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***LEARNERS TAKING TECHNICAL DRAWING: DOES GENDER MAKE A  
DIFFERENCE?***

by

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## DECLARATION

I, Ntike Jan Boroko (Student number 24361641) declare that: ***LEARNERS TAKING TECHNICAL DRAWING: DOES GENDER MAKE A DIFFERENCE?*** 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.

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SIGNATURE

N J BOROKO

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DATE



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## **Abstract**

This study investigates differences in the performances of boys and girls in Technical Drawing in secondary schools in Gauteng and North-West provinces in South Africa. The matriculation results for Gauteng and North-West Province from 2000 to 2004 were collected, including those from 24 164 males and 3 650 females for Gauteng Province and 6 295 males and 959 females for North-West Province respectively. A significant gender difference was found in both provinces in both higher and standard grade scores. The results revealed that male learners achieved significantly higher scores within this five year period in this subject than female learners.



## TABLE OF CONTENT

<b>CHAPTER 1</b> .....	1
<b>OVERVIEW OF THE STUDY</b> .....	1
1.1 Introduction.....	1
1.2 Background.....	1
1.3 Rationale .....	6
1.4 Research Question .....	6
1.4.1 Sub-questions.....	7
1.5 The aim of the study .....	7
1.6 Significance of the study .....	7
1.7 Research methodology.....	8
1.8 Limitations of the study .....	8
1.9 Chapter Outline.....	9
<b>CHAPTER 2</b> .....	11
<b>GLOBAL AND LOCAL OVERVIEW OF THE LITERATURE</b> .....	11
2.1 Introduction.....	11
2.2 Global overview.....	11
2.3 Local overview .....	14
2.3.1 Legal Aspects: Constitution on the right to education for all citizens of S. A. ....	14
2.3.2 Further Education and Training Legislation .....	15
2.3.4 Elimination of Sexism in Education .....	16
2.3.5 Government projects e.g. “Take-a-girl-child to Work” .....	17
2.4 The Role of stakeholders at FET schools .....	19
2.4.1 Government’s expectations from parents .....	19
2.4.2 Reluctance of some parents to participate .....	22



2.4.3 Government’s expectation from school principal.....	22
2.4.4 Government’s expectation from learners.....	25
2.5 Summary.....	26
<b>CHAPTER 3.....</b>	<b>27</b>
<b>RESEARCH DESIGN AND RESEARCH METHODS.....</b>	<b>27</b>
3.1 Introduction.....	27
3.2 Qualitative and Quantitative research methods.....	27
3.2.1 Qualitative Approach.....	27
3.2.2 Quantitative Approach.....	28
3.3 Research Methods.....	28
3.3.1 Sampling and Population.....	29
3.3.1.1 Stratified Sampling.....	30
3.3.1.2 Instrumentation.....	31
3.3.1.3 Non participant observation of Technical Drawing centres.....	32
3.4 Credibility, Validity and Reliability of Data.....	33
3.4.1 Reducing threats of validity and reliability of data.....	34
3.4.1.1 Internal Validity.....	35
3.4.1.2 External Validity.....	35
3.4.1.3 Content Validity.....	36
3.5.5 Pilot Study.....	37
3.5.6 Ethical Considerations.....	38
3.6 Preparation of the interview.....	39
3.6.1 The interviewing stage.....	40
3.6.2 Interviewing behaviour.....	41
3.6.3 The interview Schedule (types of interviews questions).....	42



3.7	Documentation policy for legal framework.....	43
3.8	Summary.....	44
<b>CHAPTER 4.....</b>		<b>45</b>
<b>PRESENTATION, INTERPRETATION AND ANALYSIS OF DATA .....</b>		<b>45</b>
4.1	Introduction.....	45
4.2	Presentation.....	45
4.3	Feedback on the data collection stage .....	45
4.4	Observation.....	46
4.4.1	Learning and teaching environment in schools A – D .....	46
4.4.2	The physical aspects of the schools.....	48
4.4.3	Technical Drawing centre school A – D.....	48
4.5	Formal interview.....	49
4.6	Culture of schools A – D .....	50
4.7	Presentation and analysis of data from schools A – D .....	52
4.7.1	Data obtained from interviews.....	52
4.7.2.1	Is Technical drawing a difficult subject on SG or HG? Explain why. ....	53
4.8	Summary.....	62
<b>CHAPTER 5.....</b>		<b>63</b>
<b>SUMMARY AND RECOMMENDATIONS .....</b>		<b>63</b>
5.2	Summary of the study.....	63
5.3.1	Recommendation from learners.....	64
5.3.2	Recommendations for Higher Education Institutions and Textbook Suppliers .....	65
5.3.4	Recommendation from DOE officials.....	66



5.3.5 Recommendations on physical resources .....	67
5.3.7 Recommendation with regard to Principals, Parents and Community .....	68
5.4 Suggestions for further research .....	69
5.5 Summary .....	70
5.6 Conclusion .....	70
<b>BIBLIOGRAPHY</b> .....	<b>72</b>
<b>APPENDIX</b> .....	<b>84</b>





## LIST OF FIGURES

Figure 1.1: Gauteng Province Technical Drawing Senior Certificate Results (2000 – 2004).....	4
Figure 1.2: Northwest Province Technical Drawing Senior Examination Certificate 2000 –2004..	5
Figure 1.3: National Senior Certificate Examination Pass Rate by Gender 2000 - 2004 .....	6
Figure 4.1: Gauteng Province 2000 - 2005 .....	54
Figure 4.2: North-west Province Senior Certificate Results for 2000 to 2004 .....	55



## LIST OF TABLES

Table 1.1: ...Examination results in Gauteng and North-west province and by gender, 2000-2004 (technical drawing) .....	3
Table 3.1: Response of the participants from four different schools .....	30
Table 4.1: Term 2 results in the two schools selected in the North-West Province .....	49
Table 4.2: Term 2 results in the two schools selected in Gauteng Province .....	50
Table 4.3: Explanation of differences between SG and HG paper .....	53
Table 4.4: Gauteng Province .....	54
Table 4.6: Which paper, Paper 1 or Paper 2, is more difficult? .....	56
Table 4.7: Is Technical Drawing a suitable subject for girls? Explain. ....	57
Table 4.8: Is Technical Drawing a subject meant for boys? Explain. ....	58
Table 4.9: Do girls and boys learn T/D in the same way? Why? .....	58
Table 4.10: To what extent does the gender of the educator influence the performance of learners in Technical Drawing? .....	59
Table 4.11: Are girls marginalised in T/D classes? .....	60
Table 4.12: Are some sections in Technical Drawing more difficult for girls than for boys? .....	60
Table 4.13: What can the government/school/parents do to improve the gender differences in the performance of learners in Technical Drawing? .....	61



## ABBREVIATIONS

F - Females

FET - Further Education and Training

GP - Gauteng Province

HG - Higher Grade

ICT - Integrated Communication Technology

M - Males

NCS - New Curriculum Statement

NW – North-West Province

P% - Pass Percentage

P1 - Paper One

P2 - Paper Two

SCE - Senior Certificate Examination

SG - Standard Grade

SGB - School Governing Body

T/D - Technical Drawing



## GLOSSARY

### **Gender differences**

In research done by Kane (1996:07) she explain gender differences as variations on a common human process of cognition and learning between boys and girls. According to Phendla (2004:1) “gender” means the differentiation, usually on the basis of sex, between social roles and functions labelled as “masculine” and “feminine” is universal. In this study gender difference means how boys and girls differ in performance in Technical Drawing (T/D).

### **Learner performance**

Here the focus is on the pass rate and failure rate in Technical Drawing according to different genders. According to statistics, the performance of boys is better than that of girls in T/D.

### **Technical Drawing**

According to the Concise Oxford Dictionary (1989:292) technical drawing is a subject that deals with vocational training or applied science. It is an object represented by graphical lines. The word “technical” is derived from the Greek “technikos” or “techne” meaning art, or pertaining to some particular art science or trade. It further means a particular field of knowledge pertaining to mechanical art. The word “drawing” is defined as an art of portraying the way of life and customs of a specific time through pictures. As a result, the first drawings were associated with picture, because of the absence of dimensions.

### **Differentiation**

It is interesting to note that the word *differentiation* is derived from the Latin word, meaning separation and distinction; but it can also mean ‘break’ or ‘tear’ to pieces. Distinguishing the differences between learners can lead to a separation in for example, the rigid division of learners into classes. However, distinguishing between learners must not break the child or tear him to pieces for the child as a whole on his way to maturity must always be taken into account. In this study boys are distinguished from girls in the class but they are not separated

in terms of Technical Drawing. They are mixed in one class to study the learning area at even though they may do it individually. (Kruger, 1986: 132-133).

## **Educator**

Educative teaching can only take place in a school when an educator, with his superior knowledge and skill, meets learners in the instructional-learning situation (the classroom) and accepts the responsibility for the creation, progress and result of the instructional- learning situation (Kruger & Van Schalkwyk, 1993: 14-15). An educator must have certain personality characteristics such as loyalty, a sound leadership style, a positive attitude to life, fairness, honesty, friendliness, understanding, etc. In this study an educator must help both learners, i.e. a boy and a girl, to achieve his/her goals. A good educator is not necessarily an educationist (pedagogue); most parents are not educationists and yet they are as rule good educators. The educator is independent, self-reliant, fully-matured and strong to render aid. In fulfilling his function to support and aid, the educator assumes responsibility for education. Denying this responsibility, he would be powerless to help. To ignore his call by not intervening in a situation or by refusing to commit himself does not relieve him of responsibility. He must respond to the child's state of not yet- being. The educator's responsibility consist in the making his learning area conscious of his own personal duty and then helping the learner to accomplish it (Van Rensburg & Landman, 1988: 336).

## **Learner**

Another component of the instruction-learning situation is the learner. It is important to know that the child as a learner is present in the school in his total capacity as a human being. During the time the learner spends at school on his way to becoming an adult the educators play an important role. It is the educator who must develop the learner's potential for this purposes an educator must know the nature and characteristics of the learner. Some of the characteristics of learners at school are the following:

- A learner depends on the help of an educator.
- A learner has a need to feel safe and secure in order to be able to participate in the instruction and learning situation.

## **Principal**

The key to the educational area is the Principal; the principal is the motivational yeast. How high the learners and educators rise to their challenge is the principal's responsibility. If some of the educational ingredients in our recipe are missing, it is the responsibility of the principal to compensate by intervention or innovation or substitution or, if nothing else, by raising hell with the people who stock his pantry (Jackson in Krasensia: 1980: 22). In the S.A scenario the principal is the final accountable person when students fail their exams or when the school does not perform well.

## **Culture**

According to Van der Westhuizen (1996: 78-90) culture is the sum total of inherited ideas, values, beliefs and knowledge that determines a social structure and which motivates people to enhance and cultivate traditions. Cultures are related to the Latin word "colo" which means to build and develop. In this study the culture of the school should be to built and develop the skills and knowledge of learners in Technical Drawing. One of the most difficult tasks a principal has is to create a healthy organisational culture while at the same time fostering a climate conducive to change in the school.

## **Climate**

Organisational climate is defined by Van der Westhuizen (1996:103) as the general atmosphere existing in the school. This atmosphere results from how the worker (educator) experiences his/her work environment. How the working environment is experienced is dependent on factors such as the quality of interactional relationships and the management style. In the school the educator experiences his/her environment as positive or negative depending on factors such as climate within the climate within the school.



## **Leadership**

Gray & Starke (1988:219) and Citing (1982) define the concept of leadership as both a process and a property. The process of leadership is the use of non-coercive influence to direct and co-ordinate the activities of the members of an organised group toward the accomplishment of group objectives. As a property, leadership is the set of qualities or characteristics attributed to those who are perceived to employ such influence successfully. Sayer & Williams (1989:24) Point out that leadership is the power to influence the thinking and behaviour of others in order to achieve mutually desired objectives. At the core of most definitions of leadership are two functions: providing direction and exercising influence (Van der Bank, 2003:6-7). Thus it may be said that leaders mobilise and work with others to articulate and achieve shared intentions. Leaders know the ends towards which they are striving. They pursue goals with clarity and tenacity and are eager for their accomplishment.

## **Management**

Management refers to the process of planning, organising, leading and controlling the work of the organisation members and using all available resources to reach stated organisational goals (Stoner & freeman, 1992:4). Smit & Cronje (1992:6) contend that management refers to a process or a series of activities that gives the necessary direction to an enterprise's resources so that its objectives can be achieved as productively as possible in the environment in which it functions. In this study management refers to the principal's and educator's management style in the school situation with specific reference to Technical Drawing as a subject.



## CHAPTER 1

### OVERVIEW OF THE STUDY

#### 1.1 Introduction

The participation of female learners in the technical education system is gradually increasing even though there is a concern about the quality of their performance. In general, it has been assumed that gender issues such as attitudes, motivational and socio-economic factors in the classroom have impacted negatively on female performance throughout the technical education system (Perry, 2003:14). Historically a number of indicators have pointed to this and it has been generally thought that female learners' academic achievement at school lags behind that of their male counterparts in Technical Drawing. This has been the cause for the continued assumption that females are performing poorer than their male counterparts.

Perry (2003:15) indicated girls' participation and performance in education is influenced by a number of factors that have little to do with the education process per se. Political, religious, cultural and economic factors each has a role in restricting girls' access, persistence and achievement but gender-based educational theories, system, processes, and practice also contribute to poorer outcomes for girls. This implies that an educator is expected to know and respect the culture of his or her audience for two reasons: (1) no single culture, including Western culture, has all the answers; and (2) people reject solutions which do not fit their problems. The findings in this study will indicate the reality as to whether these factors do affect and influence the performance of girls in Technical Drawing as a dynamic subject.

#### 1.2 Background

As a Technical Drawing teacher for 25 years, I have noticed that there is a discrepancy in the performance of learners taking this subject. There is also a distinct difference in the ability of female and male learners to do Technical Drawing. Noticeably girls perform well in other technical learning areas such as: Motor Mechanics, Fitting and Turning, Welding and Metalworking, Panel Beating and Auto Electrical compared to Technical Drawing. Technical drawing has to do with creative thinking and spatial abilities. This study therefore focuses on



visual - spatial ability. One instance of a difference in visual-spatial ability is Piaget's water level test (Kane, 1996:17) when he says "imagine a drawing of a drinking glass in an upright position. Then imagine a glass tilted slightly. Females have more trouble drawing an imaginary water line in the second glass; they are less likely to indicate that water remains horizontal, even in a tilted glass." According to Halpern (1992 in Kane, 1996:17) such findings have been made with American College students over and over. It appears that about 50% of college women get it wrong; research in India also shows that women there have trouble with such tests (Kane, 1996:18).

Sammons (1995:83) claims that although socio-economic factors and innate dispositions of students are major influences in achievement; schools in similar circumstances can achieve very different levels of educational progress and achievement. There are some studies that suggest that both academic and social effective outcomes such as attendance, attitudes and behaviour are affected by the school; in other words, children who attend more and are truant less frequently had better attitudes towards schooling and behaved better while at school in the more effective school compared with the less effective. In the light of studies that investigate attendance, attitude and behaviour of school boys and girls, an in-depth look into those variables might shed light on possible performance differences between boys and girls in Technical Drawing. The question is what are the causes of the discrepancies?

