76 of 1998

Section 16 of the Employment of Educators Act specifically states what an *in*capable educator is. This section also indicates that the employer and employee are entitled to take legal action against each other whenever necessary, and it indicates the legal and proper way to go about it.

Section 1 of the Employment of Educators Act deals with the misconduct of the educator. It describes the behaviour or the lack thereof that may lead to charges of misconduct. Sections 17 to 26 also state the legal procedures to be taken against the alleged guilty party, and this includes suspension, inquiries and appeals.
The above is in accordance with various other documents (Appendix J, Incapacity and misconduct, Employment of Educators Act, Act 76 of 1998. In: Joubert and Prinsloo 2001: 283-289; Oosthuizen, *et al.* 2004: 29).

2.3.4 Legislation on gender equality in education: South Africa

Human rights, including rights on gender equality, are entrenched in the Constitution of the Republic of South Africa.

Section 1 of the Constitution indicates that:

The Bill of Rights contained in The Constitution of the Republic of South Africa, Act 108 of 1996 states:

9 (1): “Everyone is equal before the law and has the right to equal protection and benefit of the law”.

Legislation is also in place to promote gender equality in all spheres. The Commission on Gender Equality has been entrusted with the task of looking after gender equality issues in South Africa. (Government Gazette, Commission on Gender Equality Act, 1996).

The following is a list of the provisions embodied in education laws regarding gender issues (Thandi Lewin: Personal communication with Department of Education, 2009):

- **The National Education Policy Act, 1996 (Act No. 27 of 1996) (NECPA):**

Section 4(c) of the NEPA provides for the achievement of equitable education opportunities, the redress of pass inequalities and the advancement of the status of women.

- **The South African Schools Act, 1996 (Act No. 84 of 1996) (the SASA):**

In its preamble the SASA undertakes to combat racism, sexism and all other forms of unfair discrimination and intolerance. Section 20(8)(d) of the SASA provides for the need for representivity when a public school employs educators additional to the establishment determined by the MEC. Section 28(e) of the SASA indicates that the MEC has to determine guidelines for the achievement of the highest practical level of representivity of members of the governing body.

- **The Further Education and Training Act, 1998 (Act No. 98 of 1998) (FETA):**

The FETA promises to redress past discrimination, and to ensure representivity and equal access to further education and training and the

workplace by persons who have been marginalized in the past, including women, the disabled and the disadvantaged. In terms of section 9(2)(a)(ii) of FETA, the Council must, subject to policy and with the concurrence of the academic board, address past imbalances and gender and disability matters. In terms of section 9(8) of FETA, the Council must be broadly representative of the community served by the institution, in respect of race, gender and in accordance with section disability. Section 11(1)(a) of FETA determines that the academic board of a public Further and Training institution is accountable to the Council for the academic functions of the Further Education and Training institution and the promotion of the participation of women and the disabled in the learning programmes. In terms of section 14(6)(d) of the FETA, the public Further Education and Training institution must take into account the need for representivity when they appoint staff members in addition to the establishment determined by the MEC. Section 16(2) of the FETA determines that the provisional must in particular with measures to curb racism, sexual violence and sexual harassment.

- **The Higher Education Act, 1997 (Act No. 101 of 1997) (the HEA)**

The preamble of the HEA provides for the redress of past discrimination, and for representivity and equal access to higher education. In terms of section 8(2)(d) of the HEA, ordinary members of the Council on Higher Education (CHE) must consist of equal numbers of women and men. Section 31(1)(ii) indicates that the Institutional Forum must advise the Council on race and gender equity policies (Thandi Lewin: Provisions, Personal communication with Department of Education: 2009).

2.3.5 The Department of Education

The Department of Education plays a vital role in ensuring policy and effective programmes to guarantee equality in respect of all the role-players, that is, the learners and their teachers.

In the “Guidelines for the consideration of governing bodies in adopting a Code of Conduct for learners, Department of Education, Notice 776 of 1998” are included the principles and values that protect the rights of learners (Joubert and Prinsloo 2001:247). As professionals educators have to adhere to these principles, values and rights. Three principles and values deserve specific mentioning here, namely democracy; non-discrimination and equality; privacy, respect and dignity, should direct educators behaviour. (Joubert and Prinsloo 2001: 247).

- **Democracy**. The Bill of Rights, as contained in the Constitution of the Republic of South Africa, Act No. 108 of 1996, encompasses the rights of all people and affirms the democratic values of human dignity, equality and freedom. A school has to protect, promote and fulfil these rights. All learners and all the partners in education at a school have the right to due process, and also to participate in decision-making about matters affecting them at school. They also have the right to have their views heard in respect of these matters (Joubert and Prinsloo 2001:247*).*

For teachers this means treating their learners with dignity and respecting their individuality. Dignity includes the way teachers conduct themselves, and also the way they speak to the learners.

- **Non-discrimination and equality.** No person may unfairly discriminate against a learner. All the learners are entitled to equal treatment before the law, and to equal protection by, and the benefits of the law (Joubert and Prinsloo 2001:247).

Shaba (1998:12) states that the equality clause in Section 9 of the Constitution is of great importance as regards learner admissions to a school. A learner cannot be excluded from a school on grounds of aptitude tests or medium of instruction. Oosthuizen, *et al.* (2004:19) point out that

"…differentiation (or discrimination) as such is therefore not wrong, as long as it is not unfair discrimination".

From my personal point of view: All learners are equal and this fact has to transpire by means of the verbal and non-verbal communication from the teacher. Teachers should not focus on their own prejudices and stereotypes, but rather on the learners' rights to be themselves.

- **Privacy, respect and dignity.** Each learner has inherent dignity, and has the right to have this dignity respected. That implies mutual respect, including respect for another's convictions and cultural traditions. Every learner also has the right to privacy, which includes the right not to have his/her person or property searched or his/her possessions seized. However, the principal or an educator may search learners, based on his/her reasonable suspicion followed by the use of search methods that are reasonable in scope. (Joubert and Prinsloo 2001:247).

From my personal point of view: Although each teacher is different to any other teacher and although each learner is different to any other, everyone is equal before the law. We should see this diversity as something that makes everyone special and unique.

According to the Report on Equity in the Classroom - EIC - (2002) by the Department of Education, "…equity is fundamental to quality", and it is "…based on the belief that all children can participate, learn and achieve equally in the classroom, irrespective of race, gender, disability or learning differences within the new approaches to learning and teaching". This same Report makes mention of bias in textbooks and the curriculum, and recommends that these learning support materials should be closely looked at (Department of Education, Report on Equity in the classroom: 2002). Furthermore, teachers should observe the impact of personal beliefs and practices on pupil participation (Department of Education, Report on Equity in the classroom: 2002).

I agree that teachers should observe their classroom practises and make changes to better aspects that influence learning. It might be wise to take some time out and do a proper reflection of what is happening in the classroom.

The Department of Education has invested in specific interventions to promote gender equity, and these programmes are specifically intended to enhance women's participation in science and technology. The Girls' Education Movement techno-girl programme and the Boys' Education Movement were introduced to empower girls and boys to enhance participation in science and to give guidance in mathematics and technology (National Report on the Development of Education 2008:12). Furthermore (Department of Education, I am my sister's & brother's keeper guidebook 2008: 1) states: " The main objective of the Girls and Boys Education Movement clubs is for boys and girls to work together to promote girl's enrolment and to successfully complete studies in maths, science and technology fields, since girls have historically been disadvantaged in these fields." This movement or programme is a positive step from the government to help girls and boys achieve success in science and technology.

2.4 VALUES AND ETHICS AT THE HEART OF IT ALL

It is difficult to find one definition for 'values'. It is a multi-faceted concept that means different things to different people, and depends on the context in which it is used. A. J. Ayer, author of "Language, truth and logic", claims that *ethics* and *values* are one and the same thing, and that value statements give us information on our and others' emotions (Higgs & Smith 2002:10,12).

To Parker (2002:37, 31) 'ethical principles' are "…guidelines that steer us in the right direction".

An example of the culminating effect of different and shared values in one class, is the following: In a specific class there are more or less thirty

learners, boys and girls. There is a boy from Belgium, a number of girls from Zimbabwe, a boy from China, a boy from Russia, and the rest are South Africans. Imagine all the different values! Myself, who is their teacher, and the learners are all in one classroom together. The education system influences everyone, and is underpinned by certain values - educators, parents, learners and the community all have their own values.

Nyberg (1990: 595-611) composed significant statements regarding values in education in his article "*Teaching Values in School: The Mirror and the Lamp*". Three of these statements are discussed below:

Parents and teachers should display and live an attitude of working together. Nyberg (1990:595-596) makes the point that educators cannot be held responsible for teaching values or about values, but rather that this is the shared task of parents and teachers.

What is the point of teaching values to children or learners? Nyberg (1990: 597) states, "I think at bottom line we have two concerns. The first is *survival,* and the second is *thriving* or *flourishing*". *Survival* is the primary need: violence, vandalism, drug abuse, teenage depression and suicide, a generation equally indifferent to world history and the future of the planet – these are clear threats to both local and international survival".

Nobody wants to live in the circumstances depicted above. So clearly, everybody involved in education needs to ponder the 'why' and 'how' of values in education, for example, which values should be taught to all learners. (Nyberg 1990: 608) states, "It is important always to remember that the realm of values is not a well-structured area, nor is there a definitely agreed-on way of teaching the values we choose as the ones we ought to teach." The Constitution aims and celebrates all people. By all people I mean their religions, languages, races, genders, sex, abilities, etc. A person needs only to read the Constitution and the Bill of Human Rights to understand this. The values that underpin the Constitution will ultimately impact on the values

that underpin the education system and I think it is for every individual to decide the effect and success of this.

In a Report by the Department of Education (Values in Education Programme of Action 2002: 4) it is stated that "…an education system is envisaged where different role-players contribute to a learning environment that:

Democracy and an open society

- learners are open towards new ideas;
- learners respect the opinions of others;
- learners are able to articulate their needs and rights; and
- learners are able to resolve conflict.

A culture of human rights and non-racism

- all learners have access to all the teaching and learning that are catered for in school;
- all the learners feel valued and welcome in the classroom, irrespective of race, class, religious or language backgrounds;
- Creativity, Heritage, and Appreciation of Diversity
- learners participate with full confidence and pride in their own cultural heritage, including their language;
- learners appreciate the cultural and historical legacies of others, including international influences; and
- learners appreciate the necessity to communicate across linguistic and other barriers, and enjoy the means to do so.

Common citizenship and civic participation

- learners identify with the symbols of being a South African citizen;
- learners develop the means to participate in local and national civic spheres;

- learners appreciate the contributions of citizens of other countries and develop an African identity as well as an international perspective". (Department of Education, Values in Education Programme of Action 2002:4)

The above mentioned characteristics of a learning environment reflect a system where learners can learn about themselves and the bigger world and its issues around them.

Nyberg (1990: 602) argues that, "We do not learn morality merely by being taught about it; we need practice in working through problems in situations that require moral reflection and choice". Teachers can easily use their classes as a context where hands-on learning can take place, where learners can role-play problems and solutions regarding morality, or good and evil.

Values mean different things to every role-player in education. It is important that somewhere down this intriguing line of difference every individual should discover similarities, or be prepared to compromise, for all to benefit from the education system they are immersed in.

2.5 CONCLUSION

The concept 'professional' can have different meanings, depending on the context in which it is used. Because of the existence of professional bodies that regulate conduct and the administration of specific occupations, people have easy access to relevant information regarding professionalism in their specific fields. In education this role is fulfilled by the SACE - the South African Council for Educators. Educators have access to the SACE's Code of Professional Ethics, to which they are lawfully obliged to register, and thus to subscribe to this Code.

This chapter also investigated the South African Constitution, the Bill of Human Rights and the Employment of Educators Act, Act 76 of 1998. The laws indicating how all people in South Africa have to be treated, and the

values of democracy, equality, respect and dignity, that should guide all decision-making, are encompassed in the above.

The information gained from the literature study can be used in a research project to compare the characteristics of a professional educator to the characteristics of the participants involved in this study. The Code of Conduct and legislation can be used to compare the expected conduct of professional educators to the conduct displayed by the participants and the characteristics they display on a daily basis. This comparison is one of the means by which I would be able to deduce whether the participants act professionally as educators and, therefore, promote gender equality in their classrooms.

In the next chapter the focus will be on theories of gender issues in the context of classroom education. These issues will be elaborated on to provide the study with a theoretical framework.

Lemmer (1993: 11) states “Teachers generally consider girls to be appreciative, calm, co-operative and sensitive but less independent creative and autonomous than boys in the classroom. Pupils who do not measure up to the teachers’ gender expectations are considered deviant.” Teachers have beliefs about gender and the classroom is an environment where personal beliefs about gender roles can become actions or a set of behaviours.

These actions and set of behaviours will impact on the learners in the classroom. Furthermore, Lemmer states “The overall effect of biased interaction in the classroom is that girls experience the inferior status afforded to them within the intimate sphere of the classroom daily.”

The current situation on gender inequality will be investigated, taking into consideration how the Western world and South Africa experience gender and the sciences, specifically in education.

CHAPTER 3

LITERATURE REVIEW AND THEORETICAL BACKGROUND ON GENDER ISSUES AND TEACHING IN SCHOOLS

3.1 INTRODUCTION

Although all women are biologically very much the same, that is where the similarities end. Women who live in the same community, travel the same route, eat the same food, share certain similarities, are still ultimately different. They have different experiences, perceptions, and beliefs, and even more so, if those women belong to different cultures, have different histories and live in different geographical areas.

The focus in this chapter will be on specific gender issues from a South African perspective. The second part of this chapter will be taken up by an investigation into aspects such as language and behaviour, including actions that parents, teachers and peers can take to prevent the transmission of stereotypical values. Female role-models for girls and women, in both a Western and African context in science and technology, will also be discussed.

3.2 GENDER AS A SOCIAL CONSTRUCT

Colebrook (2004:1) argues that gender and gender issues are nothing new. People not only today grapple with these issues, but the phenomena are as old as humankind. According to Colebrook (2004:1), “Generations of humans, from pre-Socratics, Plato, Freud and New Age philosophy have been occupying themselves with thoughts of gender and the intertwined questions regarding gender and the start of the universe”.

In the next paragraph an example will be given of experiences of socialization in the classroom and the outcomes thereof. Martin (1991, in: Janssen Reinen and Plomp, 1994: 2424) states that the “…differences in attitudes toward

computers can be explained by differential socialization of males and females which results in stereotypical sex-specific roles". From this example it can be seen that what a child learns daily can influence learning in the classroom.

Social learning theories take this issue even further. Mischel (1970, in: Martin and Levy 1994: 2446) argues, "According to the traditional social learning theory, gender-typed behaviours are acquired and preserved through reinforcement, punishment, and generalization to different contexts. In these ways, individuals learn what types of behaviours are appropriate in different types of situations". In the light of the above, I came to the conclusion that people behave differently in different settings.

In respect of gender role development, Martin and Levy (1994:2446-2449) mention the following list of theories:

- The *psycho-analytic theory* - "Freud (1960) proposed one of the earliest theories of gender-role development. In his psychoanalytic theory, individuals pass through five psychosexual stages: oral, anal, phallic, latency, and genital".
- The s*ocial learning theory* - "Social learning theories have enhanced understanding as to how social agents such as parents and teachers influence gender-role development".
- The c*ognitive development theories* - "Kohlberg (1966) proposed that gender-role development is dependent on children's intellectual level, particularly their understanding of gender categories. Children go through stages in understanding gender".
- The g*ender schematic processing theories* - "Gender schemes develop because children have inborn tendencies to categorize and simplify information. Because most societies strongly emphasize gender, it becomes a salient classification dimension".

According to Kirkup (2000:3), the 1970's and 1980's feminist theory claims that gender is a social construct and is based on the biological difference or

sex differences. The reason for inequality between men and women was due to gender. Harding (1996, in: Kirkup, 2000:3) states, “Gender is a property of individuals, social structures and symbolic systems”. On the other hand, Kethusegile (2000:26) argues as follows: “Gender relations are social constructs, involving historical processes of conflict and change. They are reconstructed on a daily basis as a result of the actions and ideas of individuals and groups, and the way in which society is governed and ruled at all levels, locally and globally”. What must be indicated here is that Kethusegile (2000:26) mentioned the fact that both local and global powers contribute to how gender is socially constructed.

Terre’Blanche and Durrheim (1999:148) define ‘social constructionism’ as follows: “The research approach that seeks to analyse how signs and images have powers to create particular representations of people and objects - that underlie our experience of these people and objects - is called social constructionism”. The common ‘stop street’ can be used as an example of social constructionism by the fact that people automatically stop and obey this red and white metal road sign. Humans lawfully obey the rules that their society has created and put in place. Some people do this out of fear for the law or its consequences, and others because of some value that determines their behaviour.

Cultures also exist within social systems, and Anderson-Levitt (2006:281) describes in “Culture as meaning-making” that ‘culture’ as meaning-making includes the *tacit* and *explicit* making of meaning. The first refers to what people would recognise as logically true, and *explicit* meaning-making refers to the declaration of certain “facts” and “beliefs.” On the other hand, and “…contrary to popular conceptions there is no reason to expect to find one distinct culture per group or per community”, says Anderson-Levitt (2006: 281). Although culture does affect a person, it cannot be perceived as the only entity that constructs meaning for a specific individual.

According to Terre’Blanche and Durrheim (1999:148), “Social constructionist approaches – also referred to as ‘critical hermeneutics’ treat people as though

their thoughts, feelings and experiences were the products of systems of meaning that exist at a social rather than an individual level". Linking this statement to gender roles it would appear that society influences every person to think that society's ideas concerned with gender values would be the definite truth and obvious reality.

A different viewpoint which is worth mentioning, is the so-called *nature* versus *nurture* conception. Kim Wallen, a psychologist at Yerkes National Primate Research Centre in Atlanta, and his team observed eleven male and twenty-three female Rhesus monkeys over a period of time. They came to the conclusion that the males have a tendency to play with certain toys like wheeled toys, and dumper trucks, whilst the female monkeys would play with both soft and hard toys. Social factors like peer group pressure, culture and tradition do not influence the toy-choice behaviour of the monkeys. Wallen, however, warns that the size and colour of the toys might explain the choice (Callaway 2008: n.p)

This could mean that genetics also plays a role in what we perceive as "stereotypes and gender roles". Whether or not this is true, research on genetics will be able to shed light on in the future. In the meantime, women should still have the right to equality.

There are many theories and ideas about gender equality, but the theory of gender as a social construct is worth considering. It seems that biological differences have led to a belief in many societies that women are lesser intellectually and biologically than their male counterparts. Where many years ago, this was said without the blinking of an eyelid, in modern times it is much more implicit.

3.3 THE INEQUALITY AND VULNERABILITY OF FEMALES AND GENDER ROLES: A BRIEF DESCRIPTION OF THE HISTORY CONCERNING GENDER INEQUALITY AND EDUCATION

When investigating the history of gender inequality and education (or the lack thereof), one stumbles on too much literature that tells the tale of hardship and struggle. It is almost like a battle between being a woman/girl/female and the fight for being recognised as a human being with fundamental human rights. It is hard to believe that in South Africa there once was a time when women had very little, or even no say in their own lives.

When considering the history of Africa, that history comes with colonialism and this has had a direct influence on women and gender. The local people and resources were exploited in many SADC (Southern African Development Community) countries (Kethusegile, 2000:23). Especially women found themselves in a troubling situation. The migrant labour system meant that men would be away from their families and homes for long periods of time. Countries that were involved in the migrant labour system include Mozambique, Malawi, Tanzania, Botswana, Lesotho and Swaziland. The men went to work in the gold mines in South Africa, especially on the Witwatersrand. The women stayed on in the rural areas, and those who went to search for a better life in the urban areas soon had to face dilemmas, like only finding work as domestic workers (Kethusegile, 2000: 23). These women worked and had to care for their families. Illiteracy guaranteed that these women remained unskilled and at the lowest rank in the hierarchy.

It seems that women in South Africa, whether concerned or not about gender issues, have had an uphill battle since the earliest of times.

Kethusegile (2000:24) states, “On the political front, colonial rule provided a model of autocratic, authoritarian rule thus offering no basis for representative democracy on a national scale. Not surprisingly, therefore, most countries have developed political systems marked by patron-client relations, modelled after old chief-commoner ties, and governed by patriarchal norms, values and

governing principles. Male dominance was firmly entrenched during colonial rule, when local forms of egalitarian politics, or female power, were firmly abolished".

It seems that women had a double weight on their shoulders. This weight consisted of the role of being a woman, according to her own indigenous culture, as well as the role that colonialism had in mind for her.

But slowly and surely things started looking a bit better. In the 1960s and 1970s activists voiced their concern that governments and development programmes were not meeting their particular needs as women. Activists compiled information about women's role and contribution to development and the "…African Training and Research Centres (ATRCs) series on women in/and development in each country of Africa were a milestone in the history of this endeavour" according to Kethusegile (2000:24). Between 1980 and 1985 the Copenhagen and Nairobi World discussions followed about women of the South and North not being the same and facing their own particular difficulties (Kethusegile 2000:25). A significant point that was discussed was the position that women found themselves in (in a hierarchical way), and the power relations this encompasses (Kethusegile 2000:26). It is interesting to note that Kethusegile (2000:26) makes a good point, namely that gender is intertwined within all races and classes. No one can forever escape gender issues, and will have to face up to it at some point in their lives.

At different spheres – at national and regional levels - priority areas have been identified, and much has been done to try and improve the standing of women, but more has to "…be done to improve the quality of men and women," according to Kethusegile (2000:43). Education is worldwide seen as a tool for empowering oneself. "Most countries in Southern Africa have therefore expanded their education and training sectors as a means towards sustainable development," according to Muwanigwa (2000:239). Plans are in place to improve the position of women and girls in society. Kethusegile (2000:43) states, "Affirmative action and quotas have proved useful in accelerating women's empowerment in some countries". Women have to be

recognised as important role-players in their communities, and also in the greater society.