The difference in performance between male and female learners is documented for subjects like Mathematics and Science. Mfusi (2005:09) argues that in the Limpopo Province during the Dinaledi project, some maths and science teachers attested to the fact that girls who joined the maths and science streams did not perform as well as their male counterparts and their numbers were low. There is a stereotyped attitude claiming that girls cannot perform well in science subjects (Mfusi, 2005:09). There is a counter argument suggesting that in Scotland and the rest of the United Kingdom (UK) the gap between the performance of male and female learners is narrowing or even reversed in public examinations in some learning areas, e.g. Mathematics, Science and English (Gipps & Murphy, 1994: 45). The United States, Canada, most of Western Europe, New Zealand, Australia, Japan and Hong Kong are experiencing better results in female school attainment in both standardized tests and in school leaving examinations in Mathematics, Science and English, but no results are available about the performance of learners in Technical Drawing (Perry, 2003:14). The table

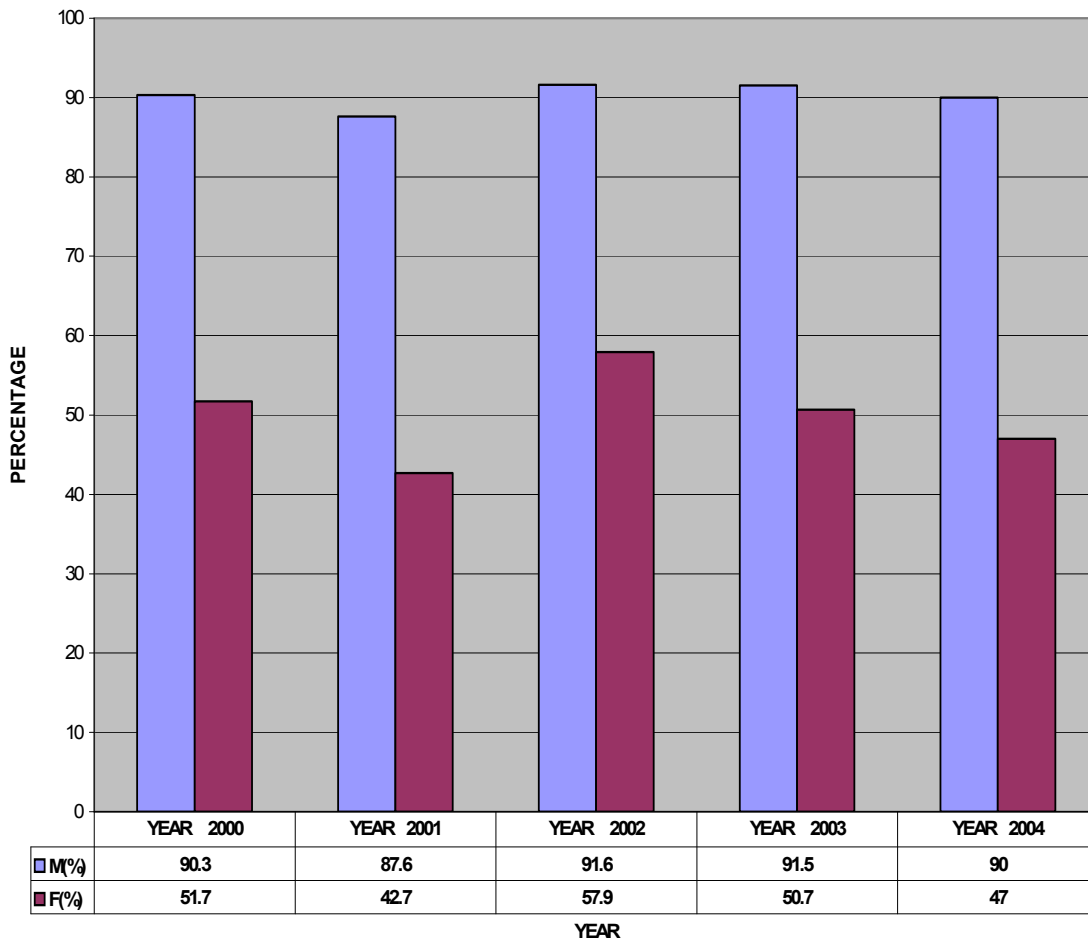


below shows the differences in performance between boys and girls during the last five years (2000-2004) in Gauteng and North-West Province in South Africa.

**TABLE 1.1 Examination results in Gauteng and North-west province and by gender, 2000-2004 (technical drawing)**

<b>2000</b>	<b>Gender</b>	<b>Candidates</b>	<b>Total Passes</b>	<b>Pass%</b>
<b>Gauteng</b>	Male	4222	3813	90.3
	Female	615	318	51.7
<b>North-West</b>	Male	1113	978	87.9
	Female	182	110	60.4
<b>2001</b>	Gender	Candidates	Total Passes	%
<b>Gauteng</b>	Male	4519	3960	87.6
	Female	771	329	42.7
<b>North-West</b>	Male	1165	987	84.7
	Female	224	77	34.4
<b>2002</b>	Gender	Candidates	Total Passes	%
<b>Gauteng</b>	Male	4644	4245	91.6
	Female	787	456	57.9
<b>North -West</b>	Male	1200	1025	85.4
	Female	227	112	49.3
<b>2003</b>	Gender	Candidates	Total Passes	%
<b>Gauteng</b>	Male	4419	4044	91.5
	Female	791	401	50.7
<b>North -West</b>	Male	1220	1031	84.5
	Female	249	109	43.8
<b>2004</b>	Gender	Candidates	Total Passes	%
<b>Gauteng</b>	Male	4535	4082	90.0
	Female	926	435	47.0
<b>North -West</b>	Male	1343	1147	85.4
	Female	327	175	53.5

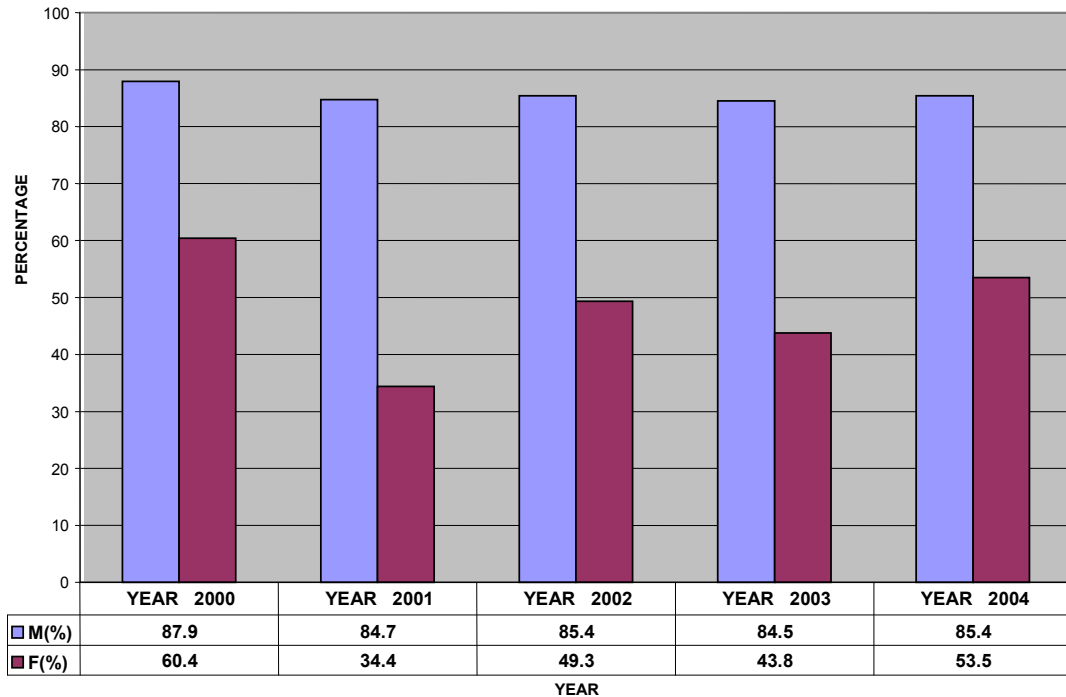
**Figure 1.1: Gauteng Province Technical Drawing Senior Certificate Results (2000 – 2004)**



According to Figure 1.1 there is discrepancy regarding gender with regard to the performance of learners in Technical Drawing from 2000 to 2004 Gauteng Province. On average, the performance of boys is 40 % higher than that of girls in Technical Drawing for the period 2000 to 2004. The difference in performance between boys and girls is very significant in the period in question.

Figure 1.2 indicates the performance of learners in Technical Drawing with regard to the two genders of learners in Northwest Province from 2000 to 2004.

**Figure 1.2: Northwest Province Technical Drawing Senior Examination Certificate  
2000 - 2004**

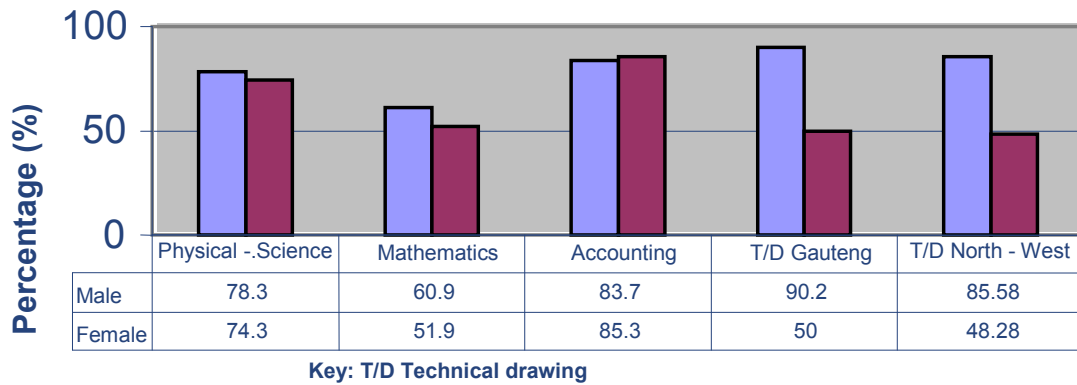


According to Figure 1.2 there is discrepancy regarding gender with regard to the performance of learners in Technical Drawing from 2000 to 2004 Northwest Province. This figure also indicates an average of 37 % difference between boys and girls. In this instance, the performance of boys is higher than that of girls for the period 2000 to 2004.

The influence of factors such as assessment and biological environmental based variables in the performance of learners remain a challenge. In view of these factors, the study concerns itself with the differences in performance between male and female learners because the researcher has been teaching Technical Drawing for the past 25years at school in the North-West Province and there is anecdotal evidence on this matter. It is therefore necessary to investigate the causes of these discrepancies in the performance of male and female learners in Technical Drawing, in the Tshwane metropolitan area.

The study looks at the participation of female learners and the performance of learners in technical education with specific reference to Technical Drawing in South Africa. Figure 1.3 reflects gender differences in the performance of learners in other subjects

**Figure 1.3: National Senior Certificate Examination Pass Rate by Gender 2000 - 2004**



The above figure indicates that except for accounting, from 2000–2004 the overall performance of male learners has been better than that of female learners in all the selected subjects (DoE, 2004: 22). There is really a need to find out the cause of the discrepancies between the performance of boys and girls in these subjects.

### 1.3 Rationale

Technical Drawing is a vital subject due the technological developments both in South Africa and globally. It is also a subject in the school curriculum which is implemented in all the nine provinces. This study seeks to study the performance of boys and girls in Gauteng and Northwest provinces. While the study concentrates on two provinces, lessons may be learned for the rest of South Africa, due to the need for emancipation of woman enshrined in the Constitution. There is anecdotal evidence that the performance and participation of female learners in Technical Drawing (T/D) is low. The study seeks to come up with empirical data to refute or validate the assumption that the performance and participation of female learners in Technical Drawing are low. It also seeks to establish the causes of the perceived discrepancy between the performance of boys and girls in Technical Drawing.

### 1.4 Research Question

What is the cause of the low participation and low performance of female learners in Technical Drawing?



### **1.4.1 Sub-questions**

The following sub-questions form an integral part of the main research question:

- Is the environment in which Technical Drawing is taught favourable for the participation of girls in this subject?
- How wide is the gap in the performance of male and female learners in Technical Drawing?
- What are the causes of the performance discrepancies between girls and boys in Technical Drawing?
- What is the contribution of the DOE, principals, educators and parents?

### **1.5 The aim of the study**

The aim of this study is:

- To explore causes for the discrepant performance in the achievements between boys and girls taking Technical Drawing in the FET schools.
- To find out factors that contributes to low performance of girls in this subject.

### **1.6 Significance of the study**

The findings of this study will contribute to fostering changes in the instruction-learning process in Technical Drawing. The stakeholders and role players in the education system, namely circuit managers, curriculum developers, learners, educators, principals and parents will know how to contribute to ensure maximum participation and improvement in the performance of female learners in Technical Drawing. The study will also influence curriculum design and new approaches to technical education as a whole. These will assist in indicating how different factors influence the performance of learners in Technical Drawing. These include but are not limited to:

- Family background
- Socio-economics factors



- Motivational factors
- Attitudes towards the learning area
- Experience.

From an intellectual point of view the findings of this study should help understand, evaluate and rationalise the causes of differences in performance levels between boys and girls doing Technical Drawing and determine if these differences are intellectual, cognitive, physical, social or behavioural. Learning outcomes should spell out the essential skills that need to be developed so that knowledge can be meaningfully applied in the civil, electrical and mechanical technology fields.

### **1.7 Research methodology**

Qualitative and quantitative research methods were used in the study. The combination of these methods was used to enhance the results. These methods are discussed in details in Chapter 3.

In this study the following methods were be used to collect the data:

- (i) Statistics – matric results from 2000-2004 in Gauteng and North-West.
- (ii) Interviews with learners, educators and DoE officials.
- (iii) Observation of Technical Drawing centre to check the suitable equipments etc.
- (iv) Literature review.

### **1.8 Limitations of the study**

The approach of Vithal & Jansen (1997:35) will be used to acknowledge the limitations of the study. This will empower the researcher to appreciate what constraints will be imposed on his study and to understand the contest in which the research claims are set. The following are noted:

- Access to schools will be limited to two weeks per term for both Gauteng and North-West Province.
- Data may not always be found /available.

- One or more participants may withdraw from the study at a critical stage (e.g. during an interview) of the research process.

Although the use of interviews as an existing instrument has the advantage of saving time and costs and thus has high validity and reliability (Mouton, 2001:100). The interview has its own risks namely, the fact that the sample sizes can be too small. Data sources can be incomplete. Given the above possible constraints, the research design will be adjusted accordingly as set out in the methodology and design section in chapter 2. There is also the possibility of a lack of references, e.g. articles and journals in technical drawing. If there were more of the resources needed my work would be more objective. However, the available literature on the learning area will be utilised to the optimum in an effort to create researched work in Technical Drawing. Therefore this study will be pioneer work in gender differences in Technical drawing hence the subjectivity of my approach in this study.

## **1.9 Chapter Outline**

### **Chapter 1**

The current research will follow the following research layout: The rationale, background and statement of the problem, aim of the research, significance of the study, research design and methodology, limitations of the research, chapter divisions and conclusion.

### **Chapter 2**

In this chapter the researcher will give an explicit investigation of influence of internal and external factors on gender differences in the learner performance with specific reference to Technical Drawing from reviews of the local and international literature and the study of relevant journals and other documents.





### **Chapter 3**

An exposition on the research design and methodology constitutes this chapter. This includes a qualitative research approach, population sampling, data collection strategies and analysis and research limitations.

### **Chapter 4**

Chapter four contains the presentation of the research findings based on the data collected from observations, interviews and documentation. The research findings will be analysed and interpreted in this chapter. This will be done in conjunction with illustrations (e.g. graphs) from the studied literature.

### **Chapter 5**

In this chapter the summary and recommendations will be given.



## CHAPTER 2

### GLOBAL AND LOCAL OVERVIEW OF THE LITERATURE

#### 2.1 Introduction

In South Africa today the provision of equal education is generally regarded as one of the most important components of the education system. It is necessitated by the phenomenal progress in the field of technology and the accompanying dizzying rate of change and expansion in the industry (Kruger, 1986:180). Technical Drawing as one of the variety of technical subjects is not an exception. Today this subject is offered to both boys and girls, unlike in the past when it was offered to boys only. “Technical Drawing is an active, problem-solving subject that promotes the creativity of the learner” (Sanders, 2001: 35). According to the New Curriculum Statement (NCS) Technical Drawing has been given a new name called Engineering Graphics and Design in the Further Education and Training band (FET) for Grade 10-12 learners ( Vinjevold, 2005 : 01).

This chapter will discuss the causes for gender differences in the performance of learners in Technical Drawing at secondary school level. The purpose of learner assessment and evaluation in this learning area is to obtain as accurate a picture as possible of learners’ capacity in order to ensure that they are provided with a programme that enables them to maximise their potential regardless of their gender (Goldstein, 2000: 217). Its focus will be on the performance of FET learners (Grade 10-12) in South African schools. It is necessary to focus on local and global trends in the performance of learners in Technical Drawing – why? Since 21<sup>st</sup> century technology has been the most important expect in the educational & economic circles. This notion is also important in the South African education system.

#### 2.2 Global overview

The turning point in technical education in England came in 1851 with the Great Exhibition in London (Kruger, 1986:170). Consequently after 1854 the British government began to give financial support to secondary education, particularly that with a technically inclined

education. In the meantime the interest in technical education including increased Technical Drawing became part of this process as a subject prompted by the exhibition of technical education held in Paris in 1867 ( Kruger, 1986 : 171). Technical Drawing is an important learning area in technical education.

South Africa is a country with few tangible assets in the way of natural resources to support the position it has built up for itself and the only thing that is indigenous to this country is the ‘know how’ ( Kruger,1986:174). The ‘know how’ is converted into products which the world wants by means of knowledge acquired from Technical Drawing as one of the school learning areas. The know-how implies to both male and female learners who study Technical Drawing.

Patton (1995: 605-619) investigated how well male and female learners could perform typical map-use tasks such as route planning, symbol identification, visual search and estimation, as well as right/left orientation. This investigation has some implications for the perception of boys and girls in Technical Drawing. Learners use special and visual skills to identify objects. Ferreira (2004: 105-107) revealed that although female learners initially perform better academically than their male counterparts, male learners do however overtake their female peers towards the end of their schooling in biology and this may be asked if it also apply to Technical Drawing.

Praat (1999:75) reviewed the achievement of boys and girls in learning areas such as Maths and Science; however, this review says nothing on Technical Drawing. Wood (2003: 365-383) examined pupil achievement from primary school to secondary school literacy/English. In this literature, it has been indicated that boys do not like writing and it affects their performance. This research was done in the South-West of England and has some bearing on Technical Drawing.

Researchers also suggest that gender differences in enrolments in other cognitive learning areas might influence gender differences in Technical Drawing performance (Kelly, 1987:305) for example if girls are fewer than boys in class. On the other hand Technical Drawing has the reputation of being difficult and is generally taken by boys than girls (Kelly, 1987:306). The result suggests that the problem of girls’ under-achievement in Technical Drawing may be a problem of varieties between schools (Kelly, 1987:307).



Among the countries of the southern region of Africa, Malawi ranks low in the area of female educational participation, particularly with respect to enrolment and performance in Mathematics, Science and Technical Drawing (Kelly, 1987: 308). In almost all the learning areas examined for the Malawi certificate of education, boys do better than girls (Erskine and Wilson, 1999:134). This probably includes Technical Drawing. The only subject in which females do as well as or better than males are Chichewa and Biblical studies, according to Kadzamia (in Erskine & Wilson, 1999:134).

The secondary school in Malawi is primarily a male institution. As the minority group among students, girls experience a variety of negative effects. There are anecdotal reports from teachers and head-teachers according to Erskine and Wilson (1999:136) that boys in mixed schools often harass and tease girls who do well. They accuse them of being unfeminine, unnatural, treading on male preserves and so on. According to these authors several teachers in Malawi attribute the fall-off in performance and the increasing unwillingness of girls to answer questions in class to a reluctance to draw attention to themselves if they are bright or to invite ridicule if they are not (Erskine & Wilson, 1999:136).

A particular instance of harassment arose in a school in which one cohort of girls had been offered the opportunity, on an experimental basis, to take Technical Drawing, a subject usually reserved for boys, at the start of their school career. The majority dropped out the second year, but three continued and consequently were the only girls in a class of about forty learners. They were subjected to great pressure from male classmates to drop out and move to another class. The head teacher had to intervene to keep the girls in the class (Erskine & Wilson, 1999:136).

The examination results from provincial and national department will be used for this study. The selected technical schools will be visited and the previous records will be used as a form of reference. At the end of the analysis a graph will then be constructed to show the difference in performance according to different genders in respective years. The above in a way gives an overview of possible variables that might affect the performance of boys and girls.

## 2.3 Local overview

The apartheid education system was notoriously based on minimum literacy and numeracy for African children, with boys trained in technical education which included Woodwork, Metalwork and Technical Drawing, and girls studying subjects such as Needlework, Housecraft and Typing (Chisholm, 2003b:5). In general, the education system was a tool for producing subservient learners and educators; gender stereotyping ensued for females across racial lines (Khumalo, 2004: 1). Today this subject is offered to both boys and girls. According to Vinjevold (2005:01) Technical Drawing is an active, problem-solving subject that promotes creativity and visualisation of the learner.

### 2.3.1 Legal Aspects: Constitution on the right to education for all citizens of S. A.

The constitution represents and embodies in legal terms, the essence, principles and main features of the democratic order that has come into being during the last decade of the previous century. The constitution itself makes it clear that the protection of human rights, and in particular the bill of rights, forms a significant part of it (Joubert & Prinsloo, 2001:15).

The Bill of Rights contained in chapter 2 of the constitution has a profound influence on the complex education environment in which there are a myriad relationships between institutions exercising authority and individual stakeholders, for example between educators, learners and their parents, between governing bodies, educators and parents, between education departments and staff members of educational institutions, etc. The Bill of Rights is involved in each of these relationships. In addition, the Bill of Rights guarantees particular education rights such as: (a) the right to a basic education, including adult basic education; (b) the right to further education, which the state through reasonable measures, must make progressively available and accessible; (c) the right to family care or parental care, or to appropriate care when removed from the family environment; (d) the right to receive education in the official language or languages in public educational institutions where that education is reasonably practicable, taking into account equity and the need to redress the results of past racially discriminatory laws and practices.

The constitution aspires to build one nation by upholding values such as dignity, equality, non – racism and non–sexism and granting of one citizenship to all South Africans. A great task now rests on the shoulders of all South Africans, especially educators to teach and parents to participate in all the learners’ school related matters. You probably realize that it is not easy to protect the rights of all the learners as an educator or school principal alone towards restoring a culture of education and training in our country while at the same time establishing a culture of respect for human rights among the learners.

Professor S.M.E Bengu the former minister of education said that while the new constitution provides the ground rules for us to create a culture of human rights in education, applying these rights is easier said than done. He points out that “the education provisions of the constitution, however important were not developed systematically and are by no means comprehensive”(Joubert & Prinsloo,2001:18). This means that something over and above the constitution is required to make complete provision for education, but the constitution is the starting point. It is therefore important for parents to participate in their daughters activities in order to help educators towards better performance by these female learners.

### **2.3.2 Further Education and Training Legislation**

Further Education and Training is a system designed to promote the integration of education and training, to enhance learner morality and progression, which are fundamentals of National Qualification Framework (NQF) as stipulated in the South African Qualification Authority Act of 1998. This system includes learning programs that will be registered on the NQF from levels 2 to 4. These correspond with Grades 10 to 12 in the school system and N1 to N3 in the technical colleges (Further Education and Training Act 98 of 1998). It prepares learners for higher education and employment.

The age of the learners in this band ideally ranges from 16 to 18 years. Historically it served the interests of the privileged racial minority through the racially and gender skewed curriculum design, which resulted in the historically disadvantaged majority of learners failing to access either Higher Education Institution or employment (DoE, 2004:7). Historically technical education subjects have been regarded as inferior compared to subjects like Mathematics, Physics and Accounting. The input and participation of the stakeholders

such as parents, will lead to development and increase in performance of female learners in Technical Drawing in the FET band.

#### **2.3.4 Elimination of Sexism in Education**

The perception of learners for technology and technical education is largely influenced by stereotypes attached to cultural background (Khumalo, 2004: 1). In black or African tradition and cultures, custom has the force of law, it exercises juridical control over the social conditioning of interrelationships in the home and in the community. In the home parents who are illiterate or have very limited literacy, tend to enforce/impose the known on the unknown – they behave in the erratic primitive psychology of castigating girls and women as home economists and domestic hands undeserving of formal education. According to these erratic conceptions of girls and women, female learners should only learn to read and write, enough for them to read to and from their parents.

Girls brought up in such tradition and cultures tend to accept and internalize erratic informal educational home values which distort their self-concepts and lower their self-esteem. Hence, even in formal education in schools girls tend to display forms of inferiority complex which affects their achievement motivation. Erratic parental participation in the informal educational setting of the home should be eliminated to make way for changing values in the 21<sup>st</sup> century. Girls and women are no longer vulnerable to oppression by men and male-dominated social values and this is expected to permeate through the performances of girl learners in technical drawing.

The state may not unfairly discriminate directly against anyone on one or more grounds, including race, gender, sex, pregnancy, marital status, ethnic or social origin, conscience, belief, culture, language and birth. No person may unfairly discriminate directly or indirectly against anyone on one or more grounds in terms of the above statement and in addition National legislation must be enacted to prevent or prohibit unfair discrimination (Constitution of RSA, Act 108 of 1996). Education must therefore be directed to the full and holistic development of the individual and community, and to strengthening respect for human rights and fundamental freedoms. It must promote understanding, tolerance, and friendship among all South Africans and must advance the principles contained in the Bill of Rights (Mandela, 1994:60) Girls were frequently denied education and training opportunities because they are

female. Furthermore, girls were educated and trained to fulfil traditional roles which perpetuate their oppression. (Refer to cultural norms which conformed women and girls to domestic chores and erratic informal participation by parents damaged the self-concept of girls and affected their self-esteem adversely).

It is also important that within all education and training programs special attention must be given to the special interest of girls. This can only be achieved through the participation of parents at local school level. Girls should be encouraged to pursue non-traditional subjects such as mathematics, science and technical drawing. In addition to this, special steps must be taken to give full recognition and value to the work and skills that are traditionally associated with women. Participation of parents could play a pivotal role in this regard.

### **2.3.5 Government projects e.g. “Take-a-girl-child to Work”**

Take a girl child to work day has become South African’s most widely supported act of volunteerism and has already influenced the lives and careers of thousands of girl learners. The theme of this year’s Cell – C national campaign on take a girl child to work is titled “Self Esteem”. This theme was strategically chosen to coincide with the working of the 50<sup>th</sup> anniversary of the famous women’s march against the pass laws (Department of Trade and Industry, 2006:1). This offers us a further opportunity to positively influence the women leaders of tomorrow.

In addition, parents’ participation in classroom events necessitates a shift in emphasis and adjustments made in the training and behaviour of teaching staff by so doing the performance of girl learners also improves. It must also be noticed that when a parent becomes involved in the learner’s activities, it must take place in a purposeful and functional manner. The teacher must know exactly why and how to involve the parent. This requires careful planning.

Four years ago Cell – C launched a CSI initiative to “deepen the thinking of girl child with regard to their infinite roles in society, enhance her self – esteem, inspire and motivate her to reach her full potential and through exposure to diverse careers and positive role models assist her to prepare for the world of work”(Cell – C, 2006:1). The initiative was a joint effort between government, the Department of Education, business and the public sector.



From that humble resolution, take a girl child to work day TM has transformed into South Africa's "largest collaborative act of volunteerism ". (The encyclopaedia of Brands and Branding in South Africa in association with the Sunday Times), with nearly 800 companies and over 200 000 girls participating in the initiative (Cell – C 2006:2).

Keeping this in mind, Cell – C has determined this year to take its commitment up a notch, and we hope the parents will follow suit; to give Take a Girl Child to Work Day TM added impetus by addressing issues particularly relevant in the girl child's life. In the South African context, this will mean confronting issues of self – esteem stemming from social ills such as sexual violence, abuse, rape and teenage pregnancy. These will give courage to female learners at school and thus improve their academic performance.

Port ShepStone Regional Hospital manager, Mr. Khawal and his management team also took part in the project "Take a Girl Child to Work" by inviting neighbouring school girls to visit the hospital on the 25 August 2006(Morai & Mgcoro, 2006:1). The ultimate aim was to expose them to careers and to empower women at all levels that are within the Health sector. It was such a memorable experience for the staff members from different departments, who worked with the girls that were so interested in knowing and learning many activities.

The project did not involve the government, DOE, business, public and Department of health only, but SANParks (South African National Parks) also took part, where more than 50 school girls from neighbouring comities visited the Kruger National Park as part of the "Take a Girl Child to Work project (Travers, 2003:1). During their visit to the Kruger National Park, the girls were taken through careers offered in the Park from camp management, housekeeping and finance to game ranging, scientific research and environmental management. They were also taken for a tour of the world famous Stevenson – Hamilton Library and shown around the different artefacts on display at this historical facility. This can only be actualized fully if the parents are also participating fully in their daughter's activities at school level, so as to improve their academic performance.

## **2.4 The Role of stakeholders at FET schools**

### **2.4.1 Government's expectations from parents**

The apartheid regime was unrepresentative, undemocratic and highly oppressive thanks God we did not stay there. It is the vision and objective of today's democratic government that the people shall govern. Democracy requires that all South African's have access to power and the right to exercise their power. Parents are expected to be part of this exercise up to the school level. This will ensure that all people including parents will be able to participate in the process of reconstructing our country and developing our girl learners at schools.

Deepening democracy and participation of parents at school and in the family will require ensuring that elected structures such as school Governing Bodies (SGB), School Management Teams (SMTs) and Learner Representative Council (LRC) to conduct themselves in an answerable and transparent manner. Clear Code of Conduct must be established and enforced for all public representatives; this will enable the parents to participate in school under a clear guided legal framework.

Parents have the responsibility of providing their children with a balanced diet, warm suitable clothing and proper medical care. Should parents fail to provide these basic needs for their children, it is the duty of the guardian teacher to contact the parents or the principal with regard to the problem, in order to seek solutions (Buchel, 1995:288). Parents have to remain involved in the formal education of their children in a sympathetic, participative and co-operative sense, by providing a sound and safe home base, which provides for mental, emotional and physical needs.

According to Dekker & Lemmer (1998:153) parents must become partners in the education of their children and that the school is responsible for orientating and preparing parents for their role. Louw, Van Ede & Louw (1999:312) are of the opinion that parents are highly involved and interested in their children and in what they do. Their attitude towards their children is positive and they care about them. They are child centred and spent time with their children. Children of such parents generally like to do what their parents expect of them hence effective teaching and learning.

Parental participation in the school is very important. It is seen as a mechanism for simultaneously raising education standards, developing new partnerships between schools and parents in the local community and promoting social inclusion (Brain & Reid, 2003:291). Parents are invited to take up a variety of roles as co-educators of their children, governance of schools, take responsibility for their children's attendance, behaviour and to provide practical help to schools. In return, schools are expected to support the participation of parents through providing the necessary support and opportunities for parents to become involved in schools, and act as a resource in promoting the wider inclusion of families and the local community.

Parental participation is about linking the school and the community and fostering good relationships. It provides schools with a way of contacting hard to reach parents. It extends the school's capacity to provide learner and family support. Parental participation may be one way of helping to improve attendance and behavioural change, as well as learner and school performance. Schools also need funds for their daily operations. Government alone cannot fulfil all our educational needs, so the parental component is very important in paying fees so that the schools can function. When the government took power in 1994 there was a backlog left by the apartheid government, so there was a need to bring equity in all spheres. Parents are an important element in addressing the imbalance of the past by assisting the government to bring equity in schools.

There are key areas where parents can play an important role, namely:

- Fundraising-to supplements the funds provided by government.
- Learner attendance-to help the school by supporting learner attendance.
- Developing resources for the school, for example, learning support material.
- Publicising the school and developing the school image in the community.
- Liaison with agencies that can help the school, such as getting sponsors for the school and other related functions that can support teaching and learning.

Parents probably know more about their children than does any professional in the school system. A healthier learning environment exists for all stakeholders when parents are active partners in the teaching process. Raising parents' awareness of school issues and teaching objectives encourages cooperation with educators. School principals have an important role



in promoting parental participation, making parents aware of conditions in which educators work, and encouraging respect for educators. Parents who are non-responsive increase the stress experienced in the classroom (McNeal & Ralph, 2001:171).

According to Collinson (1996:55) parents should keep on coming to school, even if it is just for a few minutes as they drop off their child or bring child's project to school. There is the danger that children learn one thing at school and something quite different at home, this results in negative impact on teaching and learning. For example, at school children may learn to wash their hands before eating. Then they go home, and they see their mothers preparing food with dirty hands. Who should they believe? Their teacher? Or their mother? This sort of experience makes them confused.

Having said that, one should bear in mind that participation does not mean that everyone participates in everything, but rather that parents are represented sufficiently on all levels. The time has come to view the implementation of participation in education critically and analytically. Those concerned must constantly take stock of where participation needs to be reinforced. For example, joint decision making and effective communication between the school and the parents. If not, there is likely to develop a defensive attitude towards any form of parent participation (Horowitz, 1997:25).

Ensuring gender equity is another expectation in the overall participation of our parents at school level. Special attention is being paid to the empowerment of women in general and blacks in particular. This will try to redress the imbalance of the past. There must be representation of women in all institutions, councils and commissions, and gender issues must be included in the terms of reference of these bodies, in turn these will encourage girls and improve their academic performance.

According to Prinsloo (1997:100) black parents did not participate in the education of their children at school. This has also been observed by the researcher in the North-West province during his interview with learners taking Technical Drawing in the two schools visited. That is why there is a need for parental participation in the learners' academic performance in the North-West province. Although there are school committees, school governing bodies and community schools, parents' participation is restricted to membership only. Parents did, however, attend speech days and paid school fees. In South Africa parents have legal rights

concerning the education of their children and the accountability of educators and schools. Democracy demands democratic involvement from parents and accountability from public institutions.

Again in the past, parents sent their children to school and provided for their needs, such as clothes and food (Badenhorst, 1995:114). They were often unaware of what was happening at school. The only means of communication was an annual school report sent to parents. It is therefore essential for parents to know how the school functions. This knowledge will facilitate the learning process of their daughters and will diminish friction between parents and educators. As a results girl learners' academic performance will surely improve.