3.3.1 Women and education: gender vulnerability in SADC countries

According to Kwaramba and Made (2000:202), “Manifestations of persistent discrimination in girls’ access to education are still very evident in Southern Africa and many other developing countries in the world”.

I made the following observation: Some afternoons at school, just as the bell rang, I saw four girls hurtling together as they were on their way home, by public transport, *i.e.* a taxi. I worry about their safety: they walk across busy roads; wait in long queues for hours, and get into a taxi with numerous unknown adults. They leave home early in the mornings to get to school on time. I often think about these young girls travelling to and from school.

As an educator, I observe the role and effect of education on children. For many, education is a tool and a guide. It is more than just teaching and learning. Many learners experience their school environment as a place of stability and safety. For some their homes are places of domestic violence; divorce rates are high; and sometimes there is little food at home. School is the place where they can escape the realities of life, where girls and boys can just be children; or maybe that is the “ideal picture”. Many girls and boys do not have the privilege to live in this ideal picture.

3.3.2 Girls and their performance at school level

According to Kwaramba and Made (2000:203), “In South Africa where enrolment rates between female and male are virtually on par, girls have a lower pass-rate because their performance is affected by domestic responsibilities, pregnancy and sexual harassment”. Another problem mentioned by Kwaramba and Made (2000:203) concerns the fact that the curricula sometimes still present stereotypes. “In South Africa, the education system revolves around Outcomes-based education or OBE”. Clarke (1996,

in: Kotze, 2004:61) questions the equality of assessments or “fairness” when it comes to marginalised groups of people. One of these groups is “learners for whom the context of a task is unfamiliar for reasons of personal history, or of gender or of culture.” Clarke argues that some learners (as stated above) will have a problem when participating in assessment and assessment strategies (Clarke, 1996, in: Kotze,1996:60-61). Fields of study or career choices also seems to be an area of concern, because not far from South Africa, in Mauritius, girls mostly study fashion design and languages. Boys, on the other hand, study mostly technical subjects and physical sciences. Especially girls in private and one-gendered schools suffer, as they miss the opportunity to take science as a subject as private schools deem it too costly to present all the science subjects. (Kwaramba & Made 2000:204).

3.3.3 A brief description of gender inequality and education in the Western World, specifically in North America

Harraway says (1991, in: Sheffield 2004:183), “We have all been injured, profoundly. We require regeneration, not rebirth, and for the possibilities for our reconstruction, include the utopian dream of the hope for a monstrous world without gender”.

Sadker and Sadker (1997:279) state that, “For almost two centuries girls were barred from America’s schools”. Only in the 1970s and 1980s were women allowed to attend male Ivy League colleges. Separate education was the order of the day when girls were allowed to attend school (Sadker & Sadker 1997:279). In America, during the 1970s and 1980s, women were encouraged to study and work in traditional male dominated fields. Since World War II there were no more restrictions when women wanted to participate in these fields of work and study. They felt that the stereotypes of gender no longer existed (Sheffield 2004:183). In the 1980s there was a turnaround.

Sheffield (2004:183) states, “Feminist and established woman scientists have faced a conundrum. The path to these non-traditional fields of study for women are still scattered with pitfalls and barriers, but women who are

established in their fields hesitate to speak in earnest to young women about the challenges they faced ahead of them, believing that many women will opt for alternative careers".

Sadker and Sadker (1997:282) declared that "…in the twentieth century women won greater access to educational programs at all levels; although well into the 1970s gender-segregated programs were the rule". They affirm that, "Today women encounter a second generation of barriers, subtle and insidious barriers that continue to short-circuit their education and careers".

This picture that is painted of modern-day America seems to translate into many other first and third world countries, even South Africa.

The next section will focus on gender in the classroom and the role of the educator.

3.4 TEACHING AND THE CLASSROOM

This section will investigate the role of the school and of educators, and the effect of other educational factors on girls' performance in school. No school exists in isolation, but rather, forms part of a bigger community. Thus, there exists a constant exchange of ideas and expectations. As learners and their teachers form part of this small community – the school - and of the bigger community, this process of exchanging ideas and expectations will surely occur.

3.4.1 Schools and gender role transmission

Schools have different identities due to factors such as its history, organisation, its culture and the community it serves. It would be advantageous if educational institutions did critical reflections on what values their teachers are conveying to the learners. According to Delamont (1990, in: Swann & Graddol, 1995:135), "…schools develop and reinforce sex segregations, stereotypes and even discriminations which exaggerate the

negative aspects of sex roles in the outside world, when they could be trying to alleviate them".

It seems that the classroom is a place where role transmission occurs continuously. Swann and Graddol (1995:135-136) claim that, for instance, teachers spend more time talking to, focusing on and listening to boys than to girls in the classroom, and topics that interest boys are also more frequently selected to speak about. Certain behaviours, like shouting out answers are also more acceptable in boys than in girls. Focusing specifically on discussions in the classroom between teachers and learners, it has been indicated that boys have a greater chance to actually speak in class (Swann and Graddol 1995:135-136). Furthermore, Sheffield (2004:190) argued the same point, namely, "Teachers have paid more attention to boys in the classroom than they have to girls, allowing boys to talk more and to engage with the teacher more often. Teachers have also tended to encourage boys to question and to learn from their mistakes while expecting that girls be quiet and compliant". Thus it seems that boys have the final say in many of the classrooms, and not because of their own doing, but rather because of the attitudes of their teachers. It must be mentioned that not only do teachers influence the learners they teach, but there are other contributing factors too. The next section will investigate a number of these factors.

3.4.2 Factors affecting girls' educational achievement

The Forum for African Women Educationalists (FAWE), (Muwanigwa 2000:240) indicates that there are four main factors affecting girls' achievement in schools:

> *"The persistent apprehension, fears, myths and ambivalence on the part of the parents, teachers, children and society at large towards female education, its cost effectiveness and the value of keeping girls at school. There is furthermore poor quality of the teaching/learning environment, particularly in the rural areas, under which the majority of the children in the region are*

expected to gain education, but from which most children, particularly girls, emerge as repeaters, drop-outs and failures. Girls, in many communities are seen as contributors to their own households and even larger families. The high level of wastage in the education system and the consequent inefficiency discourages parents, teachers and students. Girls' perception or low value of their status and role in society, their academic potential and the value and significant benefits of remaining in school and attaining the highest level possible."

In many communities women are, from a very young age, perceived as the caregiver in families. To merely survive is hard work, let alone having time for learning or for further studies. When a girl grows up with this state of mind, it must be difficult to focus on other things such as schoolwork, where the responsibility for the family and basic survival lie heavily on her shoulders.

A social phenomenon that affects girls' performance is pregnancy. In the case of Namibia, Kethusegile (2000:228) mentions, "Teenage pregnancy is reported to be prevalent and growing as a social problem". Pregnancy is also a reason for girls dropping out of school, thus contributing to a higher dropout rate in females than in males (Muwanigwa 2000:245). The Department of Education has set in place guidelines for schools on how to cope with pregnant learners at school, namely "Measures for the Prevention and Management of Learner Pregnancy". In accordance with the Constitution, the South African Schools Act, and the Promotion of Equality and the Prevention of Unfair Discrimination Act (No 4 of 2000), school children who are pregnant may not be unfairly discriminated against. (Department of Education, Measures for the Prevention and Management of Learner Pregnancy 2007: 2).

3.4.3 Educators are major role-players in the lives of girls

Many teachers will tell you that their learners take everything that they do or say to heart. This implies that teachers are role-players in the lives of their

learners. Not only do they play a significant role, but they can also contribute positively to their learners' intellectual prowess and emotional stability.

Kwaramba and Made (2000:207) make the following suggestions:

- Encourage teachers to set and maintain high standards for both boys and girls. Teachers should expect a high work ethic from their learners, as many learners will strive to live up to expectations.
- Sensitise teachers to the effects of gender-stereotyping and disparaging comments. This should especially happen during teacher training. Would-be teachers have to understand and prevent any negative action that will lead to discouraging their learners.

Burton and Povey (1996:129) state that,

> *"It has been our experience when working with prospective teachers of mathematics that the issue of equal opportunities is one that is taken seriously, information about it is welcomed, and student teachers tend to rate it highly on their learning agendas. However, empirically, the equal opportunity map in the mathematics classroom is not being substantially re-drawn"*.

- Ensure that girls and boys have equal access to textbooks and instructional materials, and this access should not be determined by their sex.

This study will bear these suggestions in mind, as well as the other findings emanating from the literature, and will incorporate these into the study on the Influence of the teachers' conduct in the science and technology classrooms (see chapter four).

3.4.4 The classroom environment and career choices: what can be done to improve the future for girl learners?

Many women feel that a career in science is not for them. Even if they do achieve and do well, they are still not treated as equals of men. Although there are many success stories of woman pursuing scientific careers, the contrary is more true. Despite impressive role-models in science, many women decide to leave these fields early on in their careers. This negative perception can also be ascribed to the attitudes of their teachers, and the education system itself (Sheffield 2004: 187).

The influence of especially Marie Sklodowska (later Curie) and her older sister Bronia Sklodowska, is worth mentioning here. They had a "…thirst for education, and education was inseparable in their eyes from the emancipation of women, which they considered a major element of social progress," according to Giroud (1986:17). This "*thirst for education"* invoked in these women a will to stop at nothing to pursue their careers.

Stereotypes affect a girl's perceptions of a career, and this may even start with those closest to the learner. Sheffield (2004:189) explains this in a powerful example, "A mother simply comforting a daughter that she was never good at maths either reinforces the acceptability of girls obtaining poor results in the sciences". Peer pressure (from girl groups) plays a role in girls bullying the group members (girls) to obtain bad marks because it might not be "in" or acceptable to a specific group to excel in a traditional male subject (Sheffield 2004:189). Linked with this concept of stereotypes is sexism. Ayim and Houston (1996:19) refer to 'sexism' as a "social disease" and "…reminds us that sexism is something that pervades a very broad range of human activity. It is tied up with our thinking, our everyday activities, our social institutions, laws, and policies as well as the most intimate of our relations with one another. It is indeed a multifaceted phenomenon". This clearly indicates that stereotype values are not only found in the classrooms, but in almost every sphere of life.

Sheffield (2004:189) mentions that even "…discouragement has also been institutional". I can clearly remember, as a young girl in high school, that the girls were not allowed to take subjects such as technical drawings or woodwork, and the boys were barred from home economics and typing. And that was that.

Sadker and Sadker (1997:460) make the following suggestions for teaching in a non-sexist, but also non-racist manner:

Questioning strategies:

- Calling on students: Do not rely on the "quickest hand in the West", which is usually attached to a male. Develop other strategies for student participation besides hand-raising.
- Wait time 1: 'Wait time' can be a big help in promoting equity. Giving yourself 3 to 5 seconds before you call on a student allows you more time to think, to choose which students have not been participating, and who could benefit from your extra attention.
- Wait time 2: Give yourself more time after a student speaks as well. Waiting will give you the opportunity to think about the strengths and weaknesses of a student's answers, to be more specific in your reactions, and to provide girls with more specific feedback.

Classroom organisation:

- Segregation: Avoid segregation seating patterns or activities. Sometimes teachers segregate: "Let's have a spelling bee (spelling competition) – boys against the girls!" At other times students segregate themselves. Gender, race or ethnic groups that are isolated alter the dynamics of the classroom and create barriers to effective communication among students, as well as obstacles to equitable teaching. If necessary, you will need to move students around to create a more integrated class.

- Mobility: Students sitting in the front row and middle seats receive the majority of the teacher's attention. If you move around a room you will get different students involved. By the way, students are mobile too. You may want to change their seats on a regular basis to more equally disperse classroom participation.
- Cooperative education: Research suggests that when students choose their own cooperative learning groups, inequity also emerges. For instance, in cooperative learning groups, girls tend to assist both other girls and boys, while boys are more likely to help only other boys. It is a good idea to monitor your groups, in order to intervene and stop these inequitable patterns.
- Displays: Check your bulletin boards, your displays, your textbooks. Are women and minority groups represented? Should you find other resources to supplement these materials and create a more equitable classroom climate? Do you remember the phrase, "If the wall could speak…?" Well, in a sense they do. What messages are the classroom walls and curriculum sending to your students?

Sheffield (2004:190) argues that, "Girls' dislike of, and perceived inability in science is a learned attitude encouraged by science's apparent contradiction with the preconceived parameters of femininity in western society. A different educational approach to science could change this attitude". If this is a dislike that girls have learned over time it may be possible to teach girls and help them learn to enjoy science, or related fields. So, education holds a key (one of many) to teach girls new or different attitudes towards fields of study they did not feel inclined towards in the past (Sheffield 2004:190).

The following suggestions are made by Sheffield (2004:190-192) and Smith (166-180):

- Female-friendly science: Teachers and teachers-in-training should be educated to be sensitive or aware of unconscious messages they send to girls and their involvement in science. For example, girls should be

made to feel welcome in any science or technology classroom. Educators could even make use of special induction programs for girls to familiarize them with equipment and procedures.

- The early years: Learners should already be learning about maths and science in their early years. Science, technology and maths should be incorporated in all the different learning areas, showing its relatedness in all the areas of life.
- Fear: Teachers can help girls to face up to fears concerning science and maths. They can introduce new and more difficult knowledge and skills, using appropriate and learner-friendly methodology. Smith (2004: 167) states that it is the teacher who should encourage communication or who should be talking to the learners and adults concerning how we all build an identity linked to gender.
- Stereotypes do exist: The classroom should be used to confront stereotypes about girls/woman and science. Stereotypes that are pervasive should be discussed and strategies should be devised for overcoming these challenges. An example used by Smith (2004:171) is the following, “Historically, boys’ and girls’ successes and failures have been interpreted differently by commentators. There has been a tendency to attribute boys’ achievement to something within – their innate brilliance or natural potential – whilst their failure is attributed to something external – teachers, teaching methods or texts. Likewise, girls’ failures are attributed to something within – usually the nature of their intellect – and their successes to something external – their teachers or the context – or devalued, as being due to lower-order qualities such as neatness or diligence”. The reasoning behind factors influencing achievement is again due to biological differences, differences due to intellect, or skill levels.
- Language: Use gender-neutral language in the classroom. I write from my own experience, “I have realised that when speaking to the grade fours I would frequently say, ‘Guys, please take out your stationary’. Obviously, I am referring to the boys and girls as ‘guys’. I have now consciously changed the way I speak to the learners, using gender-

neutral language. I now say: ‘Grade fours, please take out your stationary’”.

- Problem-solving: Problems to be solved can be stated to learners that contradict current stereotypes about men’s and women’s role in society. The types of problems will differ because of age. For a grade ten class you could indicate how men and woman have contributed to the enrichment of the local communities.
- Toys: Girls should be introduced to and given a chance to explore toys that are usually meant for boys. Girls can then also learn new skills that go hand in hand with these toys. Think especially of the pre-school and foundation phases where learners still spend a lot of time playing. Cars, bikes, building blocks and plastic soldiers are only a few examples of the toys usually associated with boys.
- Female role-models: Learners should be given the opportunity to learn about female scientists and their achievements, such as Marie Curie, Lise Meitner, Ellen Henrietta Swallow Richards, Evelyn Fox and Maria Mitchell, to name but a few. Smith (2004:177) claims that role-models are important to both girls and boys, and learners should be exposed to many adults who play or have played important roles in their communities.
- Positive reinforcement: Teachers should build girls’ confidence in themselves and in their abilities. For example, when a learner focuses on what he/she did wrong in an assignment or task, try to get the learner focused on what s/he did right. Explain how to improve, and let the learner experience doing it correctly by him- or herself.
- Monitor behaviour: Learners may also have a disabling effect on one another. Teachers should monitor all their learners’ behaviour, especially behaviour that impacts negatively on others. The teacher should address negative behaviour or language as soon as possible. Indicate alternative behaviour to the learner and congratulate him or her on his/her positive behaviour. Smith (2004:169) argues that when the teacher spends some time observing the learners they might want to ‘challenge’ or even face their own ‘sense of self.’ While teachers

observe what their learners are learning they themselves might be learning.

- Variety of learning skills: Teachers should expose their learners to a variety of learning methods, such as collaborative work, competitive work, group-work, problem-solving, discussion, lectures, and a variety of assessment techniques.
- Teaching aids: Textbooks and visual aids should recognize women's participation in science.
- Benefiting boys: Strategies like these can also benefit boys. Boys are more likely to feel motivated by social pressure to stay in the sciences because of their career aspirations, where girls may more easily drop out. In many societies and cultures a man is seen as the 'provider', 'breadwinner', the wage-earner or the main source of income. Therefore, the young boys may grow up with the knowledge that one day they will have to be responsible for their families.
- Job opportunities: Teachers are able to convey the accurate information concerning job opportunities that exist in science. Also, invite parents or community members to come and speak to the learners about careers in science and technology. There are many fields that teachers could focus on, like medicine, agriculture, social sciences, accounting, the building trade, natural sciences, *etc.* An architect may be invited to address the learners on how she uses science, technology and maths in her work.
- Relevance: Science and maths must be made relevant in girls' lives and interests.

Sheffield (2004:192) mentions*, "Studies show that girls and women are particularly interested in applied science, knowledge that goes beyond the theoretical to incorporate the real, physical, and social world outside the classroom and that addresses the ethical issues or discusses the social and political context of the science being discussed. Allowing students to engage in real-world projects that impact on the community in which they live or participate in some form of activism allows students to see how they can affect the world around them"*.

Smith, in the article entitled “Gender Issues in Primary Schools” (2004:179) names key points to consider in improving gender issues at school level:

- Gender behaviours are not predetermined, but socially constructed.
- Each child needs to develop his/her own sense of identity and what it means to him/her to be female or male.
- Generalizations about gender-related achievement and behaviour are not helpful to a teacher committed to valuing each child as an individual.
- The teachers’ own attitudes and beliefs about appropriate behaviour for boys and girls influence the way they respond to stereotypical and non-stereotypical behaviour in children.
- Primary school children need positive male and female role-models.
- Stories and narratives are central to developing a child’s understanding of him/herself and how he or she functions in the world as a boy or a girl.
- ‘Reflective talk’ is a key feature at school where all the pupils, girls and boys, can be educated to understand their own identities.

Teachers can use a combination of methods and strategies to ensure gender equality during their teaching in the classroom. The above strategies may help the teachers to identify intentional and unintentional behaviour, verbal and non-verbal messages, and/or language that can prevent inequality in the classroom. School principals and teachers should grasp the immense power that they have in their schools. More importantly, they should improve the physical and emotional conditions in order for girls to engage in and take part in science and technology. Schools can have excellent policies on gender equality but the teachers are ultimately responsible for the implementation in the classroom. Lloyd and Duveen (1992, in: Smith 2004:175), “Authorities may identify approved attitudes but they cannot prevent teachers from holding other beliefs”. Teachers should therefore regularly check their personal beliefs.

In the next section the importance of role-models to influence girls' perceptions about subject and career choices, with specific reference to science and technology, will be discussed.

3.5 ROLE-MODELS FOR GIRLS AND WOMEN IN RESPECT OF SCIENCE AND TECHNOLOGY

In this study the aim is to promote the equality of gender in the classroom through being sensitive to the educators' own professional conduct. Schools cannot be held solely responsible for addressing gender issues. The society at large and the communities should contribute to these issues as well. The scars of gender inequality can be seen in accounts of daily human activity. Role-models are needed to indicate that obstacles do exist and can be overcome.

According to Richter and Tyeku (1999:193), "For many developing countries, including South Africa, science and technology, judiciously directed and applied, holds the key to social development. Democratisation, equity and redress, the cornerstones for post-apartheid South Africa, rely on higher educational levels, science and technology development, increased wealth and better understanding of the human and social factors involved in technological applications and advances".

To bring about change, that is, address gender inequality, a good start is to showcase positive role-models in science and technology.

However, not all the researchers agree to the positive effect of role-models. Some writers believe that the problem with role-models is that it takes some responsibility away from the person looking up to the role-model because it may be too easy to forget that this person had to actually work very hard, probably had some access to resources, and will still face more obstacles (Fisher 1988, in: Houston 1996:146). Furthermore, Houston (1996:158) suggests that teachers include a wide variety of model-making resources in

their classroom, and thus give learners a chance to evaluate the role-model, based on their personal choice.

3.5.1 Marie Curie: A historic Western role-model for girls and women

Whether or not people actually know the story of Marie Curie, most people know that there exists a link between her and science. She won two Nobel prizes, one in Physics and the other in Chemistry (Sheffield 2004:xv). For many women she is an icon, the forerunner for all women pursuing the once heavily guarded field of 'Science.' 'The Times' compiled a book called "Great Lives: A century in obituaries (2005)" and the opening statement to Madame Curie's obituary reads as follow: " 4 July 1934, Mme Curie, whose death we announce with regret on another page, had a worldwide reputation as the most distinguished woman investigator of our times". Marie Curie is a legend in her own right. She did not, however, have any super powers, but rather, she worked feverishly, with impeccable dedication. Giroud (1986:1) states, "She was a proud, passionate, and hard woman who played an important role in her time because she had the ambition and the means to do so, and who has played an important role in our time too, since there is a direct relationship between Marie Curie-Sklodowska and atomic energy". She succeeded where no woman has even ever tried. She is doubtlessly a motivation for girls and boys alike.

Sheffield (2004:xxix) states, "But the retelling of Marie Curie's struggles and failures allows us to recognize her battles as a reflection of the cultural norms and values that have, and often still do, inhibit women's ability to achieve scientific renown in a patriarchal society and a male-dominated profession". A lesson that can be learnt from her dedication and commitment is that constant reflection on societal values can bring about change and, hopefully, improvement for every member of society.

Marie Curie was not only involved in science, but also in industry. Xavier Roque indicated that Curie was not only a scientist but she also had an "…integrated vision of industry and scientific research", as indicated in his

article “Marie Curie and the Radium Industry: A Preliminary Sketch in History and Technology (1997)” (Sheffield 2004: xxxiv).

According to Sheffield (2004:xxxii), “Marie Curie’s life story exemplifies the struggles women faced to gain access to and participate in science in the late nineteenth and early twentieth centuries. Many women throughout modern western history have faced similar barriers, but like Curie managed to find a path to science”. Because of this woman and her dedication to science, and also many other women, women are now able to study science, and related fields.

From Marie Curie’s work and life it can be seen that women faced adversity from early times when trying to enter and pursue a vocation in science. Gender has been used as the filter to separate, not the intelligent from the unintelligent or the willing to learn from the unwilling, but male from female.

3.5.2 Mamphela Ramphele: A role-model for girls in South Africa

When investigating Mamphela Ramhele’s track record it is easy to see why she is seen as a modern-day heroine. In her book *Laying Ghosts To Rest, Dilemmas of the transformation in South Africa*, Ramphele takes a hard look at sexism as a disconcerting demon in South African society.

Ramphele is an immaculate role-model for girls and women. She turned relentless obstacles into triumphs. These triumphs were not only personal, but many people are still benefiting from her efforts.

What makes Ramphele special is the fact that she was a victim of apartheid, but triumphed. South Africa had its first democratic elections on 27 April 1994 and on 10 May 1994 the inauguration of President Nelson Mandela took place (Ramphele 2008:38-39). These two dates resound in the hearts of all true South Africans as the time that the “rainbow nation” was born.

Mamphela Ramphele is a medical doctor, and she holds a Ph.D. in Social Anthropology. She first rose to prominence in the 1970s as an activist and, with Steve Biko, a founder member of the Black Consciousness Movement. (Ramphele 2008:343). Further endeavours and achievements include serving on the boards of the South African Labour and Development Research Unit at the University of Cape Town, the Equal Opportunities Research Project, and Idasa. From 1996 to 2000 she was Vice-Chancellor of the University of Cape Town. She was appointed managing director of the World Bank in Washington DC in 2000. She currently chairs Circle Capital Ventures in South Africa. The awards she received include the Global Health Science Award, the Kilby Award, and the Outstanding International Leadership and Commitment Award for Health, Education and Social Development. (Ramphele 2008: 343).

To say women had a tough time in the past, is putting it lightly. An example of professional women's struggle while being pregnant and working, could be illustrated as follows: Ramphele (2008:67) states, "Until the early 1970s female teachers were forced to resign each time they went on maternity leave, resulting in the erosion of their years in-service credits. As late as the early 1990s no female civil servant was entitled to maternity leave". To think that female civil servants could have no maternity leave, thus not being able to spend quality time bonding with their new babies, is a gross form of gender inequality.

Violence is not an unknown phenomenon in most countries. According to Ramphele (2008:103), South Africa is known for the highest recorded prevalence of violence against women. In many of the cases of physical or sexual abuse, the woman actually knew the person responsible for the acts of abuse (Ramphele 2008:103).

Ramphele (2008:75) indicates, "In our own society, we seem to be torn between the values of our human rights-based Constitution and traditional practices that violate some of those rights. While gender equality is firmly

entrenched in the Bill of Rights as part of the inherent equality of all human beings, women are still being treated as lesser beings in the name of culture". It seems that in what we *perceive* as modern times, culture and cultural believes still seem to play the predominant role.

The common denominator in sexism, whatever the language, race, culture or religion, is that women are perceived as lesser, biologically and intellectually than men in most spheres of life.

Ramphele (2008:105) rightfully asks, "How can we build a strong nation anchored on a value system reflecting the human rights principles enshrined in our Constitution if some men and their families are caught up in identity crises that preclude equality between men and women?"

3.6 CONCLUSION

In this chapter a number of gender issues were inspected, specifically from a Western and an African perspective. Gender as a social construct, and what this mean for the learners, were discussed. Women's vulnerability was also addressed. In the Western world many women had similar, but also different *experiences of inequality* due to gender difference. The role of the school and the teacher in transferring gender stereotypes and gender roles were investigated. Gender issues in the classroom were discussed and recommendations were made for improving gender sensitivity. The important contributions of Marie Curie, from a Western perspective, and Mamphela Ramphele, from a South African perspective, were discussed. These two women are depicted as role-models for females, because both had to overcome obstacles to reach the top. It was concluded that schools and society at large share the responsibility of addressing issues of gender equality and gender sensitivity.
The next chapter will comprise of the research methodology and the research design.

CHAPTER 4

RESEARCH DESIGN AND METHODOLOGY

Terminology: PAR: Participant Action Research

4.1 INTRODUCTION

The approach followed in this study falls within the realm of qualitative research. According to McMillan and Schumacher (2001:395), “Qualitative research describes and analyzes people’s individual and collective social actions, beliefs, thoughts, and perceptions. The researcher interprets phenomena in terms of the meanings people bring to them”. I will try to make sense of the findings or to develop a greater understanding of what is found in the results. My personal subjectivity will play a role in interpretation of data. However, in order to minimise any bias, I will declare all factors including my personal experience and history, which could have an influence on the findings

McMillan and Schumacher (2001:31) indicate that, “…the purpose of a research design is to provide, within an appropriate mode of inquiry, the most valid, accurate answers possible to research questions”. Durrheim (1999:29) describes a ‘research design’ as a “bridge” between the research question and the actual implementation thereof.

In this chapter participative action research, as a mode of inquiry within the broader framework of a qualitative research approach will be investigated. In the literature the following concepts, namely action research, participatory research, co-operative research, and participatory action research are often intermingled. Although each concept is indicated separately in research literature they are often mentioned together in the same text.

There are many different definitions for ‘action research’. Greenwood and Levin (1998:4) indicate that “…action research is social research carried out by a team encompassing a professional action researcher and members of an

organization or community seeking to improve their situation. Action research promotes broad participation in the research process and supports action leading to a more just or satisfying situation for the stakeholders". Collins (1999:2) defines 'participatory research' as "… the collective generation of knowledge which leads to the planning and achievement of jointly set objectives".

Kemmis (2009:463), in his article "Action research as a practice-based practice", explains that the goal of action research is to "…change people's practices and their understandings of their practices". Action research can make a change, which results in better action but the opposite can also happen. If the results are unsustainable for the participants or the students, then the impact of the action research is unconstructive (Kemmis 2009:464). It is important to ensure that the action research actually contributes to the context in which the study takes place.

In an explication of 'action research' by Reason and Bradbury (2001:1), they state that "…action research is a participatory, democratic process concerned with developing practical knowing in the pursuit of worthwhile human purposes, grounded in a participatory worldview which we believe is emerging at this historical moment. It seeks to bring together action and reflection, theory and practice, in participation with others, in the pursuit of practical solutions to issues of pressing concern to people, and more generally the flourishing of individual persons and their communities".

Figure 4.1 indicates the characteristics of action research.

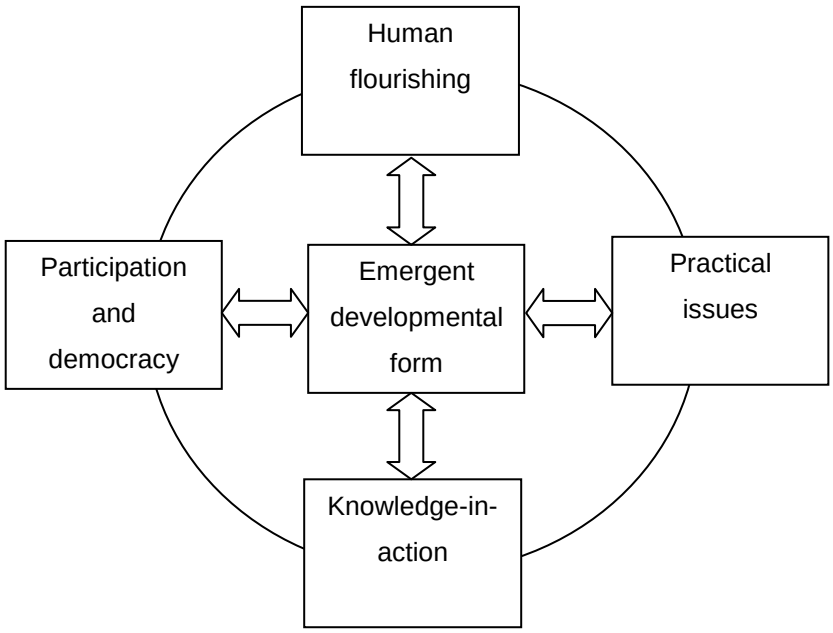


Figure 4.1: Characteristics of action research
Source: Reason and Bradbury (2001:1)

Research in the field is important because it uses current data to understand and improve specific actions in education. Studying the participant's behaviour in this study will help me to understand them better. Johnson (2008:32) states, "Among other things, research is used to build theories that in turn help determine the best practices in education".

I would want this study to create a deeper understanding or to raise the active awareness of this phenomenon within the specific context. When teachers engage in action research it opens them to becoming life-long learners, developing and monitoring their teaching methods (Sowa 2009:1027). Being life-long learners is envisaged by the Department of Education for all its educators. When educators learn and keep up with the latest developments in the field of education and the learning area content, they can indeed be considered to be life-long learners.

4.1.1 Methodology employed in this study: Participatory Action Research

This study hopes to improve the teachers' awareness of gender bias in the science and technology classrooms. Action research will be employed to empower teachers to better their professional growth and awareness. Johnson (2008:33) makes the point that "…empowered teachers are able to bring their talents, experiences and creative ideas into the classroom. They can implement programs and strategies that best meet the needs of their students". Hensen (1996, in: Johnson 2008:35) states that action research has the following benefits, namely it

- helps teachers to develop new knowledge directly related to their classrooms;
- promotes reflective teaching and thinking;
- expands teachers' pedagogical repertoire;
- puts teachers in charge of their craft;
- reinforces the link between practice and student achievement;
- fosters an openness towards new ideas and towards learning new things and
- gives teachers ownership of effective practices.

This research has the potential to raise critical awareness in the participants about their own practice. Even if these technology and natural science teachers only reflect on their teaching-learning dynamics in the classroom or laboratory, then this research would have made an impact.

A microscope is used to see things we cannot see with the naked eye. Participatory research is used to highlight the things teachers say and do of which they are either aware or are not aware.

Collins (1999:52) mentions that participatory research is a collective endeavour. It is not dependent on the researcher or the participants, but on

the dynamics between the two. It will take the effort of all the participants to come up with a strategy that best explains their own behaviour and the change of behaviour, if any.

According to Reason and Bradbury (2001:2), any kind of research that is participative of nature is also action research, and there is no distinctive difference. Not only is action research a tool for generating a deeper understanding of phenomena, but also for seeking solutions to problems and for bringing about positive changes in problematic situations.

4.1.2 Theoretical framework

This project is built on the premise that the concept of gender roles is socially created in different societies and communities, and then adopted and internalised by the people in that community. Terre'Blanche and Durrheim (1999:148) state, "Social constructionist approaches treat people as though their thoughts, feelings and experiences were the products of systems of meaning that exist at a social rather than an individual level." In this study the participants make their own meaning from their personal experiences. They constantly analyse and synthesise the meaning of their surroundings, their experiences and their beliefs.

McMillan and Schumacher (2001:396) indicate that, "Qualitative researchers believe that reality is a social construction, that is, individuals or groups derive or ascribe meanings to specific entities, such as events, persons, processes or objects. People form constructions as viewpoints, perceptions and belief systems". The participants in this study will also have their own ideas on gender, which are influenced by the environment they live in and that they are part of.

4.2 AIMS OF THE STUDY AND PROBLEM FORMULATION

The aim of this study is to find out what kind of conduct a professional teacher exhibits that may convey messages of stereotypical values or beliefs about

gender roles in the science and technology classes. It will be interesting to note how different teachers view what they do in their classes every day.
This study will be done in the classrooms of a primary school with teachers in the science and technology learning areas. The primary school environment lays the foundation for subject choices in high school, which then often lead to career choices. For example, a learner will have to study science and maths at secondary school (Further Education and Training) if she/he wants to study medicine or engineering. Primary school teachers will either instil in their learners an enthusiasm for science, technology and maths, or a dislike or fear of these subjects.

Teachers are human beings who form part of a community with particular attitudes and beliefs. The aim is to understand how teachers convey gender-neutral messages to their learners in the technology and science classes. How are teachers sensitised to gender issues in the classroom? Teaching does not only take place within the four walls of a classroom, but also in the entire context of the school. The action research project is used to shed light on what happens during the interaction between educator and learner.

Johnson (2008:136-137) indicates that a Participatory Action Research project often results in one of the following outcomes:

- *A greater understanding of the situation, the child, or students in general*: Describing how these interactions or instruction will change to reflect this greater understanding.

In this study the opportunity existed for educators to develop a better understanding of the effect of their behaviour on the learners and the learning environment, in this case, the science and technology classroom.

- *The discovery of a problem:* Finding and defining a problem are the initial elements of the problem-solving process. Using problem-solving

strategies to create a plan of action. Once a plan has been created, it can be implemented and evaluated.

In this study the educators involved identified a problem, and brought forward solutions to aspects that hamper teaching and learning in the science or technology classroom. These solutions served as tools for educator empowerment.

- *A plan, program, or pedagogical method is found to be effective:* An action research report would describe why and how it is effective and allow you to make out a case for its continued use. Also, even with an effective plan, program, or pedagogical method, some elements can be made more effective. They have to be identified.

In this study teachers would be asked to reflect on their own classroom interaction practices.

- *A plan, program, or pedagogical method is found to need modification.* Any new plan on paper often does not result in its perfect functioning in reality. Having to adjust and adapt is a normal part of doing anything new or innovative. An action research study is used to identify the elements that need to be modified and to describe how they will be changed.

In this study any inappropriate gender messages need to be changed.

- *A plan, program, or pedagogical method is found to be ineffective.* Action research can be used to document the ineffectiveness of a program. The research report can be used to support the change or elimination of the plan, program, or pedagogical method.

When teaching science and technology teachers should be able to reflect on their own teaching methods.

Johnson (2008:136-137) described each outcome and I applied it in the context of this study.

- *The problem statement: How can the professional conduct of a teacher combat the transmission of stereotypical gender roles in the science and technology classes in a primary school?* There will be some kind of outcome. Educators need to become conscious of the fact that they are important role-players in the lives of the young children they teach, particularly in areas such as science and technology, which were/are regarded as predominantly male areas of interest.

In this study the following methods will be focussed on, namely participant observation, learning-by-doing, discussions, interviews and the presentation of a lesson. Permission will be sought from the educator to observe a lesson where any of the interventions are being implemented.

4.3 DATA COLLECTION TECHNIQUES AND RESEARCH METHODS

All research methods contain certain details which are typical to that research. According to Durrheim (1999:42), “Qualitative methods allow the researcher to study selected issues in depth, openness and detail as they identify and attempt to understand the categories of information that emerge from the data”. This study will be done from an interpretive perspective, which Terre’ Blanche and Kelly (1999:123) describe as follows, “Researchers working from this tradition assume that people’s subjective experiences are real and should be taken seriously (ontology), that we can understand others’ experiences by interacting with them and listening to what they tell us (epistemology), and that qualitative research techniques are best suited to this task (methodology)”.

Participatory action research makes use of a number of methods which are commonly used. These include participant observation, surveys, secondary data analysis, learning-by-doing, dialogue, political action, group-work and

discussion, interviewing, mapping, story-telling, community art and media, diagramming, educational camps, exchange programmes, ranking and scoring, shared analysis, writing and presentations (Kindon, Pain & Kesby 2007:17).

The four dimensions of a research design, according to Durrheim (1999: 33) are "…the purpose of the study, the theoretical paradigm informing the research, the context or situation within which the situation is carried out, and the research techniques employed to collect and analyse data".

This specific action research project will endeavour to explain the behaviour of teachers that combat any form of stereotypes in their classrooms.

The following methods and techniques will be used in this project:

4.3.1 Focus groups as part of Participatory Action Research

According to Kitzinger and Barbour (1999:4), "…focus groups are group discussions exploring a specific set of issues. The group is 'focused' in that it involves some kind of collective activity".

The group generates the data (Kitzinger and Barbour 1999:4). The participants in the focus group are encouraged to talk and listen to one another, ask questions about experiences and knowledge, and make comments (Kitzinger and Barbour 1999:4). Furthermore, Kent (2000:81) makes the point that "…the importance of dialogue and communication in participatory research point to a number of issues for the legitimation and validation of the method. In effect, the quality of the dialogue and effectiveness of the communication determine the extent to which agreements, or research outcomes, are to be expected". The participants in the focus groups are all different people with their own unique characteristics. By bringing all the different viewpoints and experiences to the discussion it expands the channels of communication.

4.3.2 Mind maps

Mind maps are used in conjunction with the focus group discussions. It is a tangible way for the participants to express their thoughts on the topics discussed. Paper, pens and highlighters were provided for the participants to use during the session. The participants could write whatever and how much they wanted to on the topic under discussion.

4.3.2.1 The participants develop their own strategy of intervention

Greenbaum (2000:3) indicates that "…the intent of using the group for the discussion is to encourage the participants in the session to interact with each other so that the quality of the output is enhanced". Park (2001:81) argues that dialogue between the participants are important, and he mentions that, "…dialogue occupies a central position as inquiry in pursuing the three objectives of participatory research, and the knowledge associated with them, by making it possible for participants to create a social space in which they can share experiences and information, create common meanings and forge concerted actions together".

Action research allows teachers to become 'agents of change' (Sowa 2009: 1027). The participants expand their own ideas and strategies. If they are involved in the developing process of interventions they are more likely to put the interventions into operation as well.

Greenbaum (2000:144-145) suggests the following two techniques to encourage full group participation during focus group sessions:

- Use articulation questions in the screening process. Essentially, an articulation question is intended to be something that will make the prospective focus group participant think a little before answering, to determine if the person is capable of providing a reasonably clear answer. The question should be open-ended, and will not have a "right" answer.

- Communicate to the participants that it is important that all of them share their views during the group session.

In this study I will be asking the participants questions about their own classroom practises and their experiences. These experiences can be used to devise a way to improve gender equality in the science and technology classes. It was expected from the teachers to share their thoughts on professional educators and gender equality in education. All the information was recorded by means of a Dictaphone and micro tape. The participants were encouraged to share their thoughts, even if they did not agree with the opinions being expressed. There existed a general feeling of respect for one another amongst the participants.

4.3.2.2 The participants implement their own strategy

Sowa (2009:1030) indicated that in her project, also making use of action research, the importance of reflection or self-reflection as a process during research. Sowa (2009: 1030) claims, "…the data showed that reflection was a crucial factor contributing to the changes in their teaching. All the teachers noted that their experiences had made them more reflective and critical about their teaching". The teachers should be able to go to their own classes and decide which of their practices are good and sustainable and which can be improved on. This will create an environment where learners and teachers can grow personally, as there is a continued reflective practice.

Kemmis (2009:466) uses the example, namely "…what education means (thinking, saying) to a teacher is always already shaped by ideas that pre-exist in various discourses of education; how education is done (doing) is always already shaped by the material and economic resources made available for the task; and how people will relate to one another in educational settings and situations (relating) is always already shaped by previously established patterns of social relationships and power".

In this study the educators came up with an intervention strategy (see 5.3.2 for the intervention strategy) within the contexts of the group discussion. This also included a way to monitor and record their own behaviour and the effect on the learners in their classrooms. As a participant myself, I also made suggestions to improve the classroom practice. The participants went back to their classes to implement the interventions over a period of time, and afterwards they gave feedback by means of research journals, interviews and class observations.

4.3.3 Research journals

The research journal is an A4 book of 72 pages with lines. The research journal was used as a log journal to record data in the participants' classrooms. Thoughts and ideas on the interventions were recorded. Any other information which was considered of value to the participants, was also recorded in the journal. Each entry was done at the participant's own discretion. An important outcome of the research journal is that it presented an opportunity for reflection. From this reflection, it is believed, stemmed the participants' change in their classroom practice.

4.3.4 Interviews after the intervention

Interviews were conducted *after* the implementation of a new strategy. Michell (1999:36) argues that interviews should be held with members of the focus groups in order to gather information from them. Focus groups can be hierarchal and can cause some voices to be silenced. The interview will then give these participants the opportunity to speak their minds (Michell 1999: 36). Sidhu (1984:145) states that, "The interview is a conversation carried out with the definite purpose of obtaining certain information by means of the spoken word". The interview is an important way to gather data because

- the interviewer can probe into causal factors, determine attitudes, discover the origin of the problem, involve the interviewee in an

analysis of his own problems and secure his cooperation in this analysis;

- perhaps no research technique is as close to the teacher's vital problems as the interview;
- it is superior to many other tools because of its flexibility; many on-the-spot improvements, explanations, adjustments or variations can be introduced in the data-gathering process;
- people are usually more willing and less hesitant to talk than to write, especially as regards delicate, intimate and confidential topics;
- through the respondent's incidental comments, facial and bodily expressions, tone of voice, gestures, reactions, feelings, attitudes, evasiveness and non-cooperation, an interviewer can acquire information that would not be conveyed in any other way; and
- sometimes interviews can be repeated at intervals to trace the development of behaviour, attitudes or situations.

In this study semi-structured interviews were conducted to establish how individual educators perceive certain aspects of their classes, especially after a new strategy was adopted, concerning teaching in a gender-sensitive manner. An interview schedule guided the discussion, although the questions were fairly open-ended. (see Appendix A).

4.3.5 Observations after the intervention

The observations were done after the participants had had some time to implement the interventions. The classroom observation lasted 40 minutes. Each participant implemented whichever intervention he or she wanted to. I sat at the back of every classroom and took down notes in my own research journal.