#### **2.4.2 Reluctance of some parents to participate**

Some parents are reluctant to participate in school affairs or do not take a keen interest in their children's education. "Parents who are unsupportive and do not participate are obviously the most difficult to reach. In many cases, the reasons stem from the fact that the parents' own problems take precedence over their child's education" (Vandergrift & Greene, 1992:58). In the writer's view, reluctance among parents is often caused by illiteracy. They perceive the school as an area of literates where they are not welcome and cannot be accommodated. Poverty is a further cause of reluctance, as parents cannot afford all their children's school needs. Staying away from any school activity implies not being embarrassed when meeting educators.

In some cases reluctance stems from ignorance, where parents simply do not understand the role they can play in their children's education. Most of them regard educators as the ultimate force in their children's education. They believe that paying the school a visit would interfere in the educators' duties. The acceptance of parents by both educators and principals should therefore be encouraged.

#### **2.4.3 Government's expectation from school principal**

The school principal is viewed as the person who has the final say and is accountable for the successes and failures of the school by giving a vision (Founder & Merrill, 2001:35). He or

She is the one who initiates projects and sees to it that they are carried out as planned (Datnow & Castellano, 2001:278). He or She has to plan, organize, lead and control all activities including human resources management (Daresh, 2001:105). He or She is the head of the school, the person responsible for all activities that occur in and around the school (Saxe, 1980:195).

The principal is the person who acts as a headmaster and controls the uncontrollable (James & Vince, 2001:313); (Pearsall, 1999:1136). It is expected from the principal to help his or her staff members to attain individual, as well as school relationships and objectives (Bryant, 1998:8) He or She is the person with the highest authority in a school (Crowther, 1995:918).

The responsibility of the principal is to carry out duties listed in Personnel Administration Measures (PAM) under the Employment of Educators Act, 1998 and those listed in SASA. In par 4.2 of the PAM states that the purpose of the position of the principal is to ensure that the school is managed satisfactorily and in accordance with relevant positions. Among other duties of the principal is to participate in community educational activities and community development. The principal as being the member of the SGB does not alter his or her position as an employee and representative of the employer in the school.

The principal's good relationship with staff at schools played a major role in the performance of learners. From the interviews conducted in the four schools in both Gauteng and North-West provinces by the author of this article it has shown that the gender of an educator does not have any influence on the academic performance of girl learners in the FET schools particularly in subject like Technical Drawing. However the experience and approach of the educator on the subject has either positive or negative influence on the learner.

Relationships in schools includes those between the school and the state, the parents and the school, the educator and the learner, the parent and the educator, the school and the community, the school and business sector, the school principal and the School Governing Body, the educator and the school principal. In this article the focus is the need for parental participation in their daughters' academic performance at FET schools in the North-West Province. There can only be good performance if there is good relationship among school stakeholders.

An effective relationship implies trust and acting in good faith. It is only in relation to group membership that we understand the community around us. Relationships are keys to understanding both material and human interactions. We cannot understand facts in isolation but only in relation to ourselves and in our relationship with other people. Relationships with others affect our own sense of self. Education that is democratic offers all legitimate stakeholders opportunities to participate and take decisions in the school.

Democratic participation in decision making cannot be accomplished simply by issuing an invitation and holding an open meeting. It often requires teaching people how to participate, making them feel comfortable, and empowering them to feel competent and capable. Effective learning and teaching takes on meaning when embedded in the reality of caring human relationships. Effective leaders strive to perform at their peak levels amidst circumstances of complexity while drawing from areas of strength and weakness (Quirk & Fandt, 2000:61).

Schools that strive for social justice must be concerned with the quality of relationships among all those who constitute ‘the school’ and the nature of the school circumstances in which educators teach and learners learn. Democratisation of our schools need a more collaborative relationship approach in which all stakeholders are engaged in a tradition of working together in open and collaborative ways. Effective managers must do more to ensure that the organization runs smoothly (Westwood, 2001:30).

Educators also have a primary responsibility in education to help learners cultivate personal qualities of motivation that can give them courage for developing aspiration, independent learning, achieving goals and fostering resilience in the face of setbacks (Alderman, 1999:03). Good & Brophy (2002:221) state that to be motivated to learn steady encouragement and support from all stakeholders including parents must be granted. Such motivation is unlikely to develop in a chaotic atmosphere, so it is important to build a good relationship between government, principal and parents in order to improve the performance of a girl learner at FET schools.

Another role of educators in the girl learner’s education is to have a sense of humour. According to (Cruickshank, 1995:317) an appropriate sense of humour is frequently noted by learners as important characteristics of educators they enjoy. These educators make learning

fun. He is also of the opinion that humour in the classroom appears to reinforce learning and improve long-term retention. Moreover, effective use of humour has both a spontaneous and a deliberate or planned dimension. A sense of humour is conveyed through our ability to laugh when something funny occurs.

Further more the role of educators in the learners' education is to be credible and worthy of trust. The credibility of the educators exists in the eyes of the beholders, learners. Regardless of an educator's knowledge, experience education level, or position, all elements that might be expected to ensure ones credibility, are credible only when learners believe one to be. Educators establish themselves as credible and trustworthy by credentials, messages sent to learners and behaviour.

Educator's credentials are most likely to influence the perceptions of young learners, those who are relatively knowledgeable about the subject or those who are highly motivated to succeed. The messages, the educator sends to the learner impacts on credibility. For example, when the educator is able to demonstrate to learners how the topics he/she presents are related to their interest and needs, they are viewed as more credible. Credibility and trust are the result of being open, honest and equitable in dealing with learners.

Cruickshank (1995:410) says that educators should involve parents constructively in their child's education and this will improve attendance and behaviour of the learner. Educators recognise the important role parent's play in the lives of learners. Therefore they want to maintain constructive relationship with them. Educators are also aware that conditions existing in learners homes impact on their school success. As a result, they benefit from knowing what home conditions are like, and they would like to influence them positively.

#### **2.4.4 Government's expectation from learners**

A learner is a person receiving or obliged to receive education in terms of the South African Schools Act (SASA) No. 84 1997. Parents and educators play a major role as far as the learner's education is concerned. According to Du Toit (1993:13) the relationship of the educator and the learner is extended qualitatively and quantitatively by assimilation and accommodation. Every parent must make sure that every child for whom he/she is responsible must attend school from the first day of the year in which such child reaches the



age of seven until the last day of the year in which such child reaches the age of fifteen or the ninth grade.

According to SASA (1997:6) the aim of the schools act is that the quality of education of all learners must be improved. For example there must be better facilities, better trained educators, and better methods of teaching and better school conditions. Learners must also be motivated and disciplined to take their education seriously and to use opportunities that are now open to them. A public school must admit learners and serve their educational requirements without unfairly discriminating in any way. Learners at different schools elect their learner representative council (LRC). LRC is the only recognised and legitimate representative learner body at the school. Learners also take part in formulating school policy and code of conduct to enhance teaching and learning.

## **2.5 Summary**

The educational arena is engaged in world-wide change. This is true in South Africa also where change dominates the profession and educators are expected to lead the transformation process. In this chapter, learners taking Technical Drawing in secondary schools are discussed in terms of performance. It is in fact the premise of this research that gender does make a difference in terms of performance in Technical Drawing.

The principals as leaders are viewed deeply as individuals and holistically worldwide. The new view of leadership in learning organisations is different. Creativity within an organisation is to be found among educators, learners and principals who are expected to make a difference in life. People have to believe in their capacity to act and bring about good results (Rosenbatch & Taylor, 1989: 27).

Leadership means planning for change. Developing and translating a vision in learners at schools is an important step in leadership. If one were to summarise the organisational leadership area today in one word, that word would be diversity in instruction and learning, especially in Technical Drawing. Finally, in this chapter, a case was made as to whether does gender make a difference in terms of the performance of learners taking technical drawing in secondary schools. The research methods and design of the study will be presented in the next chapter.



## **RESEARCH DESIGN AND RESEARCH METHODS**

### **3.1 Introduction**

This chapter deals with the research design, which refers to the plan and structure of the investigation used to obtain evidence to answer research questions. According to McMillan & Schumacher (1997: 162) the design describes the procedures for conducting the study, including when, from whom, and under what conditions the data will be obtained. In other words, the design indicates how the research is set up, what happens to the subjects and what methods of data collection are used.

### **3.2 Qualitative and Quantitative research methods**

There two research methods which are distinct in nature: quantitative and qualitative research methods.

#### **3.2.1 Qualitative Approach**

A qualitative and quantitative methodological approach will be adopted. According to Cresswell (1998:15) qualitative research is a process of inquiry in which social and human problems are explored. Again, McMillan and Schumacher (1993:372) support Sowell (2001:22) when he defines qualitative research as “data collection strategies that acquire data in the form of words rather than numbers”. It is against this background that the researcher decided to use a qualitative approach because the study will investigate gender difference in learner performance. The study will investigate through observations interviews and documentation.

This study will adopt these methods for the following reasons:

- The purpose of qualitative research is to understand social phenomena from the respondents` and participants` perspective.

- Due to its flexible nature, qualitative research ensures the use of an emergent design, which means that decisions about data collection strategies are made during the study.
- In qualitative research, the researcher becomes the research instrument, meaning that he/she becomes immersed in the research project.
- The content in the study is important, based on the belief that human actions are strongly influenced by the settings in which they occur (McMillan & Schumacher, 1993; 14-15).

### **3.2.2 Quantitative Approach**

In the quantitative approach, standardised measurement procedures are used to assign numbers and statistics are used to summarise results (Dooley in Khumalo, 2004: 79). The quantitative approach emphasised the quantification of constructs. The quantitative researcher believes that the best way of measuring the properties of a phenomenon (e.g. the performance or attitude towards a certain topic) is through quantitative measurement, i.e. assigning numbers to the perceived qualities of things (Babbie & Mouton, 2001:49). In this study, interviews and document analysis are used for quantifying the performance and attitude of learners and educators towards Technical Drawing as a learning area at secondary school level. If it combines the two approaches, it should be clear on which research questions involve quantitative methods and data, and which involve qualitative methods and data, and which involve both. The sort of combinations that will be involved should also be clear.

From the reasons mentioned above, it becomes clear that since learner performance is a social phenomenon involving groups of people, interacting in their practical contents, the quantitative and qualitative approach methods are the most appropriate for this study. How data will be collected is now outlined.

### **3.3 Research Methods**

In line with the above principles, the present research relies on three techniques in order to collect data on the difference in performance between boys and girls in Technical Drawing in

secondary schools in the Gauteng and North-West Provinces. These techniques involve interviews, observation and literature review.

The causes of performance discrepancies between girls and boys in Technical Drawing and the environment in which Technical Drawing is taught will be investigated. Interview Schedules for educators, learners and government officials will be prepared. Standardised (face-to-face) interviews will be used to collect data on these two Provinces. As far as documentation is concerned, this method will act as a supplement to the interview phase. The researcher will also observe while interviewing takes place.

### **3.3.1 Sampling and Population**

Sampling is the process of selecting individuals to participate in a research study (Fraenke & Wallen, 1996:111). According to Bryman (2001:93), decisions about sample size represent a compromise between the constraints of time and cost, the need for precision and a variety of further considerations. In view of the aim of this study, stratified sampling was used to select the sample of this study. Stratified sampling is described as a technique that classifies the population into homogenous subsets (with heterogeneity between subsets) and selects the appropriate number of subsets from each (Babbie, 1992:215).

The target population of this study consists of all the technical and combined secondary schools in the Gauteng and North-West Province which amount to more than hundred and fifty schools. There are many types of sampling methods than can be administered in qualitative and quantitative studies. In the context of the present study, the simple random sampling method is chosen in order to obtain a sample that is representative of the population. In this method the subjects are selected from the population so that all members of the population have the same probability of being chosen (McMillan & Schumacher, 1997:166).

As far the two Provinces are concerned, that is the Gauteng and North-West Provinces, all the technical and combined secondary schools are distributed over districts and regions. Thus two schools are randomly selected from each province. The participants in this study will consist of the population of 4 (four) learners, 2 (two) educators from the four selected schools

and two (2) officials, one from each selected province. In this way both urban and rural areas will be represented. All the selected participants will be interviewed in order to collect data on learners’ performance discrepancies that prevail in these schools in Technical Drawing. Thus, in the four schools that will be selected for the study, a total of 16 learners, i.e. 8 girls and 8 boys and 8 educators, i.e. 4 males and 4 females will be interviewed. In addition two officials, one from each province will also be interviewed in order to collect data (see Table 3.1 below). Two Provinces have been selected because technical schools are few in the Tshwane metropolitan area. This will also help to validate the data to be collected. Table 3.1 shows the number of respondents in the study. The responses of the participants interviewed in the four different schools and the two provincial department officials:

**TABLE 3.1: Number of the participants from four different schools**

PARTICIPANTS	EDUCATORS		LEARNERS		TOTALS	GOV.OFFICIALS	
	MALE	FEMALE	MALE	FEMALE		N.W	GP
SCHOOL A	1	1	2	2	6	1	1
SCHOOL B	1	1	2	2	6		
SCHOOL C	1	1	2	2	6		
SCHOOL D	2	0	2	2	6		
TOTALS	5	3	8	8	24	2	

KEY: GP=Gauteng Province, N.W=North-West Province

### 3.3.1.1 Stratified Sampling

According to Cohen, Manion & Morrison (2000:100) stratified sampling involves dividing the population into homogeneous groups, each group containing subjects with similar characteristics. For example, group A might contain males and group B females. In order to obtain a sample representative of the whole population in terms of sex, a random selection of subjects from group A and B must be taken. In this study learners that do Technical Drawing in Grade 12 have been selected because they are the focus group. Two boys and two girls are selected from each of the four randomly selected, i.e. male and female in each of these schools.

A stratified random sample is therefore a useful blend of randomisation and categorisation, thereby enabling both quantitative and qualitative research to be undertaken. It is therefore appropriate sampling to use in this study as it uses both methods mentioned above (Cohen, Manion & Morrison, 2000:101).

### **3.3.1.2 Instrumentation**

Instrumentation implies the techniques to be used to collect data. The three most common techniques used in this study are standardized (face-to-face) interviews, observation and documentation. The interview is performed on smaller samples and involves direct interaction between individuals, which has both advantages and disadvantages as compared with the questionnaire. The choice of interviews in the research can be justified by the following advantages (McMillan & Schumacher, 1997: 263):

- It is flexible and adaptable.
- It can be used with many different problems and types of person.
- Responses can be probed, followed, classified and elaborated to achieve specific accurate responses.
- Non-verbal as well as verbal behaviour can be noted.
- The interview could motivate the respondent.
- Interviews result in a much higher response rate than questionnaires, especially for topics that concern personal qualities or negative feelings.

In spite of all the advantages that the interview techniques present for qualitative research in general, the present research, with sensitive issues like learners' performance discrepancies and school climate, environment, has made the researcher somewhat sceptical about its application; educators may be uncomfortable and unwilling to give information about their learners' behaviour and their school performance in general. The element of confidentiality has to be clearly demarcated and stressed, but still, there is always the potential for faking or for being less than right forth and candid, because the subjects may believe that sharing certain information would not be in their best interest (McMillan & Schumacher, 1997:264). Moreover, interviewing is costly and time-consuming because it is labour-intensive. For this reason fewer subjects are selected for interviews than could be obtained with questionnaires.

Despite all the above-mentioned disadvantages of interviews, the salient reason for choosing the standardised (face-to-face) interviews is that it results in a much higher response rate than questionnaires. Furthermore, in order to mitigate potential bias, the researcher, as the sole interviewer in the study, should be thought of as a neutral medium through which information is exchanged. If this goal is attained, then my presence will have no effect on the perceptions or answers of the respondents. In other words, if the interview is conducted correctly, it does not matter who the interviewer is; any number of different interviewers would obtain the same results (McMillan & Schumacher, 1997: 264). This aspect of interviewing is essentially one of reliability, which is discussed in more detail in section 3.5.

### **3.3.1.3 Non participant observation of Technical Drawing centres**

Non participant observation was done in order to note of factors that affect the participants in this study. It was observed that learners from remote areas without any technical background such as schools A and B experienced a completely different situation attending with other learners from urban areas like those of schools C and D. Technical Drawing is Greek to them; as a result they perform poorly in this subject. They also feel insecure and lack self-confidence. This makes a specific demand on the educator who plans the Technical Drawing learning activities, because he/she must consider the social, cultural and the economic background of the learners before planning the learning activities (Vermeulen, 1997:17). Because of the above factors schools A and C have registered all learners in the Standard Grade (SG) in this learning area. From the interview, there is the perception that Higher Grade paper (HG) is more difficult than the Standard Grade paper (SG).