4.4 ETHICAL CONSIDERATIONS

For any researcher ethics are important to consider before and during the study. McMillan and Schumacher (2001: 420) suggests " Qualitative researchers need to be sensitive to ethical principles because of their research topic, face-to-face interactive data collection, an emergent design and reciprocity with participants." Durrheim and Wassenaar (1999:66) state that three important ethical principles should be adhered to when doing research, namely autonomy, non-maleficence and beneficence.

Autonomy refers to the fact that the researcher should respect the persons participating in the research, as well as the parameters within which he or she works (Durrheim & Wassenaar 1999:66). The participants should cooperate willingly, and anonymity must be ensured.

Non-maleficence refers to not doing any harm to any person contributing to the research. *Beneficence* refers to the research contributing to society or to the participants. (Durrheim & Wassenaar 1999:66).

In this study the participants and the school will all remain anonymous. Collectively they are called the *participants,* and on an individual basis, participant A, B, C and D.

Informed consent and *confidentiality* are the vital heartbeats of good research ethics. The participant should be informed what the purpose of the research is and the researcher should answer any queries the participants might have. (Durrheim & Wassenaar 1999: 66-68). McMillan & Schumacher (2001:421) describes anonymity and indicate that researchers use "…imaginary locations and disguise features of settings in such a way to make them appear similar to several possible sites". Confidentiality is an important ethic as researchers must protect the identity of participants from the public as well as people who the participant share a location with. (McMillan & Schumacher 2001: 421).

There are several aspects of research ethics to consider when investigating a research problem. Because humans are exactly that, human, researchers need to sensitise themselves and treat participants with dignity and respect.

In this study I respected the participants' beliefs, different cultures and personalities.

Participatory action researchers mention a number of other ethical considerations when conducting this particular form of research. This is often referred to as Participatory Ethics. Manzo and Brightbill (2007:37) indicate as follows, "Facilitation of participants' self-representation could be seen as developing existing notions of 'justice' and making an important contribution to research ethics".

Accountability and *social responsiveness* are also to be considered in the ethics of PAR. It is expected from participatory action researchers to be accountable towards their role-players or "stakeholders", and they can decide whether the research is responsible and accountable. Manzo and Brightbill (2007:38) state "The ethic of social responsiveness produces a research process that is fluid and which changes in response to different situations and the needs of participants". PAR can be used as an agency for creating mutual respect between researcher and participant (Manzo & Brightbill 2007:37-38).
Early in this research study the participants were asked if they would take part in this research project, and the project was explained to them. The participants were allowed to withdraw from the project at any stage, as was also stated in the letter requesting their consent (see the appendices).
All of these ethical aspects would be taken into consideration during the investigation.

4.5 THE TRUSTWORTHINESS OF THE RESEARCH

'Trustworthiness' means that the data should be reliable and valid. Collins (1999:91-92) mentions, "Reliability refers to the consistency of measurement. The more reliable the measure, the less random error in measurement."

Johnson (2008:102) indicates the following, “Action researchers, however, observe messy, real-world events in which humans are mucking about. These humans are inherently and wondrously unpredictable and not at all inclined to exist in hermetically sealed worlds. Thus, each time we search and research we expect to see different things. The closest we come to repetition is in noticing recurring items, themes, or patterns that emerge from our data. Therefore, action research findings are not generalized broadly; instead, they are used to help understand particular situations as well as inform similar situations”.

Levin and Greenwood (2001:105) argue, “The credibility/validity of action research knowledge is measured according to whether actions that arise from it solve problems (workability) and increase participants’ control over their own situation”. Collins (1999:92) defines ‘validity’ as “…the degree of success which the research method achieved in measuring what the researcher intended it to measure”. In qualitative research the term ‘trustworthiness’ of the research data is used to describe that during the design phase the researcher should be able to state why the action plan should be ‘believable’, ‘trustworthy’ and ‘valid’” (Henning, Van Rensburg and Smit 2004:146).

The trustworthiness of the outcomes of this study will be ensured by means of a variety of methods, such as focus group discussions, log journals and interviews, to paint a true and a ‘as close as’ picture of the situation in the primary school science and technology classrooms. Participants will have access to the research report to enable so-called ‘member checks’. I will also clarify any unclear concepts with the participants. The data collection was done over a three-month period, and this time was considered to be long enough to collect the data.

4.6 THE TIME FRAME

TIME PERIOD/ DATE USED FOR DATA COLLECTION	***RESEARCH METHOD EMPLOYED***	***TIME ALLOCATION***
January 2010	Participatory Action Research: Focus group discussions and mind maps.	Two sessions
February/ March 2010	Intervention implemented: Participants keep a record of the implementation.	Seven weeks
March 2010	Interviews with the participants.	Scheduled time: a period of 2 weeks.
	Classroom observations with all the participants	One week
April 2010 (after the first term holidays)	Collection of all research journals	After the first term holidays
May/June/July 2010	Data analysis	Approximately 8 weeks

4.7 THE PARTICIPANTS

The selection of the participants:

The participants are the teachers involved in teaching the natural sciences and technology in grades four to seven - the Intermediate phase (grades 4 to 6) and the Senior phase (grade 7). The selection of the teachers was based on the extent to which they would be able to provide the necessary information, as they are the ones teaching in the specific fields

Participant A: Female teacher, teaching grades 4, 5, 6, and 7, Technology.
Participant B: Female teacher, teaching grade 4, Natural Sciences.
Participant C: Male teacher, teaching grades 5 and 6, Natural Sciences.
Participant D: Male teacher, teaching grade 7, Natural Sciences.

4.8 LIMITATION OF THE STUDY AND BARRIERS TO DATA COLLECTION

This study was limited to teachers teaching the learning areas technology and natural sciences at a primary school. Focus groups interviews would be held with them at a determined time and venue.

Important to mention here is that a national curriculum change or modification to the Intermediate phase (grades 4 to 6) was announced at the end of 2009. As from 2011 and 2012 certain learning areas/subjects would not be included in the Intermediate phase. One of these subjects is technology, or design and technology. The reason for this reduction in the total number of learning areas is to make the intermediate phase less stressful for the learners. Technology would be incorporated in the mathematics and natural sciences syllabus.

4.9 DATA PROCESSING AND ANALYSIS

According to Johnson (2008:63), “In analysing data, you need to establish how many total things were recorded, how many categories or kinds of things there are, and how many things are in each category”.

The following aspects assisted in collecting and analysing the data, according to Johnson (2008:100-101):

- Record your observations carefully and precisely. Always double-check to make sure you are recording exactly what you are seeing.

- Make sure you record and report everything that is of importance. Record and report fully; do not omit data that may be counter to what you believe. The goal is to understand fully all aspects of what you are observing.
- Be as objective as possible in describing and interpreting what you see. Pronounced biases and hidden agendas are fairly easy to spot and prevent you from seeing all aspects of what you are trying to study.
- Use enough data sources. Your observations and analysis will be much more accurate and credible if you are able to find similar patterns using two or more forms of data.

In this study I focused on the process of collecting and analysing data, and which data collection methods to use and to implement during the investigation.

During the analysis I focused on the emergence of categories and themes.

4.10 THE ROLE OF THE RESEARCHER AS PARTICIPANT OBSERVER: FACTORS INFLUENCING THE RESEARCH

Sidhu (1984:167) describes the 'participant observer' as follows, "He lives in the community or social setting under study, as he takes part in the activities and functions of the particular group. It enables him to get the feel of what the various activities and processes mean to the regular participants. Even as a participant observer he takes an objective position in the group. He can generally get at the depth of material and can do research in delicate areas".

Although I am a participant observer in this project I thought that the skills that Kelly (1999) mentions could be helpful in this study. Kelly (1999:396) mentions that, "Becoming a good interpretive researcher also requires the development of one's interpersonal skills, especially the abilities to build and maintain rapport, to make others feel relaxed and unguarded, to be open and forthright, to tolerate ambiguity and contradiction, and not to be thrown by

confusion and apparent chaos. Furthermore, the interpretive researcher is often in the position of being a facilitator, and the fruitfulness of the enquiry is a product of the skill of the researcher in engaging creatively with participants and contexts".

Sidhu (1984: 166) points out that a good observer is a person who would not judge the participants, and would be able to do a number of things at the same time. Furthermore, a good observer should be able to work quickly and correctly.

In this research the above-mentioned characteristics were observed during the focus group discussions, the interviews and the observations.

4.11 REFLECTING ON MY OWN GENDER SENSITIVITY

A researcher has to be open and candid about his/her own beliefs and perceptions whilst conducting research.

Johnson (2008: 82) makes the point that, "In an action research project you are the lens through which a bit of classroom reality is described. It is a given that this reality will be filtered through your own experiences and perceptions; however, you have the responsibility to present an accurate portrayal and to be as unbiased as possible. Any biases should be stated up front so that the readers of your report are able to take this into account".

I would like to relay the following incident that made me think about and questioning stereotypes.

"Growing up, I almost never even thought about stereotypes and gender roles. When I was in grade 9 I had to choose subjects at my local high school. I chose mathematics, natural sciences, biology and home economics. Some of the boys complained to the teachers, also wanting to take home economics. Whether they were merely complaining to be the class clowns or

not, it struck me that they actually had no choice in the matter. Boys did not take home economics and girls did not do woodwork. No questions asked".

This incident made me aware of gender roles and stereotypes.

As a teacher I try to promote gender equality in my class. I also try to monitor and change behaviour that might reflect stereotypes. It is an active process in my mind that influences my actions in the classroom.

4.12 CONCLUSION

This chapter investigated the research methods and tools that would be employed to collect data. Participatory Action Research is used to create a deeper understanding of this particular situation. This type of research creates an environment where participants are requested to play an active role in order for myself as the researcher to gather data, and to create a means of bringing about mindset changes.

This research study will make use of focus group discussions and mind maps to create a strategies which the participant themselves would then implement. After the focus group discussions, an interview was held with each participant to conclude final thoughts and ideas. I played the role of facilitator, but was also a participant observer.

In the next chapter the focus will be on a discussion of the analysis of the data, and the preliminary findings. The context of the study will be explained, as well as the social and historical background of the school.

CHAPTER 5

DISCUSSION OF THE ANALYSIS OF THE DATA AND THE PRELIMINARY FINDINGS

5.1 INTRODUCTION

In this chapter the social and historical context of this study will be dealt with in order to present a background against which to discuss the analysis of the data, as well as the preliminary findings.

This research project is aimed at investigating how gender sensitivity can be addressed in the science and technology classrooms of a school. The investigation solely focused on the educators who are involved in the teaching of science and technology, because these subject areas have always been male-dominated areas, and the I wanted to sensitise both teachers and learners to these stereotypes with a view to influencing the learners' future career choices. The effect was intended to be two-fold, namely on the educators themselves, and on the learners they teach. Combating gender stereotyping in the classroom was a constant focal point of reflection throughout the entire study.

Issues regarding gender in the classroom and elsewhere constantly exist and cannot merely be solved and then relegated to the past. In a recent article entitled, "Gendercide: What happened to 100 million baby girls?" (Gendercide, The Economist March 2010), it was mentioned that there are a number of countries in the world where it is deemed better to bring a boy into the world, rather than a girl. The article claims that girls are "…killed, aborted or neglected." "Baby girls are thus the victims of a malign combination of ancient prejudice and modern preference for small families" (Gendercide, The Economist, March 2010).

The motivation for this study is to create awareness about gender stereotyping in science and technology classrooms in a primary school.

Learners are influenced by ever so many aspects throughout their lives, of which schoolteachers are just one. Being in the classroom, I found that learners are bombarded by all kinds of messages from all directions. The classroom should thus be the one place where all the learners are exposed to equal opportunities in respect of their future career choices.

This same article (Gendercide, The Economist, March 2010) gives important advice on raising the value of girls in society. Female education should be promoted and laws should make it possible for women to inherit property, because in some countries this is still not allowed. Most importantly, the article (Gendercide, The Economist, March 2010) advises that "…women should be engaged in public life – using everything from television to women traffic police". Evidence in this study (see section 3.5.1 and 3.5.2) gives good reasons why learners should be educated on female role-models at primary school level.

5.2 THE CONTEXT OF THE STUDY

The primary school in this study is located in an affluent Johannesburg suburb. The school has a rich recorded history, which dates back to the early 1950's, a history recorded in books and school magazines and has many photo collections and video recordings. Because of the anonymity of the study the name of the school cannot be mentioned. This study was undertaken in the science and technology classrooms of the school, where the focus group discussions were also done. The classrooms were specifically chosen as it suited the participants, and were relatively private, although the learners were outside the classroom on the corridors. These focus group discussions were held in the mornings before school started or during break

The school was established in the early 1950's. One particular principal, now deceased, took the little rural school to new heights with his enthusiasm. Sports fields, gardens, tennis courts and a swimming pool were built during his reign. From there onwards traditions and rituals were established, some of which are still being practised.

The learners are the prime concern of the school. There is a huge collection of photos about the different aspects of the school - from the first means of transport, which were horses and bicycles, to the sport houses learners belonged to. When looking through these photos, you clearly see how times have changed, but the one thing that remained constant is the learner-centeredness of the school.

The parents are often mentioned in the history of the school. They have helped and supported the learners, and the staff, and assisted in the overall growth of the school. There are many photos of the educators who taught at this school. Some photos were taken in the classrooms and others during extra-mural activities. There is a full history of all the principals who served at the school.

From the above one can deduce that the general ethos and values underlying all aspects of the school are respect, tolerance, preparation for the future, consideration for yourself and for others, while believing in yourself and the community at large.

The school and its teaching staff are constantly endeavouring through to create an environment where values of respect, dignity and tolerance are high on the list of priorities. For example, during assembly different religions are displayed and explained to the learners. When the Hindu community in South Africa celebrated the “Festival of lights” or “Diwali, specific teachers and learners where given the opportunity to explain to the rest of the school why Diwali is held and what it means to celebrate this feast. The learners read a poem, played traditional music, used special instruments, were dressed in traditional Hindu clothes, and did a traditional dance that accompanies Diwali. The rest of the school was given the opportunity of understanding and appreciating a religion different to their own. This also created the chance for the Hindu learners to feel proud to display their own religion to their fellow peers. The management of the school (grade heads, heads of departments and the quality assurance team) decided that, because this is a good way to

promote tolerance and the acceptance of others, these displays should be done more frequently.

The school has its own traditions dating back from when the school started. Some of words and titles are even outdated and are explained to the learners before an event takes place. The two sports fields are named after previous headmasters who served the school. Camaraderie is built by singing the school anthem, school song and the national anthem on a Friday morning during assembly.

I chose this school for this project because it has followed a tradition of openness and tolerance towards diversity, while still adhering to its own traditions. This would make an optimal setting to conduct a Participatory Action Research project, focusing on gender issues. I felt that the teachers would be open-minded to learn about stereotypes and even their own stereotypes and beliefs.

5.3 THE DATA-GATHERING PROCESS

I decided to conduct a PAR study as a research strategy where the goal is to get participants actively involved in the study. PAR makes use of the people within their context, and aims to bring about some form of sustainable change. A number of methods were used to collect the data, such as focus group discussions, mind maps, logs or research journals, interviews, and class observations. According to Johnson (2008:100), “Accuracy in action research means that the data you are collecting create a fairly true picture of the bit of reality you are observing”.

5.3.1 Criteria for selecting the site and the participants

The specific primary school was chosen because of its diverse staff and learner population. The school has a history of tolerance and respect for diversity, and this is seen as the real strength of the school.

The participants were chosen because they teach either science or technology at the school. Four teachers, two female and two male, will be included in the research project, also including myself as the researcher. These participants (teachers) are diverse in their gender, culture, race and religions. This diversity is seen as an asset, contributing to the study, as different points of view would be brought to the table (see section 4.7).

5.3.2 Focus group discussions

The time to get the group together that suited everybody was one of the most difficult aspects of this study. Different educators have different duties and responsibilities at the school, including extra-mural activities on most of the days. One of the participants suggested that we all meet on a Wednesday morning for a 30-minute discussion session. The participants met up for three morning meetings. The first focus group discussion was held to inform the participants what the study entails, the aims and the intended date of completion. Each one was given an A3 paper and pen, and they were told that they would be asked three questions. They could answer these questions in any manner on the paper. A mind map was considered a good suggestion, but any method would be acceptable.

The three questions they were asked are the following, namely

- Q1: What is your perception of gender equality in education with regard to the learners in your class/es?
- Q2: What is your perception of a professional educator?
- Q3: Would you be willing to work as part of a group, to come up with a strategy for monitoring and improving your own classroom practise with special focus on gender equality in the science and technology classroom?

A group discussion took place on some of the questions (see Appendix C).

In her book, Sheffield (2004:189) discusses ways of improving gender sensitivity to create an environment where girls and boys can truly enjoy science. I was especially impressed by the way she described easy and achievable verbal and non-verbal behaviour to improve gender equality in the classroom.

A second focus group discussion was held a week later. The suggestions made by Sheffield were introduced to the participants, and they were invited to make use of them as an intervention or improvement strategy in their classrooms. During the discussions the participants were asked to read through the strategies and choose the three that resonates with them personally. This information was recorded by means of a Dictaphone and micro-cassettes. The process commenced of finding links between the participants' choices.

The participants finally agreed on the following three interventions:

- Educators need to be educated to be aware of the messages that they unintentionally may be relaying to girls with regards to their participation in science.
- Learners need to be brought into contact with female scientists as role-models, as well as to information about women's achievements in science.
- Teachers need to inform the learners of the many and expanding job opportunities that exist in the sciences.

It was expected from the educators to implement some or all of the interventions over the following seven weeks.

At the end of the session it was discussed how the data could be recorded. One of the participants said that there might be a problem in having the time do this. It was suggested that each participant could keep a research journal as they could control the 'how' and 'when' of recording data during or after the

implementation. They would also be given information on female scientists and role-models.

5.3.3 The participants' own research journals

Each participant was given a book to be used as research journal (see Appendix D). On the first page were stated the three interventions that the group had decided on. They were also given questions that could help with their reflection of their implementations. Also, as promised, some information on female role-models in science.

During informal discussions with the participants the next few weeks it transpired that some participants had trouble getting started with the research journal, or perhaps just felt a bit insecure about what they were supposed to be doing. I tried to explain that there was no wrong and no right way to implementing the interventions. A participant was asked to reflect on one of her lessons on 'transport'. Very excited she came to tell me that she had already made some changes to her classroom setting to make it more gender equal. Boys and girls now sat next to each other to improve communication. When an assignment for group-work was given, the educator made sure the groups consisted of boys and girls. This was a conscious effort on the educator's part. This lesson was then used as an example to show the other participants what they could do. This is one of the positive aspects about Participatory Action Research, because participants take charge of their own development and growth.

5.3.4 Semi-structured interviews

After the exams I started with the interviews (see Appendix A for the interview schedule). The aim of the interviews was to obtain the participants' opinions on gender equality in education, but more so, within the walls of their own classrooms. I decided to use a set of six questions, but could explore an issue arising during the interview, if I wanted to. A semi-structured interview was used to create an open-ended dialogue between the participant and myself.

The content of the interviews would consequently differ, except for the six basic questions.

Other matters that came up were the following: Participant B wanted to know if she could read through the questions beforehand. To put her to ease, she was allowed to. Participant A was eager to get the interview over and done with. She seemed a bit tense before the interview. She also did not like it that the interview was being recorded on tape, but she, nonetheless, gave her approval to continue with the interview. By means of the interviews valuable information was gained on the selected science and technology teachers' views on what was going on in their classrooms, as well as their personal values and perceptions. The recorded interviews were transcribed and analysed.

5.3.5 Classroom observations

A third focus group discussion was held to ask the participants' permission to do a classroom observation of them doing any of the three interventions. They were also asked if there were any concerns they would like to raise.

The class observations were a door opened to me and I could enter the remarkable world of "education in progress". I was in the privileged position to see what was happening in the sphere of teaching and learning. What was similar in all four of the observations was that the learners were very interested in having me in their classroom, but once they knew the reason, they went about their normal routine.

5.3.6 My own observations about the process and some conflicting data

Throughout this research process I was worried about what I was going to learn from the participants. They allowed me to be a part of their lives and their day-to-day teaching experiences. I once again realised that educators play such an important role not only in teaching, but also because of their

non-verbal messages through their conduct in the classroom. A dedicated educator can truly inspire the learners to achieve, and to be the best.

Participant C used the following metaphor in his interview. He said that the learner is like a *"seed in the soil busy growing".* The tiny seed needs many different things to grow, like air, water, soil and sunlight. The teacher is the person who has to add all these elements together to make the plant grow.

One of the participants did not, however, perceive any change in her behaviour, skills or attitude during this study. Although change was a fundamental aspect in participatory action research, and in this study, this participant felt that no change occurred whatsoever. She was, then, the negative case, which usually validates research results in qualitative research. As Johnson (2008:100) mentions, "Make sure you record and report everything that is of importance. Record and report fully; do not omit data that may be counter to what you believe. The goal is to understand fully aspects of what you are observing".

5.4 THE PROCESS OF DATA ANALYSIS

After collecting the data, all the recorded data were transcribed, after which followed the process of coding. According to Altrichter, Feldman, Posch and Somekh (2008:163), "Categories (features) need to be chosen that are relevant to the research question and at the same time partially express the contents of the data." Using these categories the data were sorted: for example, by ascribing a suitable category to each passage of a text". I found that I had to read through the transcribed texts a number of times and only then did I find overlapping themes. Each theme was given a particular name or phrase and then I used what the participants said, wrote and also my own observations to substantiate a theme or category within the theme. The themes emerged from the headings and sub-headings used to describe the paragraphs, ideas and thoughts. (see Appendix E.)