A leader is more effective when there is good a relationship with subordinates, when the task is clearly stated and when there is a high level of formal authority on his or her part. Fiedler's research in Bush & West-Burnham(1994:60) on a task-orientated leader has shown that when the situation is particularly favourable or unfavourable to the leader, a task-orientated leader is more effective and when the situation is unfavourable, a people-oriented leader is more effective (Bush & West–Burnham,1994:61).

The major innovation in Fiedler's work (Bush & West-Burnham, 1996:62) is that he takes into account the situation, including the relationship with subordinates as well as the style of

the leader. In this study the principal of the school, the learning area educator and the learner taking Technical Drawing as a subject and departmental officials are taken into consideration.

The principal's relationship with the staff on schools A – D played a major role in the performance of learners at. From the interviews conducted in all four schools, it is clear that the gender of an educator does not influence much on the performance of learners in this learning area. However, the experience and approach to the learning area has either positive or negative influences on the learner.

A person who is motivated works hard and has self-directed behaviour towards important goals (Gray & Starke, 1988:107). If all Technical Drawing educators in schools A – D can organise their Technical Drawing classrooms so that clear models and drawings that belong to previous learners can be put on the display board, new learners, especially girls, might have a positive attitude towards Technical Drawing and this will also improve their results. Female learners might also realise that Technical Drawing is fun and possible to do.

Educators also have a primary responsibility in education to help learners cultivate personal qualities of motivation that can give them resources for developing aspiration, independent learning, achieving goals and fostering resilience in the face of setbacks (Alderman, 1999:03). Good & Brophy (2000:221) state that to be motivated to learn, steady encouragement and support from all stakeholders concerned must be granted. Such motivation is unlikely to develop in a chaotic atmosphere, so it is important to organise and manage the school and classroom as an effective learning environment (Good & Brophy, 2000:222). In the Technical drawing centres observed, there were no wall charts or models which are necessary to enhance the learning of Technical Drawing. Such a learning environment could negatively affect the performance of girls as people who have been excluded from this subject in the past.

### **3.4 Credibility, Validity and Reliability of Data**

The aim of good research design is to provide results that are judged to be credible. According to McMillan & Schumacher (1997:164), credibility refers to the extent to which



the results approximate reality and are judged to be trustworthy and reasonable. Credibility of research also takes into consideration potential sources of error that may undermine the quality of the research and may distort the findings. Throughout the research, precautions will be taken to minimise errors and hence to ensure credibility.

As far as validity is concerned, a frequently used (but somewhat old-fashioned) definition of a valid instrument is that it measures what it is supposed to measure. A more accurate definition of validity revolves around the defensibility of the inferences researchers make from the data collected through the use of an instrument (Frankel & Wallen. 1993:102). Hammersley's (1990:57) view about validity is clear and convincing: "By validity, I mean truth: interpreted as the extent to which an account accurately represents the social phenomenon to which it refers". Any concern with validity implies that the researcher should investigate what s/he is supposed to investigate and s/he should, therefore, address validity at different stages of the research. In simple terms, validity refers to the appropriateness, meaningfulness and usefulness of the inferences researchers make based on the data they collect.

Another important term that needs elaboration is reliability. According to McMillan & Schumacher (1997:178), it refers to the consistency of measurement; that is, the extent to which the results are similar over different forms of the same instrument or occasions of data collecting. Another way to conceptualise reliability is to determine the extent to which measures are free from error. If an instrument has little error it is reliable and if it has a great amount of error it is unreliable (McMillan & Schumacher, 1997:239). It is also possible to obtain a stability estimate of reliability by correlating the results of an original interview with results obtained a second time by the same interviewer.

### **3.4.1 Reducing threats of validity and reliability of data**

In this study validity was ensured by reviewing relevant literature on the problem to establish their findings and by discussing the research problem with respondents prior to administering the instrument.

### **3.4.1.1 Internal Validity**

Internal validity seeks to demonstrate that the explanation of a particular event, issue or set of data which a piece of research provides can actually be sustained by data (Cohen, Manion & Morrison, 2000:107). To some degree this concerns accuracy, which can be applied to quantitative and qualitative research. In this study accuracy in terms of Technical Drawing is important, therefore internal validity will enable the researcher in validating the data obtained from interviews, observations and documentation. “The findings must accurately describe the phenomena being researched (Cohen, Manion & Morrison, 2000:107). In this study the phenomena are boys and girls doing Technical Drawing in Grade 12.

### **3.4.1.2 External Validity**

External validity refers to the degree to which the results can be generalised to the wider population, cases or situation. In this study external validity will be obtained from national department matriculation results of two selected provinces, namely Gauteng and North-West Provinces for general results and Technical Drawing in particular. The issue of generalisation according to writers,” for positivist researcher’s generalisability is a sine qua non, whilst this is attenuated in naturalistic research” (Cohen, Manion & Morrison, 2000:109). For positivists variables have to be isolated and controlled, and samples randomised, whilst for ethnographers human behaviour is infinitely complex, irreducible, socially situated and unique.

In this study quantitative and qualitative approaches have been adopted; therefore the issue of generalisability is essential. These writers suggest that it is possible to assess the typicality of situation – the participants and settings, to identify possible comparison groups such as boys and girls doing Technical Drawing in Grade 12 and to indicate how data might translate into different settings and cultures.

Schofield (1992:200) suggests that it is important in qualitative research to provide a clear, detailed and in–depth description so that others can decide the extent to which findings from one piece of research are generalisable to another situation. Lincoln and Guba (1985:316) argue that it is not the research’s task to provide an index of transferability; rather they

suggest researchers should provide sufficiently rich data for the readers and users of research to determine whether transferability is possible. In this respect transferability requires description. Due to limited transferability and the type of research (mini scope), description will not be provided, but sufficient rich data for the readers and users of research will be provided.

### **3.4.1.3 Content Validity**

To demonstrate this form of validity the instrument must show that it fairly and comprehensively covers the domain or items that it purports to cover. In this study schedule questions for interviews cover items that they purport to cover. It is also unlikely that each issue will be able to be addressed in its entirety simply because of the time available and type of scope in this study.

Nevertheless the researcher ensures that the elements of the main issue to be covered in the research are both a fair representation of the wider issue under investigation (and its weighting) and that the elements chosen for the research sample are themselves addressed in depth. Therefore careful sampling of items is required to ensure their representativeness.

In order to reduce threats of validity in the research, the following techniques are applied. First and foremost, at the beginning of the study, during the preparation of research proposal, the opinions of different colleagues are sought to make sure that the relevant issues of the topic are in focus. In the second stage, when selecting the instruments to be used to collect data, the use of interviews, observation and documents is found to be the most appropriate to obtain enough data on differences in performance between boys and girls in Technical Drawing. Again, at the stage of the instrument design, the prepared instruments could attain breath and depth of the content.

Furthermore, the use of three instruments (interviews, observation and documentation) in this research is a way to enhance validity. It is a way to cross-check and finds regularities in the data to ensure that the study represents the views and perceptions of the respondents. This technique is called triangulation; the rationale for this is that each method has restrictions and by using several methods in the same study, the restrictions of one are often the strengths of

the other. Denzin (1987:101-103) argues that the greater the triangulation in a researcher, the greater the confidence of the researcher in his findings.

Moreover, the questions to be asked to the educators, learners and government officials during the interviews are well planned and written in an interview schedule to ensure that each one is not irrelevant but is related to the differences in performance between boys and girls in Technical Drawing.

It is important not to forget to learn to understand and where appropriate, speak the vocabulary of the sample being studied. If researchers do not understand what informants mean when they use certain terms or if they take such terms to mean something which they do not mean, the recording of invalid data will surely result.

Just like validity, reliability is also considered at every stage of research. When designing the research instrument, the questions to be asked in the interview are well formulated to meet the understanding of each respondent. Leading questions that may influence the respondents are avoided. At the data collection stage, it is important to ensure that the subjects chosen in the sample are key informants in the study. Reliability is further enhanced by applying the same procedures to interviews and establishing a rapport with each and every one, hence the interview questions should be the same to all participants in this study.

### **3.5.5 Pilot Study**

No matter how careful a researcher designs data-collection instrumentation as a questionnaire, interview, observation or documentation, there is always the possibility of error and ambiguity (Babbie & Mouton, 2001:244). In this study, a pilot study was conducted in order to ensure that the questions were not ambiguous or confusing to the respondents. The pilot study was conducted in one of the schools in Hammanskraal (North-West Province) and one in Soshanguve (Gauteng Province), which is representative of South Africa's history and demographics. The interview schedule questions were sent to the schools (NW and GP) and to the departmental officials to be completed by Technical Drawing educators and learners enrolled for the earning area.



A date was set for a site visit and discussion to deal with problems and unclear statements. On the same day the learner target group was interviewed using the interview questions. Involvement of the learners was valuable because the instrument was then refined to suit the level of the learners, particularly with regard to the use of simpler language. After the interviews the educators and departmental officials were asked to comment freely. No negative comments were received; therefore the existing questions for interviews were not changed. At the end of the pilot study the researcher became aware of the need to refine some research questions.

### **3.5.6 Ethical Considerations**

Although conducting interviews generally requires nominal manipulation of settings, measures on ethics should be considered. At the first stage of negotiation with the participants their informed consent must be sought (See Appendices 1 to 4). Homan (1991:46) emphasises the principles of democratic procedures that enlist the collaboration of the respondents not only in the collection of data but also in the interpretation of data and in giving clearance for their release. The rights of all the participants are protected and they are free to withdraw from the study at any time.

Moreover, obtaining the consent of educators does not mean clear access to the schools. The Department and the principals of the school are approached in a formal way and even a letter should be presented to them (see the appendices). Besides, assurance is also given to all participants that their privacy will be protected. During the interviews, educators, learners and government officials have to divulge information on sensible issues relating to their schools, like differences in performance between boys and girls in Technical Drawing. The participants are free to decide what information they would like to withhold and what they would like to communicate.

Besides obtaining the consent of the participants, other ethical issues, like confidentiality and anonymity are also considered. Before starting the interviews, the respondents' confidentiality and anonymity must be assured as emphasised by Brown & Dowling (1998:102). In order to protect the anonymity of educators, learners and government officials, pseudonyms are used. However, it is worth mentioning that the law does not protect

researchers if the government compels them to disclose matters of confidence. The researchers as well as the participants can be subpoenaed.

### **3.6 Preparation of the interview**

Once the interview to collect data has been designed, an interview schedule is constructed. The schedule lists all the questions that will be asked, giving room for the interviewee to write answers. The questions are related directly to the objectives of the study and follow a given sequence that is adhered to in each interview. In the context of the present study, the questions to be asked are directed toward finding the causes of performance discrepancies between girls and boys and low participation and under performance of female learners in Technical Drawing in secondary schools.

In so far as the interviews are concerned, standardised (face-to-face) interviews in which the participants are asked the same questions in the same order, thus reducing interviewer effects and bias are to be used. The question asked will be a mixture of both structured and semi-structured ones. The structured questions are directed to educators and learners and a mixture both structured and semi-structured will be asked to the government officials' selected, followed by a set of choices as the answer. Three sets of questions will be presented in the interview schedule: the first set will deal with the demographic questions, questions involving the gender, school province, situation of the school, grade of learners, highest qualification of the educator and teaching experience. The second set will deal with Technical Drawing (T/D) content and the third set will deal with the role of the government, the school and the teacher to improve the gender differences in the performance of learners in Technical Drawing.

By and large, as far as the structured questions for government officials are concerned, to each question on part 2 of Annexure c, five options will be given. They are: Agree, Strongly Agree, Not Sure, Disagree and Strongly Disagree. It is reckoned that while preparing the questions, all leading questions must be avoided. A final consideration in preparing the interview is to think about the way personal characteristics of the interviewer may influence the responses. Being the sole interviewer in this present research, the researcher has taken Sax` s (1979: 243-244) variables into consideration. The first two variables are the age and

sex of the interviewer and interviewee. Being a male interviewer in the early fifties and well experienced in the subject, the researcher has found himself appropriate to conduct the interview as Sax points out that interviewers between twenty-six and fifty years of age do a better job of interviewing than either younger or older interviewers. Moreover, the interviewer will try to cater for gender equity as encouraged by our present government.

### **3.6.1 The interviewing stage**

Gaining entry into the field requires establishing good relations with all individuals at the research site. Research permission comes without a guarantee that the participants will behave naturally before an outsider who takes field notes, especially when some of participants are adolescent learners. The researcher's skill is reflected in whether the participants regard him/her as an interested, respectful, non-judgmental person who maintains confidentiality, or whether they view the researcher as a rude, disruptive and a critical person who cannot be trusted. The researcher must attend to maintaining the trust and confidentiality of the participants constantly throughout the data collection period. The participants may decline to share their perceptions, feelings and thoughts with the researcher (McMillan & Schumacher, 1997: 434).

In the school, informed consent must be obtained from the principal before contacting the educators and learners. A letter is to be presented to the principal of each school (see Appendix). The educators and learners are allowed the choice of the place where to conduct the interview as they need to feel free and relaxed during the interview. The success of the research depends, among other factors, upon the presentation of the data in full and in an unbiased form. To control bias, a qualitative researcher has to enter the field without any preconceived ideas and must try to be neutral during the interview. He or she should also aim at obtaining complete and accurate information in the course of the interview and should play an active role and should record the interviewee's responses as well as his/her constructions. By and large, a verbatim account of all the interviewee's responses must be noted and the whole interview should be taped. Considering ethical principles, the interviewee's permission must be asked before taping. The tape recorder must be placed unobtrusively on the table.



### 3.6.2 Interviewing behaviour

It is a fact that what happens during the interview sessions is more important than how much the interviewer has prepared. An interviewer can read about theories on interviews from books and can even prepare a good interview from books and can even prepare a good interview schedule but if s/he does not possess some personal qualities and some good manners during the interview, the whole process may fail. According to McMillan & Schumacher (1997: 266-267), some important points that the interviewer must take into consideration during the interview are:

- Good physical appearance: dress according to existing norms or in a fashion similar to the respondent.
- Friendly, relaxed and pleasant appearance: appear interested in the welfare of the respondents.
- Good relationship and rapport with interviewee: one should spend a few minutes with small talk in order to obtain a proper relationship.
- Respect the individual being interviewed.
- Explain the purpose of the interviews before starting.
- Stress the confidentiality of the study.
- Ask the questions in the exact words indicated on the interview schedule.
- Be fluent: Read the questions without error or stumbling in a natural, unforced manner.
- Ask the same question in different ways.
- Use probes carefully.
- Ask the interviewee to repeat an answer or statement when there is some doubt.
- Tell the interviewee that he/she has the right not to answer a question.
- Vary who controls the flow of common action.
- Learn how to wait: Silence is a valuable strategy to employ in an interview.
- Learn to be patient: allow the interviewee to think well before answering.
- Good recording: record the answers by tape-recording or by means of written notes.
- Give a final assurance of confidentiality before leaving.
- Thank the respondent.



It is worth mentioning that all these personal qualities and good manners on the part of the interviewer are very important but if the questions themselves are not well prepared or if they aim at the interviewees' private lives, then the whole process of interviewing will be in vain. Thus, the questions to be asked in the interviews must be prepared very cautiously and carefully as described in the topic that follows.

### **3.6.3 The interview Schedule (types of interviews questions)**

Before entering the field where the interviews will be conducted, the questions are already prepared in an interview schedule. According to Frankel & Wallen (1993:386) the questions are based on six types:

- Background or demographic questions: These are routine sorts of questions about the background characteristics of the respondents. They include questions about education, age, situation and the like.
- Knowledge questions; these are questions to find out about factual information the respondent possesses.
- Experience or behaviour questions: These are questions about what a respondent is currently doing or has done in the past.
- Opinion or values questions. Questions to find out about what people think about some topic or issue. Answers to such questions call attention to the respondent's goals, beliefs, attentions or values.
- Feelings questions. These are questions to find out how respondents feel about things. They are directed towards the emotional responses of people to their experiences.
- Sensory questions. These are questions a researcher asks to find out what a respondent has seen, heard, tasted, smelled or touched.

In the present study, the educators, learners and government officials will be interviewed. Three different interview schedules will be prepared by taking the six types of questions discussed above into consideration.

The questions asked to the educators, learners and officials will have approximately the same objectives, that is, to find the causes of performance discrepancies between boys and girls in Technical Drawing (See Schedule A-C).

### **3.7 Documentation policy for legal framework**

Documentations are records of the past events that are written or printed; they may be anecdotal notes, letters, diaries and documents. Official documents include internal papers and external papers. Documents are the most important data source in concept analysis and historical studies. In the present study both the internal and external papers will be used to collect data. Term 2 (two) matriculation (Grade 12) June examination results for the selected schools will be used as internal papers and the two provinces selected (Gauteng and North-West) official documents will be used as external papers.

The performance differences between boys and girls in Higher Grade paper and Standard Grade paper will be compared. The causes for performance discrepancies between boys and girls in Technical Drawing will be investigated in these schools. In addition the national or provincial matriculation results from 2000 to 2004 in both the Gauteng and the North-West Provinces will be used as external papers. The analysis and interpretation of the external papers will be done using the documentation analysis method.

Research into learners' approaches to learning indicates that their behaviour and attitudes influences or predict learning out-comes and contribute to their achievement (Wood 2003:369). At the same time, many of the under-achieving girls are becoming more visible and more challenging (Wood, 2003, 377). Thus learners' oppositional learner identities create problems for discipline and classroom management. Teachers perceived their underlying problem to be extrinsic stemming from the home environment and previous schooling. In analysing performance in the Kenya Secondary Certificate of education examination over a five-year period (1989-1993), Makau (1994:10) found that in two examinations the female performance was significantly poorer than that of males in Technical Drawing (Makau, 1997: 12). This finding raises a number of questions. Why do females find languages easier than other learning area such as technical drawing?

Are there built-in gender stereotypes in curriculum development and implementation which females find un-attractive? If females can perform as well as or better than males in languages, why can they not apply or transfer this ability to other disciplines such as Technical Drawing, Mathematics, Science and Humanities in school curricula Makau, (1997:13) Other factors such as socio-economics do contribute to the differences in the performance of boys and girls in Technical Drawing.

### **3.8 Summary**

This chapter explains clearly how the research is to be conducted in order to find out the causes for performance discrepancies between boys and girls in Technical Drawing and the low participation of female learners in technical schools within the Gauteng and North-West Provinces. It provides ample justifications for the techniques to be used to gather data in these two provinces. Finally, a guide on interviewing behaviour is also provided. In the next chapter, all the data collected will be presented, analysed and interpreted thoroughly.



## **PRESENTATION, INTERPRETATION AND ANALYSIS OF DATA**

### **4.1 Introduction**

This chapter deals with the presentation, interpretation and analysis of data gathered in the interviews, observation and documentation as instruments used in the two selected provinces, namely the Gauteng and North-West Provinces.

### **4.2 Presentation**

As the research is both qualitative and quantitative involving interviews, observation and documentation techniques, the analysis of the data will definitely adopt qualitative and quantitative techniques. In simple terms, data analysis is the process of making sense of data. This involves consolidating, reducing and interpreting what the respondents said and what the researcher has seen and observed. It is the process of making meaning and systematically searching and arranging the interview transcripts, field notes and other materials that the researcher accumulated to increase his/her own understanding and to enable him/her to present what he/she discovered from others (Bogdan & Bicklen, 1992:153).

The present chapter, therefore, will try to make sense of all the data gathered during the interviews, observation and documentation received from the two selected provinces and from the four schools visited in these provinces.

### **4.3 Feedback on the data collection stage**

As explained in chapter three, four technical schools have been selected for the research process in order to investigate the causes of performance discrepancies between boys and girls in Technical Drawing. The four schools are found in the Tshwane Metropolitan, which covers both the Gauteng and North-West Provinces, and in each school two educators and four learners were interviewed. In addition, two officials from government sectors were also

interviewed. For the purpose of confidentiality and anonymity, the four schools are named A, B, C, D and in each school, the two educators are named x for male and y for female. The learners are named 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, and 16. They were also named 1B for a boy and 2G for a girl. Finally the two government officials are named G01 and G02.

On the site of each school, permission was asked from the principal and the school governing body (SGB) to conduct the interviews with two educators and four learners. In all four schools the principals were very co-operative and helped the researcher to choose two educators and four learners for the interviews. The two government officials were also cooperative to give information about the performance differences between boys and girls in Technical Drawing.

As far as the interviews of educators are concerned, the letter of permission was first presented to them before starting questioning them. In all the schools the educators who were selected accepted to be interviewed and everything went on smoothly as planned.

#### **4.4 Observation**

While collecting data, the research made site observation in order to triangulate the notes and the responses of the respondents.

##### **4.4.1 Learning and teaching environment in schools A – D**

Van der Westhuisen (1999:511) states that in planning and designing a school building its purpose, namely to realise educational aims and objectives, should be considered. A school building should be planned with specific education needs in mind. Provision should be made for all educational activities that take place at a school and stimulating venues should be suitable for accommodating various groups of learners as well as for using various educational media. In this study teaching and learning in school A, C, and D were satisfying and conducive for learning and teaching, but school B lacks proper fence and there was no security guard at the gate.

In South Africa the existing physical structure of all four schools was far from accommodating inclusion. Their physical structure is not user-friendly to the physically impaired learners, as facilities such as ramps and suitable toilets are absent. The doors are too narrow to accommodate wheel chairs for the physically impaired.

To manage inclusion properly, the infrastructure must be accommodative to all types of impairments. For example, Braille for blind learners must be provided at all schools to facilitate access to buildings by the blind; double- or triple-storey buildings must be provided with ramps for the physically challenged to facilitate movement and access to all buildings and classrooms. Otherwise schools must be built at ground level.

In classrooms, seating must be spacious enough to allow even physically challenged learners to sit comfortably. Desks must be big enough to accommodate all disabilities. The classroom itself must be spacious enough to allow free movement even for wheelchair-bound learners especially those who are taking Technical Drawing as a subject.

Partnership in education is essential. The success of education is vested entirely in the co-operation among parents and teachers. Hence today, in terms of SASA, parents have to play an active role in their children's education. The establishment of school governing bodies is in line with the act that empowers parents to have a say in their children's education. Parental involvement has wide implications for education as parents could assist teachers in various ways. "Neither the parents nor the teachers alone can fulfil the education task completely" (Badenhorst, 1996:109).

Education is a partnership and a joint effort. All problems that originate at school, such as disciplinary or financial problems, can only be effectively addressed and ultimately solved jointly by the teachers and parents this will on the other hand improve performance of learners taking Technical Drawing in particular girl learners as they are struggling more than boys in some instances .

#### **4.4.2 The physical aspects of the schools**

Schools A and B are situated in the southern part of Tshwane Metropolitan and in a rural region of North-West Province called Bojanala Eastern region. It is found in a very isolated and calm region. Schools A and B are classified as rural schools, and grouped together. The two schools have a large and attractive gate with good fencing. The yard in school A is tidy and there is a 24 hrs security guard at the gate, but in school B there is no security guard. The buildings were built with of new face bricks and contain all the infrastructures and physical facilities. The reception area is very large, tidy and well ventilated. Since effective learning results from effective teaching, a well–equipped education and well equipped institution will contribute towards learning.

Schools C and D are classified as urban schools and grouped together and are situated in the Gauteng Province; the physical aspects of these schools are in a better condition as compared to school A and B. These schools are better resourced as compared to A and B. There is proper and well trained security in both schools. There is increased enrolment of girls in the SG in all four schools visited in this subject (Technical Drawing).

#### **4.4.3 Technical Drawing centre school A – D**

Technical Drawing centres in schools A – D are spacious and well ventilated. The centres are well furnished to suit each and every learner. From the researcher’s observation, the environment was conducive to teaching as far as furniture was concerned, but there were no pictures or drawing models on the walls. This could bring a negative impact on the learner’s performance. It was found that the environment was conducive to teaching but not to learning.



#### 4.5 Formal interview

Formal interviews were conducted with learners and educators from the four sampled schools to establish the views of the respondents with regard to the performance of different genders in Technical Drawing.

##### 4.5.1 Difference in Higher Grade (HG) and Standard Grade (SG)

Based on the observation and interviews in all four schools it was found that few learners in schools B and D have registered the subject on the higher grade. The reason for this is that there is a perception from both the learners and educators that the higher grade paper is more challenging than the standard grade. This is confirmed by the statistics from school B. Only seven (7) out of fifty (50) learners registered on the HG from the seven, no girl learner has passed the subject on the higher grade in June 2006.

In school D out of 68 girls only 2 has registered the subject on HG and out of 78 boys nine (9) of them registered on the higher grade, none of the girls has passed the subject during the June examinations 2006. This is confirmed by the data in Table 4.1 and 4.2 collected from the four schools visited. The data was collected from the four schools visited for term 2, Grade 12 in June 2006.

**TABLE 4.1 Term 2 results in the two schools selected in the North-West Province.**

School	GRADE	ROLL	BOYS(M)	GIRLS(F)	P(M)	P(F)	P%(M)	P%(F)	DIF%
<b>A</b>	SG	114	78	36	34	12	44	33	11
<b>B</b>	HG	07	07	-	02	-	29	-	
	SG	45	33	12	01	00	03	-	03

Key, P(M) =NO OF MALE PASS, P(F)= NO OF FEMALE PASS, P%M=PASS % MALE, P%F=PASS % FEMALE, DIF%=DIFFERENCES IN %

According to Table 4.1 there is a difference in performance between boys and girls who are taking Technical Drawing in Standard Grade in both schools. The table also indicate that



there are no female learners registered the subject in High Grade. Notably, only 29 % of the boys who registered the subject on High Grade managed to pass.

**TABLE 4.2: Term 2 results in the two schools selected in Gauteng Province**

School	GRADE	ROLL	BOYS(M)	GIRLS(F)	P(M)	P(F)	P%(M)	P%(F)	DIF%
<b>C</b>	SG	43	31	12	06	02	19	17	02
<b>D</b>	HG	10	08	02	04	00	50	00	50
	SG	135	69	66	46	30	67	45	22

According to Table 4.2 there is also a difference in performance between boys and girls who are taking Technical Drawing in Standard Grade in both schools. The table also indicates that there are only two female learners out of a total of 68 girls in the school who take Technical Drawing as a subject. Notably, none of the girls who registered the subject on High Grade managed to pass.

#### 4.6 Culture of schools A – D

Learners from remote areas without any technical background such as schools A and B experienced a completely different situation attending with other learners from urban areas like those of schools C and D. Technical Drawing is Greek to them; as a result they perform poorly in this subject. They also feel insecure and lack self-confidence. This makes a specific demand on the educator who plans the Technical Drawing learning activities, because he/she must consider the social, cultural and the economic background of the learners before planning the learning activities (Vermeulen, 1997:17). Because of the above factors schools A and C have registered all learners in the Standard Grade (SG) in this learning area. From the interview, there is the perception that Higher Grade paper (HG) is more difficult than the Standard Grade paper (SG).

A leader is more effective when there is good a relationship with subordinates, when the task is clearly stated and when there is a high level of formal authority on his or her part. Fiedler's research in Bush & West-Burnham(1994:60) on a task-orientated leader has shown that when the situation is particularly favourable or unfavourable to the leader, a task-orientated leader

is more effective and when the situation is unfavourable, a people-oriented leader is more effective (Bush & West–Burnham,1994:61).

The major innovation in Fiedler’s work (Bush & West-Burnham, 1996:62) is that he takes into account the situation, including the relationship with subordinates as well as the style of the leader. In this study the principal of the school, the learning area educator and the learner taking Technical Drawing as a subject and departmental officials are taken into consideration.

The principal’s relationship with the staff on schools A – D played a major role in the performance of learners at. From the interviews conducted in all four schools, it is clear that the gender of an educator does not influence much on the performance of learners in this learning area. However, the experience and approach to the learning area has either positive or negative influences on the learner.

A person who is motivated works hard and has self-directed behaviour towards important goals (Gray & Starke, 1988:107). If all Technical Drawing educators in schools A – D can organise their Technical Drawing classrooms so that clear models and drawings that belong to previous learners can be put on the display board, new learners, especially girls, might have a positive attitude towards Technical Drawing and this will also improve their results. Female learners might also realise that Technical Drawing is fun and possible to do.

Educators also have a primary responsibility in education to help learners cultivate personal qualities of motivation that can give them resources for developing aspiration, independent learning, achieving goals and fostering resilience in the face of setbacks (Alderman, 1999:03). Good & Brophy (2000:221) state that to be motivated to learn, steady encouragement and support from all stakeholders concerned must be granted. Such motivation is unlikely to develop in a chaotic atmosphere, so it is important to organise and manage the school and classroom as an effective learning environment (Good & Brophy, 2000:222).

Culture and societal influence plays an important role in shaping the perception of the school community towards girls Technical Drawing as a subject in school. The site observation notes of the researcher indicated that School A and B are less disciplined as compared to

School C and D. Lack of discipline which amongst other factors results in late coming and thus influence the performance of learners. Cultural and traditionally girls expected to perform domestic chores at home before leaving for school, while the expectation on boys is very minimal. The late coming of learners resulted in the missing of Technical Drawing lessons and periods. Generally the missing of period and lessons is associated with low achievement due to the knowledge gap that results from late coming.

#### **4.7 Presentation and analysis of data from schools A – D**

Interviews were conducted in order to solicit the views of learners and educators on the performance of learners in Technical drawing.

##### **4.7.1 Data obtained from interviews**

Eight individual interviews were conducted with Technical Drawing educators. Two of these educators were from each of the four schools. Technical Drawing educators, one male and one female where possible for gender equality were chosen for the interview because they are the ones who teach the subject and know exactly what happens in the instruction and learning situation. See Annexure A for the interview questions.

About sixteen (16) learners, eight girls and eight boys, were individually interviewed. Four of these learners were from each of the four schools. All these learners are presently in Grade 12 (Standard 10) taking Technical Drawing as one of the compulsory subjects. They were chosen because they are the main focus of this research. Some of them have registered this learning area on the Higher Grade (HG), some on the Standard Grade (SG). See Annexure B for the interview questions.

In addition, the two government officials were also individually interviewed. They were chosen because of their experience and relevance to this topic. See Annexure C and part 2 for interview questions.



#### 4.7.2 Data Analysis

The responses to the interview questions will now be presented according to each of the questions asked and responses given during the interview (see Annexure A – C: Interview Schedule). The questions asked will serve as sub-headings. Tables are used to present the findings.

##### 4.7.2.1 Is Technical drawing a difficult subject on SG or HG? Explain why.

The nine questions and their responses are tabulated in Table 4.3 to 4.13 according to different heading.

**Table 4.3 Explanation of differences between SG and HG paper**

<b>RESPONDENTS</b>	<b>SG</b>	<b>HG</b>	<b>TOTAL</b>
Number of Educators	0	08	08
Percentage	0	100 %	100%
Number of Learners (M/F)	01	15	16
Percentage	6.2	93.8 %	100%
Number of Officials	0	02	02
Percentage	0	100 %	100%
Total Number	01	25	26
Percentage	3.8	96.2 %	100%
<b>TOTAL RESPONDENTS</b>			<b>26</b>

Responses in table 4.3 indicate that only one participant found the paper SG difficult; the rest of the participants agree that HG is more difficult than SG. This is supported by low participation and performance of learners in this grade. This is a general perception of all participants.

This does not reflect only the poor performance of girls but the in low participation as well. It is also found that of all the girls that register this subject on the HG none of them passed in

the four interviewed schools as indicated by Table 4.6 and 4.7 below. The tables below show the difference in performance between boys and girls in the Gauteng and North-West Province respectively for the past five years (2000 - 2004) in this subject.