Altrichter, *et al.* (2008: 163) describe how to do inductive data coding, namely "Develop the categories by grouping concepts together that belong together. This is a two-step process. First you give conceptual labels to parts of the text. Then the concepts are grouped together into categories. This gives some structure to the whole by suggesting connections among individual categories".

The semi-structured interviews were done differently. Each interview was first discussed on its own, to create a deeper understanding of the thoughts of each participant. I then looked for overlapping and interesting categories within the data. The data were then divided into headings and sub-headings that summarised the content and from where themes emerged. I constantly referred to the data on my personal computer to record anything relevant to the research project. In my personal research journal I made notes and observations of the research process.

5.5 EMERGING CATEGORIES AND THEMES FROM THE DIFFERENT METHODS OF DATA COLLECTION

The following categories, themes and findings emerged from each method of data collection:

5.5.1 The focus group discussions

A typist transcribed all the recordings *verbatim.* When I received the tapes and transcriptions I started checking whether they were correct or if any recordings were omitted. Some of the recordings were not very clear due to learners making a noise outside the classroom, and indistinguishable sentences. The hard and digital copies of the focus group discussions would be kept in a safe place.

The following main categories emerged from the focus group discussions:

5.5.1.1 Socio-economic factors influencing the learners

The participants mentioned that there could sometimes be a discrepancy between the home situation and the school situation. Participant C stated that in socially deprived communities the girls are more adept at certain skills than the boys. All the participants agreed with participant C. Participant D mentioned that the status of women in rural areas in South Africa is changing – although slowly - because in the past, education was not important. “Your purpose was to serve your man”. He also mentioned that this situation still exists today.

Cruickshank, Bainer and Metcalf (1995:31) mention that “…the diversity of students is a fact of life in all our classrooms”. They identified six aspects how students differ from one another, namely socio-economic, cultural, gender, developmental, learning style and learning ability. According to them (1995:31), “Low socio-economic status children are also more educationally disadvantaged. They tend to live in communities and states that spend less on education, their teachers are often less well paid, they do less academically, they are more often retarded, and they drop out of school at a higher rate.” The above information corresponded with what the participants said about learners coming from socially deprived communities.

5.5.1.2 A classroom environment conducive to gender equality

When the topic of the qualities of professional educators was raised, participant C mentioned that the teacher’s attitude towards the learners is important. Girls should be given opportunities that are “open” in other words the playing field is equal to all learners. The teacher should also teach with a believe that everyone of these individuals in your class can manifest.” Cruickshank, *et al.* (1995: 369) declared that the physical environment “…consists of those aspects of the classroom that exists independent of the people who inhabit it. The psychological environment exists only in the minds of those who occupy the classroom. The psychological environment is

sometimes referred to as the social or emotional climate of the classroom". So, by creating an environment (physical and emotional) where all the learners can thrive and prosper, the participants or teachers are developing the learners' skills, knowledge and attitudes in the fields of science and technology. The classroom is an environment consisting of different factors, which all influence the learners.

Later in the discussion participant C mentioned that the learners learn different things at home (their social context) which can all establish and infuse a stereotype in the classroom. He uses the example of the boy who works with his father at home using tools and machinery. This "boy" can work with tools and machinery and the "girls" have never seen these tools or machinery. Some of the boys and girls have different skills because of what they learn at home. Participant C says, "So you find again the expression when in technology and science you might find certain skills might be lacking and then stereotype automatically sets in."

Participant D raised the concern about science education "higher up" (Secondary education, Further Education and Training). He said that the girls out-perform the boys in science and technology in the primary school level, but when later on they drop out of science they say it is a difficult subject. Participant D questioned why this was happening. Participant B said that she thinks it is important to create a classroom atmosphere where each learner, no matter of what sex, can have a say and that one sex should not dominate the other. Participant D said that he does not even mention boy/girls. The learners are divided into small groups during-group work and they have the same roles to fulfil. "Equal opportunities for all". Participant A agreed with what participant D said, and iterated that the learners do not see the gender-role thing, but rather just worked together as a group. Cruickshank, *et al.* (1995: 374) said, "An inviting classroom is one that is an appealing, positive place that provides a sense of physical and emotional safety for students and the teacher".

Some of the suggestions that Sheffield (2004) made were already being implemented in the school's discipline system, the participants mentioned. The school changed its entire discipline system at the beginning of 2008. Positive reinforcement – which is a discipline strategy -, is one of the biggest focus points. Teachers look for the things that learners do right and acknowledge this. All the good things – whether it concerns schoolwork or behaviour, are recorded using different methods like credit cards, star charts or incentive sheets. Cruickshank, *et al*. (1995: 356) declare, "Reinforcement is intended to strengthen and increase the frequency of a desirable behaviour or response, usually by providing some type of reward. Reinforcement lets students know that they have done something good in the hope that they will do it again or with greater frequency".

Altrichter, *et al.* (2008: 204) mentions the following: "Don't forget to consider existing strengths. When we talk about 'improving a situation' or 'solving a problem' it is part of our culture to think in terms of errors and mistakes. However, there is another way of looking at it. We can often bring improvement by emphasising strengths and building on processes that are already operating in the system. What processes are in operation that already tends towards an 'improvement of the situation' and how can I strengthen them?"

The school discipline system or positive reinforcement is perceived as strengths in this study, because all the learners are acknowledged for what they do correctly in class.

5.5.2 The mind maps during the focus group discussion 1

Using the mind maps as a source of data I could establish some of the ideas the participants had on gender equality and professionalism in education. I needed to know what their thoughts were about gender equality in education, as well as the characteristics of a professional educator, as these ideas may influence their own actions as teachers.

The following are some of the most frequent categories, which were found when the mind maps were analyzed:
What is your perception of gender equality in education with regards to the learners?

5.5.2.1 Gender equality determined by fairness and equal treatment

- **Theme: *Treating all learners equally.***

Participant C wrote a question on the mind map asking whether children in the school are equal in terms of their abilities. He answered his own question by stating that things happen within a certain context and gender is a contributing factor. Participant D wrote that equality in education means involving everybody equally and fairly.

- **Theme: *Learners should have the same rights and privileges*.**

Participant A noted that equality in education to her means “All learners being treated equally”.

- **Theme: *Fairness and equal opportunities.***

Participant A wrote that there should be fairness in discipline and praise – “from the top down” (meaning for teachers and learners). Participant B wrote that all children should have the same rights in all the classrooms.

- **Theme: *Focus on individuality – individual talents, skills, strengths and abilities.***

Participant D noted that there should be a “…focus on the individual’s talents and skills”. Participant A wrote the word “individuality”.

Recurring theme: From the above it is clear that the participants regard fairness and equal treatment as vital aspects of gender equality.

Good & Brophy (1997: 34) refers to Bossert (1981) "He contended that teachers need to be aware of the different interests that students bring to the classroom and be prepared to encourage all students to participate in a variety of classroom work." Brophy (1985, in: Cruickshank, *et al.* 1995:35) mentioned "…that we must not only treat boys and girls the same in similar situations but that we must over-compensate, for example, direct more math and science questions at girls, to counteract gender expectation differences".

5.5.2.2 A professional educator will be sensitive to gender issues

- **Theme: *Well-prepared and organised.***

Participant B wrote that a professional educator is someone who is well-prepared and is organised. Participant D wrote that the teacher should be focused on the "calling" of being a teacher.

According to Cruickshank, *et al.* (1995: 328), "Knowledge of the subject and of learners help make the teacher more aware of the misconceptions students are likely to have or to develop about the subject to be learned". Therefore it is important for the teacher to be knowledgeable about the subject content and be well prepared for the learning activity.

- Theme: *Caring and compassionate.*

The following were some of the words and phrases from the participants, namely *cares, committed, caring* and *placing the needs of others above yourself.*

Teachers who build interpersonal relationships with the learners, where there is time to get to know the teacher as a person and *vice versa* are the teachers who convey warmth to their students (Cruickshank, *et al.* 1995: 316)

- **Theme: *Appearance.***

Both participants D and B made the point that a professional educator's appearance is important. As Participant D put it, "Dressing reflects attitude to the profession". The appearance of the teacher can enhance the professional look.

- **Theme: *Learner-centred.***

Participant A mentioned, "Placing the needs of others above themselves". Participant D wrote that the professional educator is someone who follows a learner-centred approach.

- **Theme*: Upholding the National Curriculum and doing extra research to enhance teaching and learning*.**

Participant B wrote that the teacher should focus on the Learning Area Outcomes and Assessment Standards set by the Department of Education. Participant A wrote that the teacher should be "…willing to do research and extend the work".

- **Theme: *Motivating and encouraging.***

Participant C wrote on the mind map that a professional educator is "…maximising creative potential." Participant A said that the educator should encourage all the learners to take part in discussions. "Uplifting" is what participant A jotted down.

According to Petty (1993:32), “Motivation is regarded by experienced and inexperienced teachers alike as a prerequisite for effective learning, and the greatest challenge that many teachers face is to make their students want to learn”.

- **Theme: *Punctual.***

Participants D and A noted that a professional educator is someone who is on time or punctual.

- **Theme: *Committed.***

Participant B wrote the word “tries” twice and also mentioned, “Does not stop**,** until the message (lesson) is understood by each and every learner”. Participant A wrote that a professional educator is committed, and always willing to learn more. Participant D wrote, “Committed”.

According to Cruickshank, *et al.* (1995:319), “Effective teachers are positive people. They generally believe in their students’ abilities to learn and in their own ability to help students be successful”.

Recurring theme: The participants stated that outstanding and professional educators display characteristics like compassion, punctuality, preparedness, and being committed to the teaching profession, and to each learner.

5.5.3 The research journals

The research journal was the tool the participants used to record data that I was not able to capture during the research period. Being a teacher myself I was not able to be in the participants classrooms, unless after consulting with the relevant educator and asking permission to come and observe a lesson.

During the second focus group discussion the participants decided to implement three interventions in their own classrooms. Through a process of deliberation and reflection, and finding a common ground, the participants decided to implement three interventions. These will be discussed in detail in 5.6.

As indicated previously, each participant was given a 72-page exercise book with lines. In the journal was a page describing what a research journal is and how to use it. It also contained a number of key questions to help the educators reflect on what they were implementing. There were also some pages with information on women in science in the journal.

The following categories emerged from the analysis of the research journals, with specific focus on comparing the past with the present situation, since the interventions started.

5.5.3.1 Women as role-models

The following discussion emanates from class observations and the research journals the participants kept.

Theme: *Engaging in discussion with the learners.*

Participant B wrote in her research journal: “The learners were intrigued and admitted to always assuming that scientists are men”. Participant A indicated the same when starting the lesson on female inventors. She asked the learners who Neil Armstrong is, and some of the learners answered that he was the first person on the moon**.** Participant A told the learners that people are very used to famous male figures from the past. She discussed a number of female inventors with the learners. The teachers compared situations of the past, where women did not always get the recognition for their achievements in science and technology, to the present. At present more effort is put into equalizing the playing field as far as the recognition of the achievements of males and females in science and technology is concerned.

During the process of self-reflection the teachers compared situations of female and male role models in the past and discussed this critically with the learners in class. Sowa (2009: 1031) in her action research project states "Furthermore, this research project demonstrates the many advantages there are in conducting practitioner action research. For example, in addition to being more reflective, teachers clearly felt more confident about their teaching, and they exhibited an openness to trying new and varied strategies."

Comparing these situations is a way that the teacher can prevent stereotyping by creating an environment where the learners can discuss the injustices of the past and take advantage of the opportunities they (especially females in science and technology) presently have.

5.5.3.2 Girls need more support and encouragement in science and technology

Theme: *Using a particular method to encourage learners*

Participant C wrote in his journal that using a lesson or a story where the "underdog succeeds" is a way to academically inspire especially the weaker classes. He wrote in his journal that this type of lesson gives the weaker learner a "sense of hope", and this ultimately leads to a more receptive lesson (a lesson where learners are more receptive of what is being taught). He feels that the learner with a weak academic record, and with dire circumstances could imply that the learner has given up; with an element of will to succeed the lesson is highly relevant. Participant C made the following note in his journal: "The Kovalevsky[1] story angles in on at learners at various states.

[1] Sofia Kovalevskaya/ Sophie Kowalevske/ Sonya Kowalevski (her name and surname changes due to alternative transliterations) was the first major Russian female mathematician, responsible for important original contributions to analysis, differential equations and mechanics, and the first woman appointed to a full professorship in Northern Europe. She could not complete her education in Russia, as women were not allowed to attend universities. She went on to further her studies in Germany. (Wikipedia n.d)

They (the learners) have psychological attributes that warrant a particular approach. The teacher ought to ignite the spark of will/fight.

Brophy (1981, in Cruickshank, *et al.* 1995: 322) declared, “Encouragement is particularly important when students are most likely to experience reluctance and difficulty, in the early stages of learning a new task or concept, for low-achieving students, and for shy or backward students”.

Participant A wrote in her research journal, “Learners work in groups with Lego sets and learn about different ways in which to join Lego. Many girls struggled in this class to understand how pieces are connected, whilst most of the boys grasped the concept easily. Girls needed constant encouragement and support while the boys are eager to move on to the next task”. Thus, the moment the teachers start encouraging and motivating their learners, especially the girls, to do a task that is outside of their comfort zones, they are confronting and overcoming limiting and stereotypical behaviours by doing and excelling in things that are traditionally associated with males/boys.

Cruickshank *et al.* (1995:322) mentioned, “Encouragement can motivate students to attempt tasks that they may be reluctant to start and to continue working at tasks when they are struggling or becoming frustrated”.
Encouragement is seen as the spark that can ignite greatness within a learner.

5.5.3.3 Make women role-models more visible with visual aids

Theme: *Using resources to enhance learning.*

Participant B wrote in her journal that the grade 4’s had a discussion lesson in science about Professor Particia Berjak who is working towards finding innovative ways to preserve seeds for the future generations. Even though she is a woman, she has done a lot of hard work and she has been recognised for the role she plays in science.

During participant C's lesson he used the promethium board to show learners pictures of Sonya Kovalevsky, what she looked like, and even the way people dressed in the time she lived. The promethium board also contained a glossary to explain the vocabulary to the learners. Sonya Kovalevsky was also the "Scientist of the Term" for the grade 5 learners. Participant C wrote in the journal (this was also part of the lesson) that Sonya Kovalevsky is an inspiration to all, because she put effort into her work.

Participant A wrote in her journal: "The learners were given a list of women inventors with a short history about each inventor and their invention. They were then given a net pyramid[2]. On the first side of the pyramid they wrote the name of their chosen inventor and drew a picture of the invention. On the second side they wrote a short history about the inventor. The third side - what life is like with the invention and the last side what life would be like without the invention" .This activity during the lesson helped the learners to understand the importance of the inventions the female inventors have made. Petty (1993:265) mentioned, "The verbal channel of communication is the one most used in teaching, but for many purposes visual information is more effective".

The main advantages of visual aids are:

- they grab your attention: you cannot teach without the attention of your students;
- they add variety: visual aids add variety and interest;
- they aid conceptualisation: many concepts or ideas are understood visually rather than verbally;
- they aid memory: research shows that most people find visual information easier to remember than verbal information; and

[2] A net pyramid is an A3 paper with a pyramid template printed on the paper. The learners construct this pyramid to capture and learn new information in a creative and active manner.

- they show you care: going to the trouble of preparing visual aids shows students you take their learning seriously.

The above shows clearly that visual aids or manifestations are there to improve learning. They deepen or strengthen the learning process. Thus, when the participants presented a lesson on female role-models in science and technology, the visual aids were used to expand and strengthen the knowledge, skills and attitudes.

5.6 INTERVENTIONS

The participants had a period of two months to implement the interventions.

- Educators need to be educated to be aware of the messages that they unknowingly relay to the girls regarding their participation in science.
- The learners need to be exposed to female scientists as role-models and to information about women's achievements in science.
- Teachers need to indicate to the learners the many and expanding job opportunities that exist in the sciences.

The educators were allowed to implement the interventions in whichever way they wanted to and felt comfortable in doing. As there is a National Curriculum with Learning Outcomes and Assessment Standards to meet by the end of the term and year-end, the actual implementation was left to the teacher. I did not want to take teaching time away from the teachers. Teachers at the school are expected to have a term, a week and a lesson plan. The implementation could be a lesson on its own or just form part of an existing lesson. The point of this exercise was to find out how the learners would respond to specific interventions either during a normal lesson using the intervention, or in an intervention-specific lesson. Interviews were conducted with the participants, and thereafter I visited their classes for the purpose of observing the implementation of the different strategies.

5.7 OBSERVATIONS AFTER THE INTERVENTIONS

The overlapping categories and themes emerging from the class observations after the teachers had implemented the interventions are as follows:

5.7.1 Messages from the educators which motivated and inspired the learners

5.7.1.1 Become anything you want to be

Theme: *Using a particular method to encourage learners.*

The participants all made use of some or other method to motivate and inspire the learners.

At some point during the lesson participant B said, “If you do the best you can, then you will be able to do whatever you want to”. She also said, “Whatever you choose to do, work hard and you can do anything. Only you have the ability to do what you want to”. She told the class that everybody has a right to education and that all have equal rights. “Become anything you want to be”, was her message to the learners.

Participant C motivated his class by telling them, “You will be amazed, if you put your mind to it”. When a learner answered a question, he told them that the answer was brilliant. “Seize the moment”, she said.

5.7.1.2 Self-acknowledgement

During the lesson, participant D made use of a method of relaxation (learners closed their eyes and were breathing in and out) to encourage the learners to focus on the task at hand. Learners also had to give themselves a pat on the back, which is a way of self-validation or self-acknowledgement.

Participant C mentioned during the lesson that it is not a person’s outer appearance that matters, and that you should not judge other people, but rather look for characteristics that define them.

5.7.2 Verbal and non-verbal communication

Theme: *Classroom communication, or method of instruction.*

Communication takes place in the classroom, irrespective of whether the teacher is aware of it.

According to Good and Brophy (1997:23), " In a single day, an elementary teacher may engage in more than a thousand interpersonal exchanges with students...teachers in secondary schools may have interactions with 150 students a day".

Participants A, B, C and D all presented the basic concepts of the learning activity to the learners. They did the following while the learners where busy, namely they walked up and down the rows, amongst the learners. They spoke to individual learners or small groups. They asked questions and they answered questions. The educators were constantly in conversation with the learners.

Petty (1993:13) points out that, "Although it is not necessary to solicit questions for every discussion period, it is wise to do so frequently, because this technique tells the student that the purpose of discussion is to satisfy their needs and interests as well at the teacher's". According to Petty (1993:13), in asking questions the teacher communicates the following messages to the learners:

- I have important questions, and I want your viewpoint.
- You certainly must have important questions too.
- We shall have an interesting discussion as we address each other's questions.
- If you need more information, we shall find it.

What is central here is that the participants relay non-verbal messages to the learners. The learners receive the message, namely that they are heard, and that what they are saying is important to the teacher. This is a way for both the girls and boys to be acknowledged.

5.7.3 Comparing past situations with present ones

Theme: *Engaging in discussion with the learners.*

Participant A asked the learners an interesting question. She wanted to know from them who the first person on the moon was. The learners answered that it was Neil Armstrong. She used this example to illustrate to the learners that we are used to far more male figures in science than females. Then she asked if the learners knew that female inventors invented the automatic dishwasher, windscreen wipers, disposable nappies and liquid paper (also known as 'tippex'). She compared what happened in the past (there was nothing to fix written mistakes with) to how easy life is with the things (like tippex is nowadays used to fix written mistakes) people have today, thanks to these female inventors.

5.7.3.1 Open discussions create opportunities for empowerment

When participant C explained to her class that there was a time when it was expected from women to only raise children and to do housework, like cleaning and cooking, the class started to laugh. Clearly, from their reaction it seemed that they were not used to it, despite their different backgrounds and family situations. During the lesson a girl put up her hand and asked the teacher why women were not allowed to vote in South Africa. The educator used this question to initiate a discussion on inequality in South Africa's past. She also mentioned the public holiday coming up soon, when South Africa would celebrate Human Rights day.

Discussions are generally considered to be of value in the following situations, according to Petty (1993:159):

- Where the students' opinions and experiences need to be known by the lecturer, or are valuable and interesting to the other students in the group.
- Where the topic involves values, attitudes, feelings and awareness, rather than exclusively factual material, *e.g.* while exploring sex-stereotyping or racism.
- Where it is necessary to give students practice in forming and evaluating opinions.

Petty (1993:160) is of opinion that, "Using discussion as a teaching method carries a hidden message – the teacher is in effect saying to his or her students, "I value your experience and I am interested in your opinions." In contrast, the unspoken message of a lecture in teacher-talk style is that the students know nothing of value about the topic".

Discussions in the classroom can also be used to acknowledge both girls and boys. This breaks the stereotype notion that all girls work quietly, orderly and neatly, and boys cleverly answer all the questions. During discussions girls as well as boys have the opportunity to voice their opinions.

5.7.3.2 Role-play to enhance learning for all

Theme: *Classroom practice.*

Participant B divided the learners into groups of two to discuss whether men and women can all do the same job. The compositions of the groups were different: some groups consisted of a boy and girls, others two boys, or two girls. The composition of the groups was premeditated. Participant B wrote in her research journal that since starting out this research project, a deliberate composition of mostly mixed girl/boy groups has been an aim in her classroom.

Participant C used role-play in his lesson when he discussed the Russian mathematician, Sonya Kovelevsky. The educator indicated how this woman had to work hard to achieve her goals. It was remarkable to see how these grade 5 learners reacted to role-play by their teacher, namely events from Sonya Kovelvsky's life. It seemed that it was a very good way to get through to the learners, because they responded as if they were living in the moment being role-played by the teacher.

Petty (1993:187) points out that, "Role-play is very useful for developing the 'interpersonal skills' of learners…It gives learners an opportunity to practise skills in a risk-free environment. It is also useful as an empathy activity where feelings and attitudes are being explored".