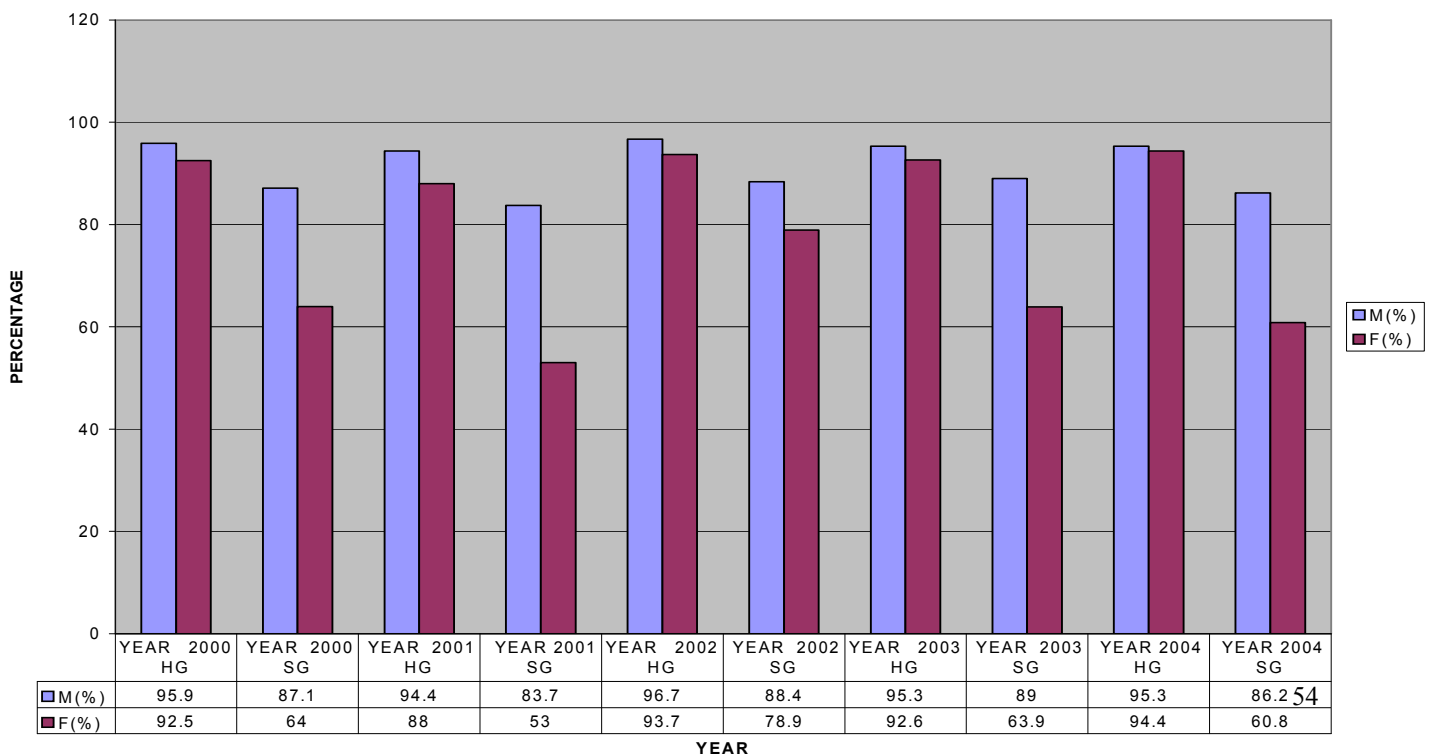
Key: HG=Higher Grade, SG= Standard Grade, P%=Pass, Diff%= Differences in performance.

**Table 4.4: Gauteng province**

Year	Grade	Roll	Male	Female	P% M	P% F	Diff %
2000	HG	1617	1482	135	95.9	92.5	3.4
	SG	2631	2331	300	87.1	64	23.1
2001	HG	1756	1572	184	94.4	88	6.4
	SG	2686	2388	298	83.7	53	30.7
2002	HG	1963	1741	222	96.7	93.7	3
	SG	2947	2513	434	88.4	78.9	9.5
2003	HG	1882	1693	189	95.3	92.6	2.7
	SG	2947	2351	375	89	63.9	25
2004	HG	2059	1807	252	95.3	94.4	0.9
	SG	2676	2275	401	86.2	60.8	25.4

Higher Grade (HG) and Standard Grade (SG) from the Gauteng Province according to gender graphically (See Figure 4.1 below).

**Figure 4.1: Gauteng Province 2000 - 2005**

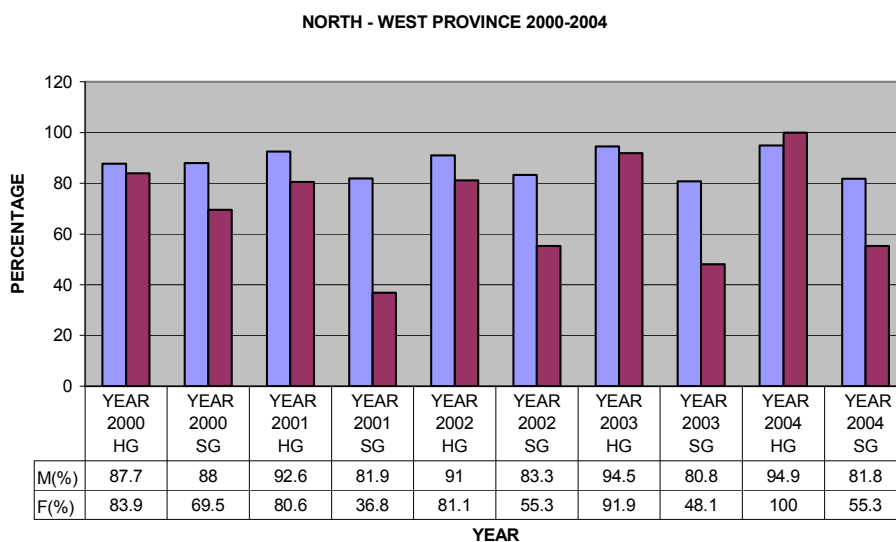


**TABLE 4.5: North-West Province**

Year	Grade	Roll	Male	Female	P% M	P% F	Diff %
2000	HG	332	306	26	87.7	83.9	3.8
	SG	777	672	105	88	69.5	18.5
2001	HG	311	286	25	92.6	80.6	12
	SG	772	701	71	81.9	36.8	45.1
2002	HG	332	302	30	91	81.1	9.9
	SG	828	723	105	83.3	55.3	28
2003	HG	345	311	34	94.5	91.9	2.6
	SG	822	720	102	80.8	48.1	32.7
2004	HG	387	351	36	94.9	100	-5.1
	SG	957	796	161	81.8	55.3	26.5

Higher Grade (HG) and Standard Grade (SG) from North-West Province according to gender  
(See Figure 4.2 below)

**Figure 4.2: North-west Province Senior Certificate Results for 2000 to 2004**



Source: Department of Education 2006

The above tables and figures indicate that there are marked differences in performance between male and female learners studying Technical Drawing.

What do the tables indicate is not gender discrimination, but an achievement of differences in the performance between the genders? Hopefully the findings here should be considered as a baseline for monitoring if the system improves each year. In general this will help us realise what is of value to us in our personal and social lives.

Deductions: From the table above it is evident that there is self-imposed stereotyping of girls in this subject. The stereotyping is more of a barrier for girls than for boys (Shakeshaft, 1995:76). Arnold (1993) in Shake shaft, (1995:77) in her longitudinal study of female and male valedictorian of high school discovered that for many females in order to see themselves as architects , designers or scientist study, must first be able to envisage a woman as a designer. School can change this kind of thinking by finding girls who love to set up and use science and technology equipments to create more options that negate self-imposed stereotypes. This will eventually improve girls` participation and performance in technical education and Technical Drawing in particular.

The second question deals with the respondents` opinions regarding the difference between Paper 1 and Paper 2 in this subject. The responses are displayed in Table 4.6.

**Table 4.6: Which paper, Paper 1 or Paper 2, is more difficult?**

<b>RESPONDENTS</b>	<b>P1</b>	<b>P2</b>	<b>BOTH</b>	<b>NONE</b>	<b>TOTAL</b>
Number of Educators	04	03	01	0	08
Percentage	50	37.5	12.5	0	100%
Number of Learners	02	13	0	01	16
Percentage	12.5	81.25	0	06.25	100%
Number of Officials	00	02	0	0	02
Percentage	33.3	66.7	0	0	100%
Total Number	06	18	01	01	26
Percentage	23	69	04	04	100%
<b>TOTAL RESPONDENTS</b>					<b>26</b>

Responses to questions in Table 4.6 show a mixed feeling about the papers even though the majority of the participants agreed that Paper 2 is more difficult compared to Paper 1.

Machine (Assembly) Drawing and Isometric in Paper 2 are the most challenging sections for girls.

There is only one learner from school D who did not have any difficulty in both papers. According to this the learner, the only difficult he found was time to finish the examination. This led us to the third question in Table 4.7 which deals with the relevancy of Technical Drawing for girls.

**Table 4.7: Is Technical Drawing a suitable subject for girls? Explain.**

RESPONDENTS	YES	NO	TOTAL
Number of Educators	5	3	8
Percentage	62.5	37.5	100%
Number of Learners	13	3	16
Percentage	81.2	18.8	100%
Number of Officials	2	0	2
Percentage	100%	0	100%
Total Number	20	6	26
Percentage	77	23	100%
TOTAL RESPONDENTS		26	

Responses show that about 20 out of 26 participants, i.e. are 77%, support the idea that Technical Drawing is a suitable subject for girls as well. This is in line with the South African policy on gender equality. South Africa is eager to see more girls in the technical field.

The remaining 23% participants think that girls are not technically inclined; hence the subject is regarded as not suitable for them. These findings complement Table 4.1 above which shows the general perception and negative attitude of girls towards Technical Drawing. We therefore need to change the mind set of our people, especially girls, in this subject. This takes us to the fourth question in Table 4.8 which deals the perception of boys in this subject.





**Table 4.8: Is Technical Drawing a subject meant for boys? Explain.**

Responses	YES	NO	Percentage
Educator's Number	01	07	8
Percentage	12.5	87.5	100%
Learner's Number	03	13	16
Percentage	18.8	81.2	100%
Gov.Official's Number	1	1	2
Percentage	50	50	100%
Total Number	05	21	26
Percentage	20	80	100%
TOTAL RESPONDENTS			26

From Table 4.8 it can be deduced that almost three-quarters of the respondents (80%) do not agree to the question that says Technical Drawing is meant for boys. This implies that both boys and girls can do Technical Drawing. "I think even girls can do it because most of them don't have problems with it" says a learner from school D. "We should not discriminate" says one educator in school B. This implies that gender equality should be the norm at our schools as it is the aim and the objective of our present government. This leads us to question five which enquiries about mixed education (mixed sex education).

**Table 4.9: Do girls and boys learn T/D in the same way? Why?**

Responses	True	False	Total
Number of Educators	5	3	8
Percentage	62.5	37.5	100%
Number of Learners	16	0	16
Percentage	100%	0	100%
Number of Officials	2	0	2
Percentage	100%	0	100%
Total Number	23	3	26
Percentage	89%	11%	100%
TOTAL RESPONDENTS			26



From Table 4.9 it can be deduced that only 3 out of 8 (11%) educators, one from school A, B, and C differ from the rest of participants. The reason for this is that Technical Drawing is a practical subject; therefore it needs boys who are technically inclined with practical hands. Almost 89 % of the participants support the idea that boys and girls learn in the same way. Negative attitudes and perception of some educators still prevail concerning girls as far as technical subjects are concerned. We need to change our attitude towards the subject and perceptions towards gender. The following question enquires about the influence between male and female educators in this subject.

**Table 4.10: To what extent does the gender of the educator influence the performance of learners in Technical Drawing?**

RESPONDENTS	YES	NO	TOTAL
Number of Educators	4	4	8
Percentage	50	50	100%
Number of Learners	7	9	16
Percentage	43.75	56.25	100%
Number of officials	1	1	2
Percentage	50	50	100%
Total Number	12	14	26
Percentage	46	54	100%
TOTAL RESPONDENTS			26

Table 4.10 shows that 54% of respondents say the gender of the educator does not influence the performance of learners in Technical Drawing. 46% respondents say there is a difference between male educators and female educators in this subject. This is supported by one educator from school D who said, “Learners are in favour of male educators for the practical subject in the field of engineering.” “Learners believe that most female educators are not inclined to technical subjects” said another educator from the same school. One learner from school D said, “They do have an effect on us because we don’t have a female educator which demotivates some of us”. This implies that there is a need for female role models in this subject. Most educators are males, therefore girls are demotivated. The next question deals with marginalisation of girls in the subject.



**Table 4.11: Are girls marginalised in T/D classes?**

<b>RESPONDENTS</b>	<b>YES</b>	<b>NO</b>	<b>TOTAL</b>
Educator's Number	2	6	8
Percentage	25	75	100%
Learner's Number	1	15	16
Percentage	6.3	93.7	100%
Gov. Official's Number	0	2	2
Percentage	0	100	100%
Total Number	3	23	26
Percentage	11	89	100%
<b>TOTAL</b>	<b>RESPONDENTS</b>		<b>26</b>

Table 4.11 indicates that the majority 23 (89%) of the respondents said that girls are not marginalised in Technical Drawing classes. In other words, there is fair and equal treatment of boys and girls by the educators. The remaining (11%) claim that girls marginalised themselves in the classroom. In simple terms there is equal treatment in the classroom of boys and girls, even though girls do not come forward for help. This shows poor self-esteem of girls. We need to build confidence in our girls in this subject. The next question focuses on the difficulty index or section in the subject for boys and girls.

**Table 4.12: Are some sections in Technical Drawing more difficult for girls than for boys?**

<b>Responses</b>	<b>True</b>	<b>False</b>	<b>Total</b>
Educator's Number	6	2	8
Percentage	75	25	100%
Learner's Number	10	6	16
Percentage	63	37	100%
Gov. Official's Number	2	0	2
Percentage	100	0	100%
Total Number	18	8	26
Percentage	69	31	100%
<b>TOTAL</b>	<b>RESPONDENTS</b>		<b>26</b>



Data from Table 4.12 show that 69% of the respondents agree that some sections in this subject are more difficult for girls than for boys. Sections such as Isometric and Machine Drawing were highlighted. The remaining 31% respondents claim that Isometric Drawing seems to be a difficult section for both sexes. This was confirmed by a learner from school B: “Isometric and Assembly Drawing are difficult for both of us”. This implies that there is a general mixed feeling about difficult sections in T/D. This was also confirmed by a female educator from school A: “Some sections are difficult for both of them, e.g. perspective drawing, etc. As a teacher (educator) I have to show them”. The last question relates to the role players such as school, parents and government officials with regard to gender differences.

**Table 4.13: What can the government/school/parents do to improve the gender differences in the performance of learners in Technical Drawing?**

<b>Respondents</b>	<b>W/shop</b>	<b>Motivation</b>	<b>More time</b>	<b>Role model</b>	<b>Text book</b>	<b>Don't know</b>	<b>Total</b>
Number of Educators	5	2	0	0	0	1	8
Percentage	62.5%	25%	0	0	0	12.5%	100%
Number of Learner	3	2	1	2	7	1	16
Percentage	18.75%	12.5%	6.25%	12.5%	43.75%	6.25%	100%
Number of Officials	1	1	0	0	0	0	2
Percentage	50%	50%	0	0	0	0	100%
Total Number	9	5	1	2	7	2	26
Percentage	34.62%	19.23%	3.85%	7.69%	26.92%	7.69%	100%
<b>TOTAL RESPONDENTS</b>							<b>26</b>

From Table 4.13 it can be deduced that there are mixed feelings, although some respondents (34.62%) view the primary task of the main stakeholders, namely both educators and learners need workshops and motivation. For learners to learn constructively we need parents to give their unconditional support in order to improve the gender differences in the performance of

learners in this subject. Government should show interest in girls as learners so that girls will develop love for Technical Drawing. Female engineers as role models should visit technical schools for motivational purposes. The policy of gender equality needs to be emphasised in schools. This implies that there is a lack of motivation and encouragement of girls to follow a technical stream.

#### **4.8 Summary**

The analysis of interviews conducted with technical educators, learners and government officials has been discussed in detail. Opinions of the above mentioned participants and their responses were also discussed. Finally, the role to be played by the school, parents and government in order to reduce the gender differences in the performance between boys and girls in Technical Drawing has also been discussed.

The next chapter will be the concluding chapter. In this chapter a summary of the research findings will be given. The last chapter discusses conclusions and recommendations from the study.



## CHAPTER 5

### SUMMARY AND RECOMMENDATIONS

#### 5.1 Introduction

This chapter presents a summary of and the recommendations the research. The summary will focus on the important aspects highlighted in the study. Having reached almost the end of this study, it is worth mentioning that before embarking on the research, the researcher was already aware that there is a discrepancy on the performance of boys and girls taking Technical Drawing as a school subject. However, the causes for the discrepancy were not known.

After some informal talks with some colleagues and after conducting a literature review on gender differences in Technical Drawing, the idea of conducting research to investigate the causes for gender differences in the performance between boys and girls in technical Drawing emerged. A title was formulated and the research started.

#### 5.2 Summary of the study

The dissertation is divided into five chapters. Chapter 1 presents an overview of the study. It also propounds the relevance of the study and reasons why the research was conducted in technical secondary schools in the Gauteng and North-West Province. The chapter explains the research methods the type of research, site selection, sampling and data collection strategies.

In Chapter 2 the literature review conducted on the causes for the low participation and low performance of girl learners in Technical Drawing was presented. The chapter also revealed aspects of research conducted in global and local countries and their relevance to the actual study.

Chapter 3 deals with the research design. This chapter outline the research methods used, the population and sampling including instrumentation. The validity and reliability of the data

gained from the interviews and documentation from the national department of education was also highlighted. The chapter further explains how the data gathered would be interpreted and analysed in Chapter four.

Chapter 4 deals with the presentation, analysis and interpretation of the data gathered during the interviews, observations and documentation. The interviews conducted include eight educators, sixteen learners and two government officials in four different technical secondary schools in the Gauteng and North-West Province. The data are presented in tables, analysed and interpreted accordingly. Deductions were made from each table.

Chapter 5 finally presents the summary and recommendations of the study.