Although the learners themselves were not actually part of the role-play, the teacher initiated it, and they all enjoyed it. This method of role-play can be used to discuss issues pertaining to gender equality.

Participants A, B, C and D had the similar responses when it came to questions from the learners. Whenever a learner had a question, his/her hand was raised and the teacher would address the learner. Learners were allowed to ask questions at any time during in the lesson, in other words, their questions and remarks where important enough to be regarded and answered by the teacher during the learning activity. This sends the message to the learners that their ideas where important to the teacher (Petty 1993:160).

5.7.3.3 Visible resources in the classroom to enhance learning opportunities for all

Theme: *Using resources to enhance learning.*

Participant A has a big working area in the technology classroom. It is used for activities like hammering, sawing, painting, and other building activities. This table served more than just its obvious purpose. Stacked on the table was a large quantity of folding chairs that the grade 7s was busy making. To

me it symbolised the expectation of accomplishment, irrespective of the learners' ability, or the lack thereof. It was as if the chairs were a testimony of each individual's work. They were in the technology classroom to learn skills, not to say, "I can never build something from scratch".

Participant B often used the promethium board[3] in her classroom. The "promethium", as it is often referred to, is an interactive whiteboard. She pasted a number of pictures on the board of men and women doing jobs in the scientific field. This was a further reinforcement of the lesson itself. She used colourful pictures about the topic of occupations in science, on the interactive board, to deepen the understanding of the lesson.

All the classrooms had posters on the walls with information and facts about science and technology.

And besides that, information about the school, such as the vision statement, rules, and regulations in respect of behaviour were visible. These visible manifestations in the classroom clearly indicated to the learners what was expected from them.

5.8 THE INTERVIEWS AFTER THE INTERVENTIONS: WHAT HAS CHANGED?

Using PAR was particularly important as the entire project was aimed at change, and at the participants taking ownership of their participation and change. Some points were highlighted, especially if there were any changes that the participants made either in respect of themselves, their teaching practices or their observations in their classrooms.

[3] The promethium board is an interactive board with a vast array of digital resources. It can also be connected to the Intranet and Internet to enhance any learning activity in all learning areas.

Any themes that arose from the data would be explicated. Semi-structured interviews were held to gain additional information from the participants. Whenever necessary, I would ask a participant a specific question that I would not ask the others. In this way a participant's answer could be clarified, giving a deeper understanding of what the participant meant. The interviews were held in a classroom, at the end of the school day. The time for the interviews were scheduled a week before the actual interview. (see Appendix A for the semi-structured interview schedule.)

5.8.1 Igniting a spark

Theme: *Using a particular method to encourage learners and keeping learners interested.*

Participant B, " … I have not ever really before this study sort of talked about what you can do with your life and… you know… jobs and career opportunities and things like that… so it's quite nice for me as well because you know… I'm more focussed on that now and for me it was always like… I teach 10 year olds so I don't touch anything about careers because they are not going to think about…. yet, but it is nice to spark an interest with them earlier and see, you know how it develops…"

Participant D, "Yes, you are more aware of it because you are now trying to do lessons saying, the girls… are you going to keep their imagination?, the boys… are you going to keep their interest, are they going to be captivated?"
Good and Brophy (1997:368) explain 'enthusiasm' by stating, "The second aspect (to enthusiasm about a subject) is dynamic vigour. Enthusiastic teachers are alive in the room; they show surprise, suspense, joy, and other feelings in their voices and they make material interesting by relating it to their experiences and showing that they themselves are interested in it".

5.8.2 A change in attitude, behaviour and methods of instruction

Theme: *A change in practice.*

Participant A: “Yes, no, look you have to help them,… to help them you have to change your attitude and be more understanding and patient with them… in… to actually give them more time…” Especially the girls did not see the concept of joining them (Lego pieces) together because they have probably never been exposed to more practically points, they have been exposed to the caring,… sort of loving doll kind of toy, so nothing has to be put together, just hair.”

Participant A explained that the exposure of a certain type of toy influences how the learners perceive and respond to certain activities in the technology class. She believes that the boys are exposed to more practical toys, and the girls to dolls. The boys find the Lego’s[4] fun and exciting, and the girls perceive it as intimidating. From the above it can be deduced that different childhood exposures influence how learners perceive the technology learning area and the related activities.

Participant C, “ …well, first of all, behaviour is related to consciousness, your thinking and the way you acted at a particular time, because we are exploring this new issue. As I become more aware of the subtleties of gender differences in my classroom, automatically my behaviour must adapt … my behaviour in the school environment is adapted or engineered for the best outcome for each of these children”.

Good and Brophy (1997:448) indicate, “As a teacher it is useful to reflect on personal experiences (as a child, as a student, as a student teacher, *etc*.) in order to understand your current beliefs about instruction”. To bring about

[4] Lego’s are used in the technology classroom to teach basic building techniques, systems and control and processing. For example, the learner gets an opportunity to build basic levers and pulleys.

change in their classrooms the participants first had to look at what they were doing at that stage.

According to Good and Brophy (1997:449), “After developing appropriate goals (or needs for knowledge from which to form goals), the next step is to choose two or three behaviours or beliefs to change or new ones to try. Do not try to change too many things at once, lest you become overwhelmed and discouraged. Consider a few issues at a time and carefully monitor your progress”.

The participants had three interventions to implement over a period of time. They had to check their progress, indicating it in their research journals. Additional information was gleaned by means of the interviews.

5.8.3 Creating awareness

Theme: *Change in practise.*

Participant B: “Yes, I would say so, I did not, you take it for granted in a way and you just carry on not really thinking that closely about gender equality in its own right”.

Participant A: “Yes, like I said, I have not changed but it makes you more aware of the fact that there are gender differences…”

Participant C: “I am more aware, in the sense that I’m realising that…to explore an issue is not instantly… that I’m suddenly going to derive knowledge about the issue, but your study has given me the opportunity to start exploring it as well”.

Sadker and Sadker (1997:463) mention: “The overwhelming majority of teachers are fair people who strive for excellence and equity in their teaching. When they become aware of inequities and are provided with appropriate

training, they can change their interaction patterns to become more fair and effective for all students".

I wanted to know from participant C if any of his attitudes have changed since participating in this research project. He said that it has mostly to do with *awareness:.* "It is about awareness. That is what it is… Now you think of…Sensitivity, boys… what matters, girls… what matters. Obviously, intellectually they may be at different levels… just,… this research project, ….just yet another dimension what you do in the classroom, something that you were not aware of before exists…it brings that awareness into you, that, hang on, you are doing this lesson… you have to take this into account…This is now… just an added dimension to it".

Participant C used a metaphor for a person who achieves something. He said, "It is like a beautiful flower that has reached the utmost of beauty, because as human beings we try to transcend ourselves by doing great things, but you find sometimes we only, …we only reach small goals, but yet it is pleasant that everyone reaches different levels within their own existence".

He used another metaphor for doing things great and achieving "mastery" in whatever a person does. "You find that in some of the children in our classes, you find that there is that,… you can see the seeds of greatness. It exists. You will notice that when you walk past certain children,… you can see those seeds, but any seed of greatness needs to be nurtured. You need to water it…You have to nurture it, and this is where a teacher comes in".

5.8.4 Gender sensitivity

Theme: *Change in practise.*

Participant D: "… you watch what you say in class, where before you did not. You know, you taught the lesson and that was that. Now you take into account sensitivities and things like that… But the kids appreciate it …that is

the most important thing… Yes, the kids can pick up,… they already know what you are doing".

Participant C: "Girls also need to understand where is your position as a teacher, what stand you take on gender issues. They need to know their teacher is fully supportive of them as well as the boys".

According to Cruickshank, *et al.* (1995:41), "Teachers are effective partly because they care about children enough to accommodate their seemingly endless diversity. To summarize, our schools need teachers who will

- care about economically disadvantaged youth and are willing to work with them (this implies a willingness to teach in rural and urban schools);
- help students gain a feeling of efficacy or control over their destinies;
- accept, appreciate, and promote culturally specific characteristics; and
- promote in all children the best attributes of both genders".

5.8.5 Seeds of greatness

Altrichter, *et al.* (2008:176) point out that "…metaphors are of a generative character. They cannot replace the analysis of data, but they can stimulate new directions for analysis".

The following two metaphors, found in the texts, are worth mentioning:

During the interview participant C was asked what he found positive about implementing the interventions, for instance, speaking about female role-models. In the conversation the following metaphor was mentioned: Participant C: "Absolutely. And that is why it is so important to try to achieve mastery in whatever you do. You find that in some of the children in our classes, .you can see the seeds of greatness. It exists. You will notice that when you walk pass certain children, you can see those seeds, but any seed

of greatness needs to be nurtured. You need to water it, you need to,… we have to use the metaphor of a plant. You have to nurture it and that is where a teacher comes in".

What can this metaphor mean in the context of this study? It could mean that the participant sees a teacher as the person who is ultimately responsible for the 'growth' of a learner and that the teacher has the 'right stuff' to help the learner 'grow'. It could also mean that a learner is dependent on a teacher for the 'right stuff' to grow.

During the interview with participant B I wondered whether she saw herself as a role-model to the children she teaches (she is the only female science teacher in the school). I then decided to ask her the question. Her response was that she had never really thought about it in that way, ". …but it is almost like… because it is their first year of science… I'm almost like the mother that teaches it to them initially…"

What could this metaphor mean? It could mean that the participant places a lot of responsibility on her own shoulders for assisting learners in science. She may even be seeing herself as a matriarch to the learners.

"A metaphor constructs different or other views of an event and this can lead to a better comprehension of that event", according to Altrichter, *et al.* (2008: 175).

5.9 RECURRING THEMES WITHIN THE CATEGORISED DATA: PRELIMINARY FINDINGS

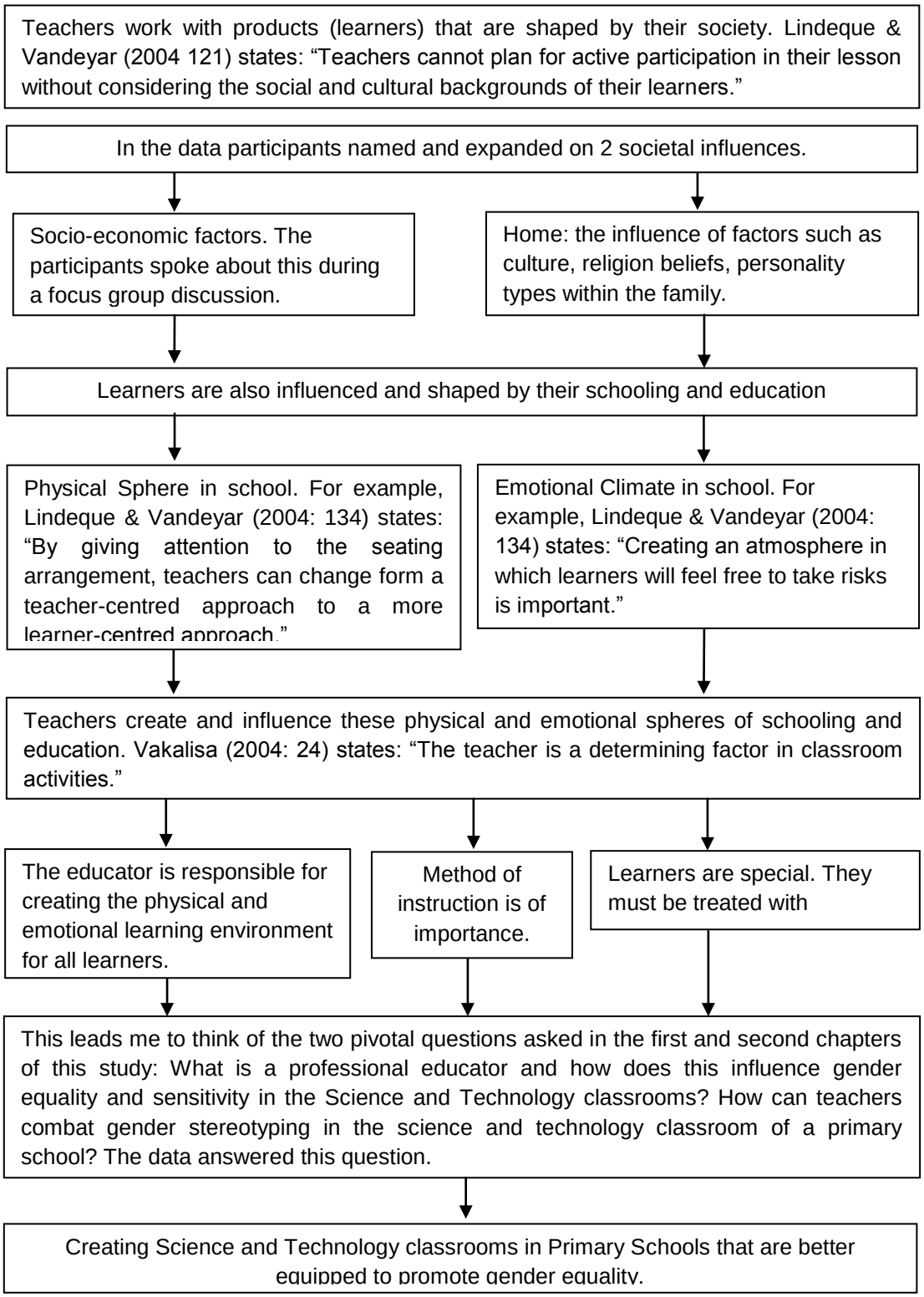


Figure 5.1: Recurring themes from data

The diagram was created to indicate the flow of one theme into the other. The themes are interlinked and intertwined in each other, as well as in the context of the study and the data they are derived from.

The diagram starts from the premise that learners grow up in societies which influence them in a specific manner. An example would be where, in some traditions, the woman walks into a room first then followed by the man, as a sign of respect. In other traditions the man always enters a room first in order to protect the woman. These traditions and cultural norms would inevitably have an impact on the individual, as for instance, how the value of 'respect' is lived, or how it manifests itself. Different norms and values are 'lived' in different ways, as derived from different societies. From here comes the premise that learners are influenced by their society. The participants named two examples of these influences, namely, socio-economic factors, and the background of the child.

Here the first diagram ends, but does not stop. It continues with a second interlinked diagram, namely factors within the surrounds of the school which have an impact on learners, for example the physical conditions or physical environment, and the emotional experiences the learner has in respect of the school.

The teacher plays a tremendous role in both situations. He/she can change the physical environment of the classroom (paint, posters and projects on the wall), but more than that, the teacher can shape and reshape the affective sentiments in the classroom ("Wow, Jenny that is a great way of thinking!" Jenny feels validated in the classroom, and may even attempt to answer another question).

The diagram lists the three main conclusions derived from the data. As themes they answer the questions posed in chapter one. They are:

- The educator is responsible for creating the physical and emotional learning environment for all learners. The professional educator will create a classroom environment conducive to gender equality.
- Method of instruction (teaching). How does he or she teach the content? Does his/her teaching lead to gender equality and fairness?
- Each learner is unique and special, their opinions are important, - make sure they are aware of it. Every one of them should be treated with respect and dignity.

5.9.1 A classroom environment conducive to gender equality

The teacher is responsible for creating the physical and emotional atmosphere in the classroom. He/she can put the learners' work on the wall, whereby signifying to the learners that their work is important. The community can be engaged in improving the physical conditions at the school.

The teacher is also responsible for the emotional climate. The learners will feel, and respond to this climate. The teacher should invest time and effort in creating an atmosphere where learners are free to speak their minds, and have the courage to ask questions, and to learn.

5.9.2 Particular methods of instruction can combat gender stereotyping

The teachers' methods of instruction and their teaching influence the learners, as it evokes specific emotions associated with methods of teaching or instruction. Imagine the teacher who stands before the learners, incessantly talking, until the bell announces the next period. The learners may experience feelings ranging from monotony and oppression, to complete boredom. Conversely, the teacher who makes use of instruction methods like role-play or discussions creates feelings of excitement and involvement. These feelings or emotions will have a positive impact on the learners' experience of their classroom as places of equity, where their opinions count, irrespective of whether they are boys or girls.

5.9.3 Learners are special people

Teachers should treat their learners with humanity, dignity and respect. The learners should feel that their teachers believe in them, even if no one else does. Encouragement is more that simply compulsory motivation. The science teacher who tells his or her learners that they can become whatever they would like to be, should mean it and demonstrate it in an authentic way. The way the teacher motivates and encourages his/her learners is the determining factor in how the learner will feel after the teacher's words of motivation. Resources like posters with inspiring messages also have a positive influence in the class. This may complement the teacher's method of instruction, especially if the teacher refers to it. Encouragement is like the coach of a netball or soccer team – he/she is constantly there at the side of the field, the one who knows every player's name, and who supports them all.

From the data the above the three themes are presented as the preliminary findings. They lead to answers to the research questions, whereby creating science and technology classrooms that are conducive to gender equity.

5.10 CONCLUSION

A very pertinent aspect stands out in this study, namely the fact that the participants deliberately motivate, encourage and inspire their learners. These qualities rest on hard work. It was found that the teachers often reminded their learners that everything in life was possible, not only because people dream big, but because the dream is accompanied by conscientious effort and hard work. This observation was manifested by the lessons learnt from female scientists who had worked hard to achieve, and to be recognised for their work.

This 'hard work' ethos is further manifested in the daily routines of the teachers in the classroom, their methods of instruction, and the convictions that they live by. "Focus on what you are doing, concentrate, focus on the task at hand", are some of the messages the teachers tried to bring across. Their

positive non-verbal behaviour was manifested while they were walking up and down the aisles in the classes, talking to the learners, asking them questions, and motivating them. The most pertinent non-verbal message here was the fact that whatever the learner was doing was important, and that there was a teacher in the classroom who wanted them all to progress, to develop and to become what they want to be. The participants relied on basic principles like respecting each child, caring for him/her, and listening to him/her, in order to promote the self-esteem and self-worth of everyone of them.

At the start of the second term, Participant D mentioned how he was using one of the interventions (female role-models in the field of science and technology) during the Soccer World Cup events. He instructed the learners to search for scientists from any of the participating countries. The research study had surely made an impact on this teacher's life!

Participant B wrote in her research journal the following concluding remarks, "Thank you for enriching my outlook on science and for bringing back my love for teaching". I knew that this research project contributed, not only to the field of education, but to the personal lives of the participants, and to each learner in their science and technology classes.

During this research project Participatory Action Research was used to involve the participants in the projects. It was important that their voices be heard and that it had in impact on the project. Three of the four participants mentioned that a change had taken place within themselves, either by means of a skill, an attitude, or in their classroom practice. One participant denied that any change had been effected. The group, however, worked together, and shared their thoughts and opinions, although it was found that some participants could have contributed more to the discussions.

It is not easy to identify the characteristics of the type of teacher whom it takes to combat stereotyping. From this study, though, a number of deductions about the characteristics of such a teacher can be made. A teacher who is genuinely interested in every learner, who is caring and compassionate, and

understanding and professional, will be able to create a space in the classroom that will make both boys and girls feel welcome.

This study focused on stereotypes, and I believe that teachers have the power to combat values and ideas which favour stereotypes. Social Constructivism as a theoretical framework was employed in this study, because I believe that ideas and convictions about gender and stereotypes are formulated by means of the input of everyone and everything (see section 4.1.2). Stereotypes are formed at an early age in a child's life, as early as in primary school. Thus, teachers are able to make equality a reality for their learners.

Although the physical conditions of the classroom contribute to the teaching-learning dynamics within the classroom, it is the emotional or affective environment that has the greatest potential to influence learners. The teacher who is able to inspire, motivate and encourage all the learners, creates this affective climate. This deduction has helped me to shape the understanding that a teacher holds the key to creating a 'space' for all learners.

The methodology used by the teacher also contributes to making the classroom a place where girls and boys can thrive, not only academically but also as human beings. Thus, specific methods where all the learners are part of the teaching process should be implemented.

The teachers involved in this study felt that some kind of change was brought about in themselves. Changes were evident in their behaviour, that is, in how they interacted with the learners, and also in the way they taught. Some participants mentioned a change in attitude, as they were now more aware of and sensitive to gender issues in the classroom. Consequently, it is evident that change is imperative to make the classroom the place for all learners to be the best they can be. There should be a conscious choice on the part of all teachers to change, and to re-invent their own beliefs about gender, gender roles and stereotypes.

In chapter six, which is the final chapter, the findings of the study will be discussed in detail, and recommendations will also be made.

CHAPTER 6

SUMMARY OF THE FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This study aimed to provide information on how to socialise and sensitise teachers who influence learners at an early age of their lives. In other words, this study ought to be able to give directions to a teacher to improve his or practice in the classroom in order to promote gender equality.

In chapter 1 the literature study was announced and the focus of the study was summarised. Theories around gender and gender stereotypes were discussed, as well as the transmission of values. Science and technology are important subjects in the school curriculum, and its value for South Africa and its citizens was explained.

One of the overarching aims with this project was the promotion of sound gender values in the classroom. The concept of ‘values’ means different things to different people. In a diverse country like South Africa where the schools reflect this diversity, the focus needs to be on the importance of values for each and every person. I needed to discover how the teachers at a specific primary school went about to prevent stereotyping, and how to improve this endeavour on a continuous basis. Participatory Action Research was chosen as a research strategy to improve the actual classroom practice and to empower teachers to improve on their own classroom practice.

This study also aimed to make it possible for every learner to enrol to study any field he or she may be interested in, irrespective of his or her gender. Girls and boys are exposed to science and technology already in the primary school, where learners already come into contact with teachers with their own value systems. Later on the learners will have to make subject choices which will eventually lead to career choices. This study aimed to equalise the

choices for girls and boys as far as any field of study is concerned which they may be interested in. This boils down to equalising the science and technology 'playing field'.

Another aim was to create opportunities for all the learners to thrive in the science and technology classrooms, irrespective of their gender. This meant teachers should be active in their classrooms, and not passive red pen masters.

Teachers are more than content experts teaching a subject. Although content plays an important part in ensuring academic success, it is not the only determining factor. Teachers who are enthusiastic about their subject will pass it on to their learners. Much is expected from teachers, as for many learners they are also a 'mother' and 'father' away from home.

In chapter 2 I focused on the characteristics of professional educators, and what the SACE - the South African Council for Educators - Code means for the education profession. In this chapter laws on gender equality in South Africa were investigated. The aim was to clarify the term 'professional educator,' as the assumption was that professional behaviour is linked, *inter alia,* to gender sensitivity in the classroom. Many teachers profess to be 'professionals' but their conduct contradicts their claim. The SACE Code gives an excellent model of what is expected of teachers in South Africa.

In chapter 3 an overview was given of how gender is manifested in the Western world, in South Africa and the SADC region. Also discussed was how women have suffered the effects of gender inequality. Gender is considered to be a social construct that is depicted in the stereotypes of different societies. Female role-models in the fields of natural science and technology were identified and discussed, specifically Marie Curie and Mamphela Ramphele (in the South African context), to highlight their struggles and victories in their fields of study.

I gave a description of the research design, theoretical framework and the methodology that were to be used, in chapter 4. A Participatory Action Research strategy was going to be implemented to get the participants involved in the study. The idea was to have participants take ownership of their teaching practice to bring about change with regard to gender sensitivity in the classrooms. The participants would determine how they were going to implement certain suggestions to improve their practice. Although suggestions were made, the participants ultimately decided for themselves what would work in their own classrooms. This strategy was most valuable to this study, as the participants gave their input and determined what were to be done. During the interviews I was able to talk informally to the participants to get their input in addition to the information gleaned during the focus group discussions.

In chapter 5 the focus was on the analysis of the data and a discussion of the preliminary findings. The data were analysed to distinguish themes and categories. I had to immerse myself in the data, reading and working through it a number of times. By making use of Participatory Action Research I became conscious of the emerging themes in the data.

The participants admitted that they had changed in respect of the fact that they were now more aware of gender issues and more sensitive to gender equality, and that they had to change their behaviour to accommodate the learners.

In chapter 6, the final chapter, the findings will be introduced, and recommendations will be made. This study also has a number of limitations and these will be indicated. Finally, this chapter will conclude the study by stressing the importance of the teachers' awareness of their professional role-model status, and the fact that they have to teach in a gender-sensitive way.

6.2 FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

The following findings emerged after the analysis of the data:

6.2.1 Underpinning values and signals send influential messages to learners.

- The school system, including aspects like discipline, says a lot about the values existing in the school. It reflects what the role-players consider important. Ultimately, these values will shape every detail of the school. Small and non-obvious aspects of a school can convey a particular message about gender equality in the school. For example, if rugby is considered very important in the school, but not netball, it conveys a message to the girls that they are not as important as the boys.

Recommendation: *The SMT must be aware of the influential messages that general and particular aspects of a school convey to the learners and that the school environment sends appropriate messages to the learners.*

6.2.2 A classroom environment conducive to gender equality

The educator is responsible for creating the physical and emotional learning environment for all learners. The importance of professional conduct in the classroom needs to be an internalised awareness and attitude of the teacher. The teachers should ultimately create a ‘space’ where learners can feel free to be themselves, to make mistakes and to make themselves heard, not only in respect of the physical environment, but also as far as the emotional component of the classroom is concerned. The learners will eventually be aware of the emotional climate of the classroom. This holds the teachers responsible for gender-friendly classrooms.

The following interesting points emanated from the data:

- A teacher's attitude plays an important role – the teacher's attitude should be "open" to the learners and opportunities should be "open."(An open attitude refers to a teacher being available emotionally for learners. Open opportunities refers to equalizing learning opportunities for learners.

Recommendation: *Teachers should create, produce and generate learning opportunities for all learners, which will reflect an attitude of professionalism.* (See section 5.5.1.2).

- The classroom environment consists of different factors, which all influence every learner.

Recommendation: *There are so many factors which make up 'the classroom', and teachers should be aware of these factors. School Management Teams (SMT) can discuss with the rest of the teaching staff which values, beliefs and life lessons must be taught and which not. For example, if the SMT of a school wants to place emphasis on using positive reinforcement, they can teach the teachers new skills on how to do this as part of classroom management.* (See sections 5.9.1 and 5.9.2).

- Fairness and equal treatment are vital to increase gender equality.

Recommendation: *Fairness and equal treatment should be made part of the school's vision, mission and strategic planning.* (see section 5.5.2.1).

- Every person has the right to education. One teacher invited the learners to "…become anything you want to be". Teachers can motivate and encourage. They can influence the learners to make the best of their opportunities, and they can help the learners to build their self-confidence.

Recommendation: *Help the learners to dream, and to dream big. If a learner tells you that he/she wants to be pilot, dream with that learner, and constantly help him/her to develop the interest. Should a learner, for instance, show an interest in birds, ask the learner questions about bird-watching, tell the learner about your own experiences, if any, in this field. This will help to create dialogue between yourself and the learner*. (See section 5.7.1).

- The project made participants think about gender equality and gender issues.

Recommendation: *Serious thinking about issues like gender equality that influence teaching can empower teachers to make better decisions and choices in their classrooms. Being cognisant about what is happening in the classroom creates an environment for growth. (*See section 5.8.3).

6.2.3 Particular methods of instruction can combat gender stereotyping

A specific methodology of instruction is important. As stated above, learners will pick up on the overall mood and climate of the classroom. From the data it can be seen that teaching-learning methods where learners feel their opinions are important, are most valuable in transmitting gender equality values.

Interesting points from the data are the following:

- Learners are used to male figures (even male role-models) from the past. Teachers should try using more female role-models in the classroom.

Recommendation: *A conscious effort should be made during lesson preparation and planning to incorporate female role-models in the fields of science and technology. In a South African context the following women can be discussed as role-models: Mamphela Ramphele, Glenda Gray and Tersia Jacobs.* (See sections 5.5.3.1 and 5.5.3.3).

- Role-play is an interesting way of getting a message across. One participant role-played events from Sonya Kovalevsky's life. The learners enjoyed this. They responded as if they were living in the moment being role-played by the teacher.

Recommendation*: Role-play can be introduced in most learning areas, and is a good way to get learners actively involved in a lesson. (*See section 5.7.3.2).

- *It is nice to spark an interest with them earlier* (when learners are still young) for example when the teacher is speaking about careers in science.

Recommendation*: When discussing any topic in science or technology, it is easy to incorporate different careers in the field. Learners enjoy it when the background of a topic is discussed and when they are involved in the lesson.* (See section 5.8.1).

- Early childhood exposure to science and technology influences how learners perceive these fields and related activities.

Recommendation: *(*This recommendation is mainly for parents and pre-school teachers.) *Ensure children/young learners are exposed to a wide variety of toys. Create times to play with different toys.* (See section 5.8.2).
Careful consideration about the methods of instruction is necessary to improve practise for gender equality and awareness.

6.2.4 Learners are special human beings

Each learner is unique and special; their opinions are important - make sure they know it. They should be treated with respect for their human dignity. From the data it is clear that teachers must let the learners know that they are important to the teachers. The teachers should employ many different

methods to convey the message to the learners that each one is special to the teacher and that his/her contributions count in the classroom.

Points from the data:

- Teachers have to make use of different techniques to motivate learners in the classroom. One teacher asked the learners to pat themselves on the shoulder*.*

Recommendation*: Different motivation techniques work for different learners and even for the teachers who implement them. Some learners may react to verbal messages and others to non-verbal messages. Teachers should become familiar with the techniques that work for their learners.* (See sections 5.7.1 and 5.7.2).

- Being human above all promotes gender equality.

Recommendation: *Treating learners with dignity and respecting their individuality is the best practice.* (See section 5.9.3).

- Seeds of greatness need to be nurtured.

Recommendation: *Teachers should focus on what learners are good at and develop those abilities. Learners should develop in all areas - academic, spiritual and social. This development should be the responsibility of the SMT and the teachers.* (See section 5.8.5).

- Teachers should take sensitivities into account.

Recommendation: *A teacher should take the time and effort to get to know the learners and be sensitive to who and what they are*. *Teachers should be sensitive towards aspects like gender, religion and family background etc.* (See section 5.8.4).

- Constant awareness in the classroom.

Recommendation: *Being aware of gender stereotypes in the local and wider community, as well as of the teachers' own stereotypes, can contribute to the conscious decisions not to realize gender stereotypes in the classroom.* (See section 5.8.3).

- "The underdog succeeds" - The person, from whom it is expected, can also succeed. This type of lesson can give a learner hope.

Recommendation*: Constantly give learners messages of hope, incorporating optimism and hard work into these messages. (*See sections 5.7.1 and 5.7.2).

6.3 LIMITATIONS OF THE STUDY

This study was done in a primary school. The PAR project was limited to only one school, as is often done when conducting such a project. This study was confined to a very specific community, which is the primary school learners, and the teachers as the participants in the study. (See section 4.1) There were 5 participants, all of them teachers of science and technology. Despite the localised nature of the project, the richness of the data provided insightful information on the subject of gender equality in the classroom, which at the same time, fulfilled the aims of the project satisfactorily.

More follow-up research could be done to deepen the understanding of this topic, as well as related sub-topics at other schools and settings.

6.4 RECOMMENDATIONS FOR FURTHER RESEARCH

The Participatory Action Research strategy proved to be very useful to bring about change and to improve practise. A comparative study between primary schools with more or less the same economic status, or with very different

economic statuses, could be done in future. It will also be interesting to see if the economic status of a school plays a role in gender equality.

Another recommendation could be that other learning areas be included, as well as participants from secondary schools. Studies on secondary schools in South Africa could be done to reveal stereotypes pertaining to gender roles and career choices. Furthermore, only the science and technology learning areas were discussed and used in data collection for this study. It will be interesting to note what the situation would be in other learning areas like mathematics, economic and management sciences.

Finally, interesting phenomena with regard to current or prevailing stereotypes about females in science and technological fields could be investigated in other contexts.

Questions such as the following could be addressed:

- Have these stereotypes changed and evolved with time or are they more or less the same as 200, 100, 50 and 10 years back?
- Do these stereotypes hold any meaning for society?

Teachers and student teachers could use the findings of this study to improve their teaching methodologies and truly become inspirational teachers.

The findings from these studies could also be applied in the realm of gender and social studies in general.

6.5 CONCLUSION

I experienced many emotions during this research project, but the most prevalent and strongest emotion was feeling privileged that four teachers opened up their worlds to me. Their worlds consisted of their classrooms,

their thoughts, ideas and writings. It could be considered as the teachers' private lives. Yes, they *let me in*!

From 2012 the learning area or subject 'technology' will be removed from the curriculum in the Intermediate phase (grades 4 to 6). Parts of technology will be incorporated under mathematics and natural science. This does raise a concern, because it eliminates a valuable three years from the curriculum where the learner could be exposed to skills and knowledge, focusing specifically on technology. It means grade seven learners and older will only then learn about technology, instead of becoming familiar with the skills and knowledge of the subject from grade 4.

Schools emulate societal values, whether wittingly or unwittingly. This happens by means of the inputs of both the teachers and the learners. Especially the learners are vulnerable to events in their daily lives. A boy who reads violent comic strips ends up drawing his own comics infused with violence. This study as aimed at merely one aspect of the vast array of influences on a child's life. Schools and teachers can only do so much. They can improve the school and learning experience for each learner who walks through the school gates. This study will hopefully contribute to the overall improvement of the school with regard to classroom practice and the teachers' professional conduct.

This study aimed to speak on behalf of every learner, girl or boy, to be given the opportunity to study science or technology, or any field that they are interested in.

According to McMillan and Schumacher (2001:396), "Qualitative researchers believe that reality is a social construction, that is, individuals or groups derive or ascribe meanings to specific entities, such as events, persons, processes, or objects. In other words, people's perceptions are what they consider 'real' to them and what directs their actions, thoughts and feelings".

All human beings are influenced by the different value systems they come into contact with, and I believe that the participants in this study could construct a nurturing space for each individual in their classrooms. As one participant put it, “Seeds of greatness need to be nurtured”.

Treating learners with respect for their human dignity is at the core of combating gender stereotyping. This boils down to regarding each and every learner as a unique individual, as opposed to a stereotype.

A true educator is someone who succeeds in acting out his duty in a professional manner, while believing in each individual learner, and helping him or her to realise his or her full potential.

BIBLIOGRAPHY

Altrichter, H., Feldman, A., Posch, P. & Somekh, B. 2008. *Teachers investigate their work. An introduction to action research across the professions*. 2nd Edition. Abington, Oxon: Routledge Taylor & Francis Group.

Anderson-Levitt, KM. 2006. Ethnography. In: *Handbook of complementary methods in education research*. Edited by JL. Green, G. Camilli, PB. Elmore, with A. Skukauskaite, E. Grace. Mahwah, New Jersey: Lawrence Erlbaum Associates, Inc. Publishers.

Ayim, M. & Houston, B. 1996. A conceptual analysis of sexism and sexist education. In: *The gender question in education. Theory, pedagogy and politics.* A. Diller, B. Houston, KP. Morgan, M. Ayim. London, Dartmouth: Westview Press.

Bertram, C., Mattson, L. & Parker, D., 2002. A closer look at the Code of Professional Ethics*. In: Handbook for the Code of Professional Ethics*. Edited by B. Parker. Centurion: The Unilever Ethics Centre, University of Natal, pp. 133-151.

Beyond Inequalities. Women in Southern Africa. Edited by BM. Kethusegile, A. Kwaramba, S. Gumbie. 2000. Zimbabwe: Harare. Southern African Research and Documentary Centre.

Burton, L. & Povey, H. 1996. Competency in the Mathematics classroom – the example of equal opportunities. In: *Developing competent teachers.* Edited by D. Hustler, and D. McIntyre . London: David Fulton Publishers, p. 129.

Coelho, P. 1993. *The Alchemist*. Translated by Alan R. Clarke. London: Harper Collins Publishers.

Callaway, E. 4 April 2008. *Male monkeys prefer boys' toys.* New Scientist. [Online]. Available: http://www.newscientist.com/article/dn13596-male-monkeys-prefer-boys-toys.html# [cited 19 October 2009] Journal reference in article: Hormones and Behaviour (DOI:10.1016/j.yhbeh.2008.03.008.

Coelho, P. 1993. *The Alchemist*. Translated by Alan R. Clarke. London: Harper Collins Publishers.

Colebrook, C. 2004. *Gender*. Transitions series. Hampshire and New York: Palgrave Macmillan.

Collins, K. 1999. *Participatory Research. A Primer.* Cape Town: Prentice Hall South Africa (Pty.) Ltd.

Cruickshank, DR., Bainer, DL. & Metcalf, KK. 1995. *The act of teaching*. New York: McGraw-Hill, Inc.

Department of Education. 2008. *I am my sister's and brother's keeper. Girls and boys education movement clubs. A guidebook for schools.* Unicef. Handmade Communications. South African National Department of Education. (National Office: Pretoria)

Department of Education. 2007. *Measures for the prevention and management of learner pregnancy*. Pretoria, Sol Plaatje House: Department of Education.

Department of Education. 2002. *Report on equity in the classroom*. Available:http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=10&category=reports&legtype=null[Cited: 7 May 2009]

Department of Education. 2003. *Revised National Curriculum Statement Grades R-9 Schools. Teachers' guide for the development of learning programmes*. Technology. Pretoria: Government Printer.

Department of Education. Speeches and press releases. 22 September 2004. "*Minister Pandor praises role of teachers*." Available: http://www.education.gov.za [cited 26 March 2008]

Department of Education. 2002. *Values in education: programme of action.* Available:http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=10&category=reports&legtype=null[Cited: 7 May 2009]

Du Plooy-Cilliers, F. & Louw, M. 2003. *Let's talk about interpersonal communication*. Second edition. Sandton: Heinemann.

Durrheim K. 1999. Research design. In: *Research in practice. Applied methods for the social sciences*. Edited by M. Terre' Blanche & K. Durrheim. Cape Town: University of Cape Town Press, pp. 29, 33, 42.

Durrheim K. & Wassenaar D. 1999. Putting design into practice: writing and evaluating research proposals. In: *Research in practice. Applied methods for the social sciences*. Edited by M. Terre'Blanche & K. Durrheim. Cape Town: University of Cape Town Press, pp. 66-68.

Gendercide: What happened to 100 million baby girls? 2010. *The Economist,* volume 394, number 8672, 6 March 2010: 11.

Gibran, K. n.d. *The Kahlil Gibran Reader. Inspirational writings*. n.p Citadel Press, Kensington Publishing Group.

Giroud, F. 1986. *Marie Curie, a life*. Translated by L. Davis. New York: Holmes & Meier.

Good, TL. & Brophy, JE. 1997. *Looking into classrooms*. 7th Edition. New York: Addison-Wesley Educational Publishers Inc.

Government Gazette. 1996. *Act No. 39, 1996: Commission on Gender Equality Act, 1996*. Volume 373, Cape Town, 24 July 1996 No 17341.

Greenbaum TL. 2000. *Moderating focus groups: a practical guide for group facilitation*. London: Sage Publications, Inc.

Greenwood, DJ. & Levin, M. 1998. *Introduction to action research. Social research for social change.* Thousand Oaks, Calif: Sage Publications Inc.

Henning, E., Van Rensburg, W. & Smit B. 2004. *Finding your way in qualitative research*. Pretoria: Van Schaik Publishers.

Higgs, P. & Smith, J. 2002. *Rethinking truth*. Edited by E. Clarke. Landsdown: Juta.

Houston, B. 1996. Role models: help or hindrance in the pursuit of autonomy? In: *The gender question in education. Theory, pedagogy and politics.* Edited by A. Diller, B. Houston, KP. Morgan, M. Ayim. London, Dartmouth: Westview Press.

Husen, T. & Poslethwaite, TN. (eds). 1994. *The International Encyclopaedia of Education.* 2nd edition, volume 1. Oxford: Pergamon.

Janssen Reinen, I. & Plomp, T. 1994. *Gender and new technology*. In: *The International Encyclopaedia of Education.* 2nd edition, volume 4. Edited by T. Husen and TN. Postlethwaite. Oxford: Pergamon.

Johnson, AP. 2008. *A short guide to action research*. 3rd Edition. Boston, New York, San Francisco: Pearson Education, Inc.

Joubert, HJ. & Prinsloo, IJ. 2001 *Education law. A practical guide for educators*. Pretoria: Van Schaik Publishers.

Kelly, K. 1999. From encounter to text: collecting qualitative data for interpretive research. In: *Research in practice. Applied methods for the social sciences.* Edited by M. Terre'Blanche & K. Durrheim. Cape Town: University of Cape Town Press.

Kemmis, S. 2009. Action research as a practice-based practice. *Educational Action Research*, September 2009, vol. 17, no. 3: 463-474.

Kent, J. 2000. Group inquiry. A democratic dialogue? In: *Research and inequality*. Edited by C. Truman, DM. Mertens and B. Humphries. London: UCL PRESS, pp. 80-94.

Kethusegile, BM. 2000. Regional overview. In: *Beyond inequalities. Women in Southern Africa.* Edited by BM. Kethusegile, A. Kwaramba, S. Gumbie. Zimbabwe: Harare. Southern African Research and Documentary Centre, pp. 23, 24, 26, 43, 228.

Kindon, S., Pain, R. & Kesby, M. 2007. *Participatory action reseach: origins, approaches and methods.* London and New York: Routledge.

Kirkup, G. 2000. Introduction to part one. In: *The gendered cyborg: a reader*. Edited by G. Kirkup, L. Janes, K. Woodward & F. Hovenden. London and New York: Routledge, in association with The Open University, pp. 3-5.

Kitzinger J. & Barbour RS. 1999. Introduction: the challenge and promise of focus groups. In: *Developing focus group research. Politics, theory and practice*. Edited by RS. Barbour and J. Kitzinger. Thousand Oaks, Calif: Sage Publications, pp. 1-20.

Kotze, GS. 2004. Outcomes-based assessment strategies. In: *Outcomes-based assessment.* Edited by JG. Maree & WJ. Fraser. Sandown: Heinemann Publishers, pp. 60-61.

Kwaramba, A. & Made, P. 2000. Girl child. In: *Beyond Inequalities. Women in Southern Africa.* Edited by BM. Kethusegile, A. Kwaramba, S. Gumbie. Zimbabwe: Harare. Southern African Research and Documentary Centre, pp. 202-204, 207.

Lemmer, EM. 1993. Gender issues in education. In Dekker EI & Lemmer EM (eds). *Critical issues in Modern Education*.Durban: Butterworths.

Levin M. & Greenwood, D. 2001. Pragmatic action research and the struggle to transform universities into learning communities. In: *Handbook of action research: participative inquiry and practice.* Edited by P. Reason and H. Bradbury. London: Sage Publications.

Lindeque, B. & Vandeyar, S. 2004. Context analysis and diversity. In: *Teaching-learning dynamics. A participative approach for OBE.* Edited by M. Jacobs, NCG. Vakalisa and N. Gawe. Sandown: Heinemann Publishers (Pty.) Ltd.

Manzo, LC. & Brightbill, N. 2007. Toward a participatory ethics. In: *Participatory action research approaches and methods.* Edited by S. Kindon, R. Pain & M. Kesby. London and New York: Routledge.

Martin, CL. & Levy G. 1994. Gender roles. In: *The International Encyclopaedia of Education.* 2nd edition, volume 4. Edited by T. Husen and TN. Postlethwaite. Oxford: Pergamon.

McMillan, JH. & Schumacher, S. 2001. *Research in education. A conceptual introduction,* Fifth edition. New York: Addison Wesley Longman, Inc.

Michell, L. 1999. Combining focus groups and interviews: telling how it is; telling how it feels. In: *Developing focus group research: politics, theory and practice.* Edited by RS. Barbour and J. Kitzinger. Thousand Oaks, Calif: Sage Publications.

More, MP. 2002. Human rights. In: *Handbook for the Code of Professional Ethics*. Edited by B. Parker. Centurion: The Unilever Ethics Centre, University of Natal, pp. 100-101.

Muwanigwa, V. 2000. Education. In: *Beyond inequalities. Women in Southern Africa.* Edited by BM. Kethusegile, A. Kwaramba, S. Gumbie. Zimbabwe: Harare. Southern African Research and Documentary Centre, pp. 239-240, 245.

National Report on the development of education. 48th International Conference on Education. 25-28 November 2008. Available: http://www.education.gov.za/dynamic/dynamic.aspx?pageid=329&catid=10&category=reports&legtype=null[Cited: 7 May 2009]

Nieuwenhuis. J. 2007. *Growing human rights and values in education*. Edited by J Beckmann and S. Prinsloo. Pretoria: Van Schaik Publishers.

Nyberg, D. 1990. Teaching values in school: the mirror and the lamp. *Teachers College Record.* Volume 91, Number 4, pg 595-611.

Oosthuizen, IJ., Rossouw, JP. & De Wet, A. 2004. *Introduction to Education Law*. Pretoria: Van Schaik Publishers.

Park, P. 2001. Knowledge and participatory research. In: *Handbook of action research: participative inquiry and practice*. Edited by P. Reason and H. Bradbury. London, Thousand Oaks, Calif: Sage Publications.

Parker, B. 2002. Ethics and the Code. In: *Handbook for the Code of Professional Ethics*. Edited by B. Parker. Centurion: The Unilever Ethics Centre, University of Natal, pp. 9, 17, 120.

Petty, G. 1993. *Teaching today. A practical guide*. Cheltenham: Stanley Thornes Publishers Ltd.

Ramphele, M. 2008. *Laying ghosts to rest. Dilemmas of the transformation in South Africa*. Cape Town: Tafelberg.

Reason, P. & Bradbury, H. 2001. Introduction: inquiry and participation in search of a world worthy of human aspiration. In: *Handbook of action research: participative inquiry and practice*. Edited by P. Reason and H. Bradbury. London: Sage Publications.

Richter L. & Tyeku S. 1999. Jobs and careers in social science research. In: *Research in practice. Applied methods for the social sciences*. Edited by M. Terre'Blanche & K. Durrheim. Cape Town: University of Cape Town Press, p. 193.

Sadker, MP., & Sadker DM. 1997. *Teachers, schools, and society*. 4th Edition. New York: The McGraw-Hill Companies, Inc.

Shaba, SM. 1998. *Educational law in South Africa. A guide to educators and managers in education.* Pretoria: Amabhuku Publications.

Sheffield, SL. 2004. *Women and science. Social impact and interaction*. Edited by MA. Largent. Santa Barbara, California: ABC-CLIO.

Sidhu, KS. 1984. *Methodology of research in education*. New Delhi: Sterling Publishers Private Limited.

Smith, J. 2004. Gender issues in primary schools. In: *Professional issues for primary teachers*. Edited by A. Browne, and D. Haylock. Thousand Oaks, CA: Paul Chapman Publishing.

Sowa, PA. 2009. Understanding our learners and developing reflective practice: conducting action research with English language learners. In: *Teaching and Teacher Education: An International Journal of Research and Studies*, November 2009, vol. 25, no. 8:1026-1032.

Steyn, SC., Wolhuter, CC., De Wet, NC., Berkhout, SJ. & De Waal, EAS. 2003. Uitdagings vir Vergelykende Opvoedkunde: alles vir almal en verstaan van die ander. The *South African Journal of Education*, Vol. 23(4): 307-312. [Online]. Available: http://0-search.sabinet.co.za.oasis.unisa.ac.za/WebZ/images/ejour/educat/educat-v23_n4_a10.pdf?sessionid=01-64822-1206175708&format=F [Cited 25 August 2008].

Swann, J. & Graddol, D. 1995. Feminising classroom talk. In: *Language and Gender. Interdisciplinary perspectives,* edited by S. Mills. London and New York: Longman.

Terre'Blanche, M. & Durrheim, K. 1999. Social constructionist methods. In: *Research in practice. Applied methods for the social sciences*. Edited by M. Terre'Blanche & K. Durrheim. Cape Town: University of Cape Town Press, p. 148.

Terre'Blanche, M. & Kelly, K. 1999. Interpretive methods. In: *Research in practice. Applied methods for the social sciences*. Edited by M. Terre'Blanche & K. Durrheim. Cape Town: University of Cape Town Press, p. 134.

Thandi Lewin*. Provisions embodied in education laws regarding gender issues.*2009. Personal communication with Department of Education. With special thanks to Thandi Lewin at the Department of Education, South Africa: Pretoria offices.

The Times. 2005. *Great lives. A century in obituaries*. Edited by I. Brunskill. London: Harper Collins Publishers.

Vakalisa, NCG. 2004. Participative learning. In: *Teaching-learning dynamics. A participative approach for OBE.* Edited by M. Jacobs, NCG. Vakalisa & N. Gawe. Sandown: Heinemann Publishers (Pty.).

Ling. L. 1998. Introduction and theoretical Perspectives. In *Values in Education*. Edited by J. Stephenson, L. Ling, E. Burman & M. Cooper. London and New York: Routledge.

Van Niekerk, P. 1999. Values and ideologies. In: *Contemporary education: global issues and trends*, edited by E. Lemmer. Durban: Heinemann.

Weinert, FL. 1994. *Human development: overview*. In: *The international encyclopaedia of education.* 2nd edition, volume 1. Edited by T. Husen and TN. Postlethwaite. Oxford: Pergamon.

WIKIPEDIA. n.d. "Sofia Kovalevskaya." [Online]. Available: http://en.wikipedia.org/wiki/Sofia_Kovalevskaya#Early_years [cited 14 May 2010].

APPENDIX A: INTERVIEW SCHEDULE

Semi-structured Interview Questions.

1. Tell me how you as a teacher changed since starting this research project?

2. During this research project we spoke a lot about gender equality. Are you now more aware of your practice with regard to gender equality? Why?

3. Tell me how your behaviour has changed since we started this project? How about your classroom practice?

4. Tell me how your attitude has changed since we started this project? How about your classroom practice?

5. What do you find positive/negative about doing these Interventions?

6. Tell me what changes you brought about for each of the three Interventions? Give examples.

APPENDIX B: LETTERS OF CONSENT

Appendix B

LETTER OF INFORMED CONSENT.

Enquiries: L. van der Merwe-Muller 19 January 2010

University of South Africa (UNISA)

Student number: 37364022

Academic Supervisor: Professor M.P. van Niekerk

Comparative and International Education: M.ED

TITLE OF RESEARCH DISSERTATION:

Combating gender stereotyping in the Science and Technology classroom of Primary schools: Participatory Action Research.

Dear Participant

You are invited to participate in a research project aimed at:

Investigating the combating of gender stereotypes in the Natural Science and Technology classrooms.

The action research entails taking part in a focus group discussion, the implementation of a strategy and a post-implementation discussion and interview. This project serves as a tool for creating an awareness of stereotypes and gender role transmission in the Science and Technology classroom. Thus, it a tool for teacher empowerment and professional growth.

Please note that your participation in this research is voluntary and is not intended to harm anyone. I am available at any time to answer any questions you may have concerned with the research. The format for the research results publication will be a masters' dissertation. No information will be revealed or published that will allow your identity to be established against your will.

You have the right to withdraw, at any stage, from this research if you feel it is offensive, intrusive or misleading.

If you are willing to partake in this study, I humbly request you to sign as a declaration of your consent that you have understood the above and that this research project is indeed voluntary.

Participant's signature ..... Date .....

Researcher's signature ..... Date 18/01/2010

Yours sincerely

L. van der Merwe-Muller

Appendix B

LETTER OF INFORMED CONSENT.

Enquiries: L. van der Merwe-Muller 19 January 2010

University of South Africa (UNISA)

Student number: 37364022

Academic Supervisor: Professor M.P. van Niekerk

Comparative and International Education: M.ED

TITLE OF RESEARCH DISSERTATION:

Combating gender stereotyping in the Science and Technology classroom of Primary schools: Participatory Action Research.

Dear Participant

You are invited to participate in a research project aimed at:

Investigating the combating of gender stereotypes in the Natural Science and Technology classrooms.

The action research entails taking part in a focus group discussion, the implementation of a strategy and a post-implementation discussion and interview. This project serves as a tool for creating an awareness of stereotypes and gender role transmission in the Science and Technology classroom. Thus, it a tool for teacher empowerment and professional growth.

Please note that your participation in this research is voluntary and is not intended to harm anyone. I am available at any time to answer any questions you may have concerned with the research. The format for the research results publication will be a masters' dissertation. No information will be revealed or published that will allow your identity to be established against your will.

You have the right to withdraw, at any stage, from this research if you feel it is offensive, intrusive or misleading.

If you are willing to partake in this study, I humbly request you to sign as a declaration of your consent that you have understood the above and that this research project is indeed voluntary.

Participant's signature ..... Date 19/01/2010

Researcher's signature ..... Date 19/01/2010

Yours sincerely

L. van der Merwe-Muller

Appendix B

LETTER OF INFORMED CONSENT.

Enquiries: L. van der Merwe-Muller 19 January 2010

University of South Africa (UNISA)

Student number: 37364022

Academic Supervisor: Professor M.P. van Niekerk

Comparative and International Education: M.ED

TITLE OF RESEARCH DISSERTATION:

Combating gender stereotyping in the Science and Technology classroom of Primary schools: Participatory Action Research.

Dear Participant

You are invited to participate in a research project aimed at:

Investigating the combating of gender stereotypes in the Natural Science and Technology classrooms.

The action research entails taking part in a focus group discussion, the implementation of a strategy and a post-implementation discussion and interview. This project serves as a tool for creating an awareness of stereotypes and gender role transmission in the Science and Technology classroom. Thus, it a tool for teacher empowerment and professional growth.

Please note that your participation in this research is voluntary and is not intended to harm anyone. I am available at any time to answer any questions you may have concerned with the research. The format for the research results publication will be a masters' dissertation. No information will be revealed or published that will allow your identity to be established against your will.

You have the right to withdraw, at any stage, from this research if you feel it is offensive, intrusive or misleading.

If you are willing to partake in this study, I humbly request you to sign as a declaration of your consent that you have understood the above and that this research project is indeed voluntary.

Participant's signature ..... Date 18-01-2010

Researcher's signature ..... Date 18-01-2010

Yours sincerely

L. van der Merwe-Muller

Appendix B

LETTER OF INFORMED CONSENT.

Enquiries: L. van der Merwe-Muller 19 January 2010

University of South Africa (UNISA)

Student number: 37364022

Academic Supervisor: Professor M.P. van Niekerk

Comparative and International Education: M.ED

TITLE OF RESEARCH DISSERTATION:

Combating gender stereotyping in the Science and Technology classroom of Primary schools: Participatory Action Research.

Dear Participant

You are invited to participate in a research project aimed at:

Investigating the combating of gender stereotypes in the Natural Science and Technology classrooms.

The action research entails taking part in a focus group discussion, the implementation of a strategy and a post-implementation discussion and interview. This project serves as a tool for creating an awareness of stereotypes and gender role transmission in the Science and Technology classroom. Thus, it a tool for teacher empowerment and professional growth.

Please note that your participation in this research is voluntary and is not intended to harm anyone. I am available at any time to answer any questions you may have concerned with the research. The format for the research results publication will be a masters' dissertation. No information will be revealed or published that will allow your identity to be established against your will.

You have the right to withdraw, at any stage, from this research if you feel it is offensive, intrusive or misleading.

If you are willing to partake in this study, I humbly request you to sign as a declaration of your consent that you have understood the above and that this research project is indeed voluntary.

Participant's signature ..... Date 20/01/2010...

Researcher's signature ..... Date .....

Yours sincerely

L. van der Merwe-Muller

Appendix B

LETTER OF INFORMED CONSENT.

Enquiries: L. van der Merwe-Muller 19 January 2010

University of South Africa (UNISA)

Student number: 37364022

Academic Supervisor: Professor M.P. van Niekerk

Comparative and International Education: M.ED

TITLE OF RESEARCH DISSERTATION:

Combating gender stereotyping in the Science and Technology classroom of Primary schools: Participatory Action Research.

Dear Participant

You are invited to participate in a research project aimed at:

Investigating the combating of gender stereotypes in the Natural Science and Technology classrooms.

The action research entails taking part in a focus group discussion, the implementation of a strategy and a post-implementation discussion and interview. This project serves as a tool for creating an awareness of stereotypes and gender role transmission in the Science and Technology classroom. Thus, it a tool for teacher empowerment and professional growth.

Please note that your participation in this research is voluntary and is not intended to harm anyone. I am available at any time to answer any questions you may have concerned with the research. The format for the research results publication will be a masters' dissertation. No information will be revealed or published that will allow your identity to be established against your will.

You have the right to withdraw, at any stage, from this research if you feel it is offensive, intrusive or misleading.

If you are willing to partake in this study, I humbly request you to sign as a declaration of your consent that you have understood the above and that this research project is indeed voluntary.

Participant's signature ..... Date 20/01/10

Researcher's signature ..... Date 20/01/2010

Yours sincerely

L. van der Merwe-Muller

Appendix B

RE: REQUEST TO CONDUCT A RESEARCH PROJECT AT A PRIMARY SCHOOL.

Enquiries: L. van der Merwe-Muller 19 January 2010

University of South Africa (UNISA)

Student number: 37364022

Academic Supervisor: Professor M.P. van Niekerk

Comparative and International Education: M.ED

TITLE OF RESEARCH DISSERTATION:

Combating gender stereotyping in the Science and Technology classroom of Primary schools: Participatory Action Research.

I, Lorna van der Merwe-Muller ask permission to conduct a research project at this Primary School. I also include, as reference, a letter of Informed Consent which will be signed by the research participants.

Permission granted to conduct a research project:

Yes	X	No

Date: 18/01/2010.

Designation: Principal

APPENDIX C: EXAMPLE OF A FOCUS GROUP DISCUSSION

Appendix C

(Participant D interrupting): National department has got guidelines,

Participant C: Guidelines? Yes but I'm talking about factors within our context.

Participant D: So we don't work with it? We don't work with it? It is there but we don't work it. There is the document …

Participant C: Yah you look at the (kan nie hoor nie/unclear) again you get socio-economically very strong . So what you found is that they have got one little girl or two little girls, a boy and a girl, then they hand it to their children so you again find it through a socio-economic structure you find that the children that come here are not clearly defined. The girls are more inadequate then boys which you might find in your socially deprived communities. You found it very, very evident that the girls might not have the abilities that certain boys have. In some primary schools it's quit a difficult one especially in the richer areas, not saying it is not there hey, it's just a little bit more vague and difficult to in the end distinguish it. You agree with me? **Everybody:** yes we do.

Participant D: I had a boy in another school and they showed a video while they were doing a discussion and they spoke about how sometimes you know the maids in the house dust or sweep and ……..little put his hand up and he accidentally, "laughs" cause of my wife's ……."that will never happen in my house". (kan nie hoor nie/unclear).

Researcher: Really?.

"everybody Laughing".

Participant D: He has no respect for women but I think (laughing) that's normal, that's gonna happen. (laughing) .

Researcher: You see we are confronted with these things in our classroom. I mean like what you (kan nie hoor nie). Are you still busy can I go to the second question? The second question is what is your perception or opinion of a professional educator?

"SILENCE"

Participant C: That one is a quit interesting question because you cannot just say to, because you are of a specific nature now you clearly defined, now you girls have not got any opportunities in life so therefore I don't really need to put a great deal of effort into teaching , because you got to actually see that all of them have got different opportunities that are open and then you have to

APPENDIX D: EXAMPLE OF A RESEARCH JOURNAL

Appendix D

Wednesday 24 February 2010

We discussed a lady called Patricia Berjak. She is a South African scientist who established a facility in Durban to rescue plants from extinction.

Intervention 2 was implemented: exposing learners to female scientists as role models and discussing female scientists' achievements in science.

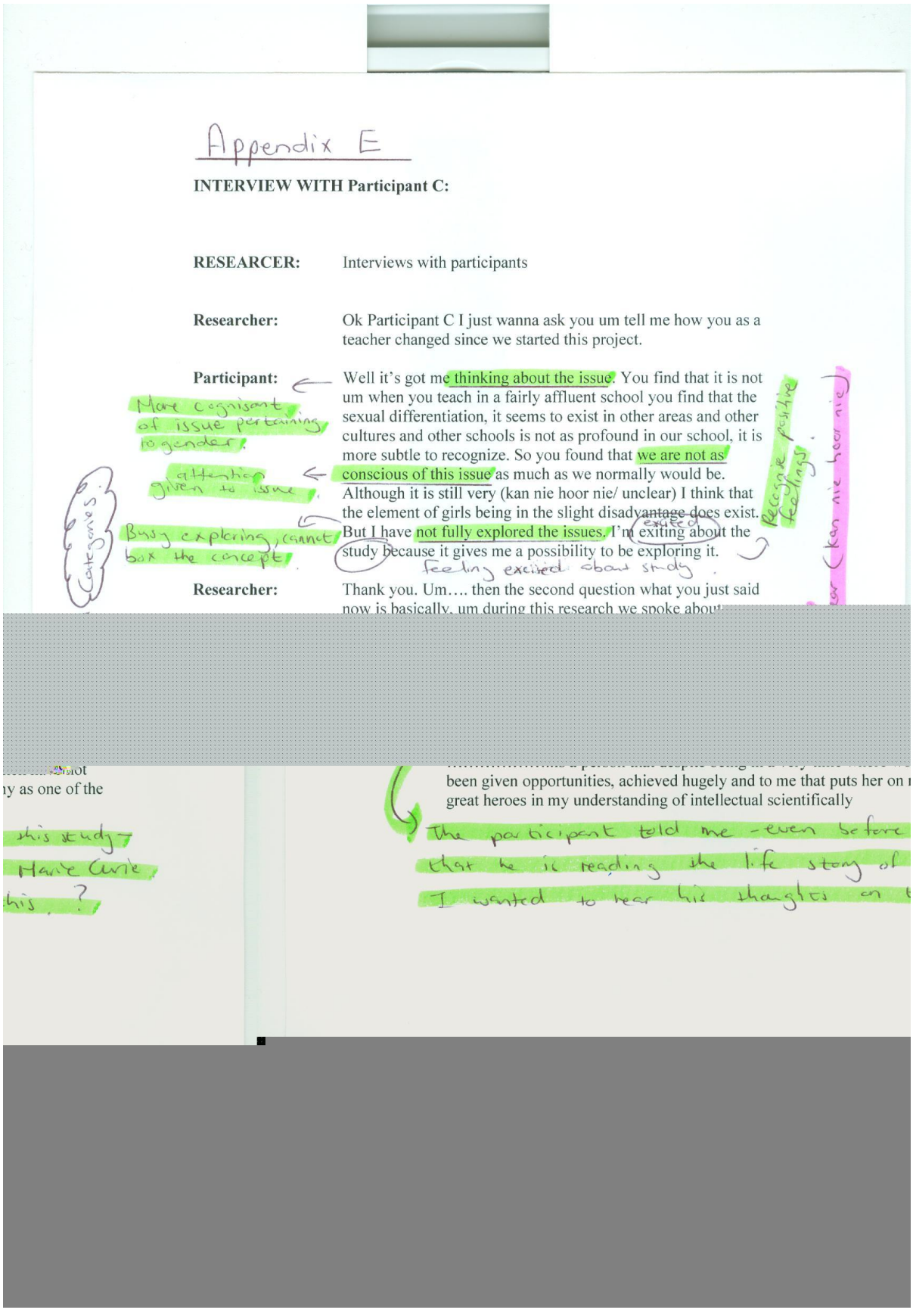
Professor Patricia Berjak is working towards finding innovative ways to preserve rare seeds for future generations. Even though she is a women, she has done a lot of hard work and she has been recognized for the role she plays in science.

Learners were intrigued and admitted to always asuming that scientists are men. The learners were impressed by the amount of female scientists that are acknowledged for their work in South Africa

Some of the learners mentioned (interestingly enough) that people (in the past) who made scientific discoveries where mostly men: Isaac Newton, Albert Einstein (for Maths), etc.

But: the girls then mentioned that women scientists can't make all new discoveries that have already been made.

APPENDIX E: EXAMPLES OF THEMES IN AN INTERVIEW



Appendix E

INTERVIEW WITH Participant C:

RESEARCER: Interviews with participants

Researcher: Ok Participant C I just wanna ask you um tell me how you as a teacher changed since we started this project.

Participant: Well it's got me thinking about the issue. You find that it is not um when you teach in a fairly affluent school you find that the sexual differentiation, it seems to exist in other areas and other cultures and other schools is not as profound in our school, it is more subtle to recognize. So you found that we are not as conscious of this issue as much as we normally would be. Although it is still very (kan nie hoor nie/ unclear) I think that the element of girls being in the slight disadvantage does exist. But I have not fully explored the issues. I'm exiting about the study because it gives me a possibility to be exploring it.

More cognisant of issue pertaining to gender

attention given to issue

Busy exploring, cannot box the concept

Categories

Recognise positive feelings

(kan nie hoor nie)

excited

feeling excited about study

Researcher: Thank you. Um…. then the second question what you just said now is basically, um during this research we spoke about

[redacted]

[redacted]

been given opportunities, achieved hugely and to me that puts her on
great heroes in my understanding of intellectual scientifically

The participant told me - even before
that he is reading the life story of
I wanted to hear his thoughts on

[redacted]