### **5.3 Recommendations**

In order to address the challenges highlighted by the empirical data, recommendations are made specifically in accordance with the various categories of the respondents, from the learner up to the level of the system which requires the attention of officials of the Department of Education.

#### **5.3.1 Recommendation from learners**

The following recommendations are made on the basis of the findings:

- ✓ Most female learners do not understand perspective drawing in Paper 2. There is a need to have user-friendly textbooks.
- ✓ Educators should use more than one method to explain difficult sections in Technical Drawing, e.g. computer aided technology and overhead projectors instead of traditional methods, like textbooks and chalkboard only.
- ✓ The government must employ more qualified and experienced educators for Technical Drawing as some educators cannot explain difficult aspects of the subject.
- ✓ Technical Drawing educators should regularly go for in-service training.
- ✓ Girls need to change their attitude towards Technical Drawing and accept it as a subject for both genders.



- ✓ More support should be given to girls as they struggle more than boys with Technical Drawing.
- ✓ It seems there is a need to revisit the issue of time allocation for examination as both boys and girls do not finish during the time allocated especially in Paper 2.
- ✓ Should change the way they perceive themselves in the Technical Drawing classes.
- ✓ Girls need encouragement and support from all stakeholders, especially parents and educators in this subject in order to have an interest in and love of the subject.
- ✓ Successful women in a technical field, such as engineers and architects, should visit schools for motivational talks to attract girls to this field.
- ✓ Free bursaries for higher institution education should be open for girls who would like to take Technical Drawing as a subject.

### **5.3.2 Recommendations for Higher Education Institutions and Textbook Suppliers**

The High education institutions and Textbook suppliers should consider the following recommendations to enhance participation and the performance of girls in Technical Drawing:

- ✓ Higher education institutions such as teacher training colleges and universities should encourage more females to follow a technical career in order to balance the male-female ratio in this sector. Scholarships and free bursaries given to females will attract them in a bigger numbers.
- ✓ In-service training for using computers as teaching media will help the present educators in teaching Technical Drawing as a graphic subject. Educators should move gradually away from chalkboard and textbook and use new technologies like computers in order to develop interest in our female learners.
- ✓ Examples used in the Technical Drawing textbooks should suit both boys and girls. According to one of the male educators most of the exercises and examples in the textbooks are too mechanical and appeal to boys only. This implies that policy makers and authors of textbooks should consider both genders when designing new textbooks and policies in this subject.



### 5.3.3 Recommendations to Educators on how to improve the results

According Chief Examiner's/ Chief Marker's/ Moderator's report and recommendations in Technical Drawing both HG and SG the papers were well received by the learners. In some of the questions learners did not do well e.g. Assembly drawing: Title, scale and projection symbol were left out completely. To remedy this, the following recommendations are re-emphasised:

- ✓ Educators should teach learners the basics.
- ✓ Educators should also be more content driven than question paper driven.
- ✓ Learners (girls) should be encouraged to take technical subjects as early as primary school. Teachers should encourage girls to see Technical Drawing as a subject for both boys and girls. The Department of Education should encourage schools to teach girls learners about careers in engineering and drawing as early as in Grade 10. This will develop interest and the love of technical drawing from early grades on.

### 5.3.4 Recommendation from DOE officials

The DoE should consider the following recommendations to enhance participation and the performance of girls in Technical Drawing:

- ✓ New teaching posts should favour female educators in order to redress the imbalances of the past. This will motivate girls to follow technical subjects, including Technical Drawing. This is in line with the affirmative action policy. There is an urgent need to reduce learner educator ratio to 15:1 in the Technical Drawing classes so that educators will be able to have one-to-one contact to improve performance. Presently the learner-educator ratio is 35:1 in secondary schools. This could be one of the factors that make our learners perform so poorly in this subject.
- ✓ The government should also provide schools with teaching models for demonstration and with leading media, especially for difficult sections like machine drawing and Isometric drawing as mentioned in question 8 in the interview schedules.



- ✓ Trips to different private companies where females are employed in the motor industry will serve as motivation to girls who are following technical careers. Technical Drawing workshops could improve performance of learners, especially girls.
  
- ✓ Where possible the results of learners should be compared with available psychological test results in order to identify the under-performers.

### **5.3.5 Recommendations on physical resources**

All technical centres in both the North-West and Gauteng Province should be fully resourced and properly secured so that learners would feel secure. This will make them have peace of mind and thus improve performance. It is important to have pictures and drawing models by former learners on the walls in these drawing centres so that the present learners will be able to compare their work with that of their predecessors.

### **5.3.6 Recommendations based on the culture of schools**

In order to improve the culture of teaching and learning in schools there is a need to reconsider boarding schools so that learners who walk long distances to school should stay in the hostels. This will improve punctuality and regular school attendance, thus improving performance in general.

For better discipline and behaviour in schools the issue of single sex education needs to be reconsidered. There are better results and control in single sex schools than in mixed schools as observed by the researcher, for example Pretoria Girls' High and Pretoria Boys' High Schools.

### 5.3.7 Recommendation with regard to Principals, Parents and Community

- ✓ Parents, the community and school principals jointly exert a particular influence on how boys and girls are socialised. This has an impact on how girls are perceived or perceive education in general.
- ✓ In order to improve participation and performance in Technical Drawing girls need to be exposed to real life like boys, e.g. fixing cars in the garages with their fathers and repairing some machines. This will build interest in the mechanical objects and creative thinking will develop gradually.
- ✓ The principals should create environments in their schools that reflect an ‘open’ climate rather than a ‘closed’ climate. This means that principals should balance autocratic and democratic management and leadership styles in their schools.
- ✓ The literature review on school climate, as discussed in Chapter two, reveals clearly that a school’s climate is a reflection of its particular nature, responsibility and feelings the people in the school have towards it (Kelley, 1980:1). Kelley goes further by admitting that a school’s climate has a strongly directive influence on the motivation and achievement of educators and learners.
- ✓ Principals who are the key figures in the day-to-day running of a school should play their role properly by adopting good leadership styles so that a positive school climate can prevail in the school. Thus principals must be made aware of their responsibilities and must be properly trained so that they can improve performance in their schools, in especially Technical Drawing as a focus subject. Other recommendations to the principals are to encourage their educators to go for in-service training and to continue with their studies.
- ✓ Parents also have a primary responsibility in education to support schools and to help learners cultivate personal qualities of motivation that can give them resources for developing aspiration, independent learning, achieving set goals and fostering resilience in the face of setbacks. It is therefore recommended that parents encourage

and support schools by sending positive messages especially to female learners. This will increase participation of girls and increase performance in this subject.

- ✓ It is essential for the community to become involved in the fundraising efforts of the school. This could help learners who are unable to do their homework due to expensive drawing instruments. The fundraising efforts must be regarded as a team effort embracing the staff, the parents and the learners. It is for this particular reason that there is so much emphasis on the establishment of a governing body (SGB).
- ✓ Some members of the community with technological expertise should help schools to explore resources like the Internet, models and real machines that are used in the Technical Drawing lessons in order to help learner to improve their performance in this subject. Our community should support girls to follow technical careers that will include Technical Drawing as one of the subjects.

#### **5.4 Suggestions for further research**

The following topics and suggestions might be considered for further research:

- A detailed comparison of performance between secondary schools in urban areas and secondary schools in rural areas with gender differences and the provision of adequate resources in mind.
- The effectiveness of an inter-change programme between the technical secondary school and integrated communication technology (ICT) with reference to Technical Drawing.
- Extending the present research to other provinces in South Africa.
- To compare Technical Drawing with Engineering Graphic Design in the new curriculum system.
- How the interest and support of parents in technical secondary schools can contribute to the participation and performances of secondary school female learners in Technical Drawing.

By considering the results obtained from this study a case study can be conducted in any one of the four schools in order to have a detailed picture of the difference in

performances between boys and girls in Technical Drawing. The researcher realises that as far as the Gauteng and North-West Provinces are concerned, not much research has been conducted on gender differences in Technical Drawing.

## **5.5 Summary**

Authors mentioned in the literature above discovered that the strategies that do not pay attention to the different ways in which boys and girls think and perceive in Technical Drawing are not likely to succeed. Building confidence, making technical drawing familiar and relevant, helping girls learn test-skills, working with teachers to change attitudes and teaching practices, and helping girls overcome their stereotypes both about technicians and themselves will ensure that “technical drawing for all south Africans” including girls will succeed. (Shakeshaft,1995:78). The literature further revealed that environmental influences that affect gender and performances are the home and the society in which the family operates school experiences and broader educational policies within which educational organisations operate. It is not a single factor, but the cumulative disadvantage accrued from a complex interaction of social and educational factors which affects a learner` s intake (participation) and success in educational opportunities.

Class ratio also has an effect during all stages of educational performance including Technical Drawing. The bigger and more congested the class, the worse they perform as discovered by the researcher and supported by the literature. Schools according to (Turner, 1995:63) make more impact on girls` than boys` performance in subjects like Technical Drawing and skills learned primarily at school. This study has tried to identify the causes for gender differences in the performance between boys and girls in Technical Drawing in technical secondary school level in the Gauteng and North-West Provinces.

## **5.6 Conclusion**

Before concluding this study, it is good to mention that the researcher was somehow reluctant at first to embark on such research, due to a false prejudice that all principals of technical secondary schools were very arrogant and authoritarian people when coming to



sensitive issues like performance of their learners and that they would not allow their educators and learners to participate fully in the research.

The researcher took a high risk and with a positive attitude started the research in schools A and B. The researcher analysed the data collected on the same day and was greatly astonished by the warm welcome of the principals and the results obtained and was encouraged and eager to pursue the study. The research was continued the next day in two more schools and the data obtained analysed to come up with the deductions which were presented in chapter four. Finally, the findings were presented and some recommendations were made.

It is therefore hoped that the recommendations made might assist the technical secondary school learners (girls in particular), educators, parents and the community at large to improve the participation and performance of female learners in Technical Drawing. The suggested topics for further research may contribute to finding solutions to problems embodied in the gender differences between boys and girls in Technical Drawing. It has been proven throughout this study that “HOMESTART” is much better than “HEADSTART”. This implies that charity begins at home where the foundation of discipline is laid on which the technical secondary school should build to produce architects and engineers as responsible citizens in the communities.



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P.OBOX346

HAMMANSKRAAL

0400

30 May 2006

Dear Educator (Colleague)

I am doing a MED (Leadership and Management) at the University of Pretoria and I am actually working on a mini-dissertation entitled, “Learner taking Technical Drawing: does gender make any differences in terms of performance?”

In this context I have to undertake research and I would be grateful if you could participate in an interview. The interview should take a minimum of 10 and a maximum of 15 minutes and will be scheduled at a time and a place that is convenient to you. All information gathered will be treated with strict confidentiality and anonymity.

Please note: Your decision to participate is completely voluntary.

Thank you for your cooperation

Yours faithfully

.....

Ntike Boroko



P.O.BOX 346  
HAMMANSKRAAL  
0400  
30 May 2006

Dear Parent

I am enrolled to a MED degree at the University of Pretoria and am working on a dissertation entitled: “Learner taking Technical Drawing: does gender make any differences in terms of performance?”

In this context, I have to undertake research and I would be grateful if you could grant your child permission to participate in an interview at his/her school during recess time. All information gathered will be treated with strict confidentiality and anonymity.

The name of your child will not appear in the research report without your or his/her written consent.

Thank you for your cooperation

Yours faithfully

.....

Ntike Boroko



P.O. BOX 346  
HAMMANSKRAAL  
0400  
30 MAY 2006

The Principal/SGB  
Gauteng/North-West Department of Education

**REQUEST TO CONDUCT RESEARCH AT YOUR SCHOOL.**

Research topic: “Learner taking Technical Drawing: does gender make any differences in terms of performance?” I am following a MED correspondence course at the university of Pretoria and I am actually working on a mini dissertation mentioned above.

In this context, I have to undertake a research and I will be grateful if you could grant me the permission to interview two educators and four learners i.e. two boys and two girls doing Technical Drawing at your school for 10-15 minutes each. All information gathered will be treated with strict confidentiality and anonymity.

Thanking you in advance for your co-operation.

Yours faithfully

.....

N.J. BOROKO



**APPENDIX 4**

**Interviews Schedule: Educators**

Please make a (X) where applicable

BIOGRAPHICAL DETAILS			
1. Name of Province			
2. Name of school			
3. Situation	Rural		Urban
4. Gender	Male		female
5. Highest Qualification			
6. Major Subject (s)			
7. Teaching experience	Less than 3 years		
	Between 3 and 5		
	Between 5 and 10		
	More than 10 years		

**QUESTIONS**

- Is Technical Drawing a difficult subject on SG or HG?  SG  HG  
Explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Between Paper 1 (P1) and Paper 2 (P2) which paper is difficult?  P1  P2  
Expatiate:  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Is Technical Drawing a suitable subject for girls?  Yes  No  
Explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
- Is Technical Drawing a subject meant for boys?  Yes  No  
Explain: \_\_\_\_\_  
\_\_\_\_\_



---

---

5. Is it true that girls and boys can learn Technical Drawing the same way? 

True	False
------	-------

Why: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

6. To what an extent does the gender of the educator influence the performance of learners in Technical Drawing?

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

7. Girls are marginalised in Technical Drawing classes? 

Yes	No
-----	----

Explain: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

8. Some sections in Technical Drawing are very difficult for girls than for boys?  
If your answer is false in (8) above, name the sections: 

True	False
------	-------

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

9. What can the government/school/teachers to improve the gender deference in the performance of learners in Technical Drawing: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_



**Interview Schedule: Learners**

Please make a (X) where applicable

BIOGRAPHICAL DETAILS			
1. Name of Province			
2. Name of school			
3. Situation	Rural		Urban
4. Gender	Male		female
5. Grade	10	11	12

**QUESTIONS**

1. Is Technical Drawing a difficult subject on SG or HG?

HG	SG
----	----

Explain: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

2. Between Paper 1 (P1) and Paper 2 (P2) which paper is difficult?

P1	P 2
----	-----

Expatiate: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

3. Is Technical Drawing a suitable subject for girls?

Yes	No
-----	----

Explain: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

4. Is Technical Drawing a subject meant for boys?

Yes	No
-----	----

Explain: \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_



5. Is it true that girls and boys can learn Technical Drawing the same way?

True	False
------	-------

Why:

---

---

---

6. To what an extent does the gender of the educator influence the performance of learners in Technical Drawing?

---

---

---

7. Girls are marginalised in Technical Drawing 

Yes	No
-----	----

Explain:

---

---

---

8. Some sections in Technical Drawing are very difficult for girls than for boys?

If your answer is false in (8) above, name the sections:

True	False
------	-------

---

---

---

9. What can the government/school/teachers to improve the gender deference in the performance of learners in Technical

Drawing:

---

---

---



**Interviews Schedule: Officials**

Please make a (X) where applicable

BIOGRAPHICAL DETAILS			
1. Name of Province			
2. Rank/ position			
3. The Province/District is dominatingly?	Rural		Urban
4. Gender	Male		female
5. Highest Qualification			
6. Subject (s) responsible for:			
7. Experience in the field?	Less than 3 years		
	Between 3 and 5		
	Between 5 and 10		
	More than 10 years		

**QUESTIONS**

8. Is Technical Drawing a difficult subject for learners on SG or HG? 

SG	HG
----	----

  
Explain: \_\_\_\_\_

\_\_\_\_\_

9. Between Paper 1 (P1) and Paper 2 (P2) which paper is difficult for learners?  
Expatiate: 

P1	P 2
----	-----

\_\_\_\_\_

10. Is Technical Drawing a suitable subject for girls? 

Yes	No
-----	----

  
Explain: \_\_\_\_\_

\_\_\_\_\_





11. Is Technical Drawing a subject meant for boys?

Yes

No

Explain: \_\_\_\_\_

\_\_\_\_\_

12. Is it true that girls and boys can learn Technical Drawing

True

False

Why: \_\_\_\_\_

\_\_\_\_\_

13. To what an extent does the gender of the educator influence the performance of learners in Technical Drawing?

\_\_\_\_\_

\_\_\_\_\_

14. Girls are marginalised in Technical Drawing classes?

True

False

Explain: \_\_\_\_\_

\_\_\_\_\_

15. The Department of Education is aware about inequality between boys and girls in Technical Drawing

Yes

No

16. If your answer is yes in 15, what is the Department doing to address the imbalances Technical Drawing?

\_\_\_\_\_

\_\_\_\_\_



## PART 2

Please give your opinion on the statement below about Technical drawing. Indicate your response by making an (X) as follows:

1= Agree, 2= Strongly Agree, 3= Not sure 4=Disagree, 5= Strongly Disagree

	Agree	Strongly Agree	Not Sure	Disagree	Strongly Disagree
1. Technical drawing is a difficult subject for learners					
2. Between P1 and P2, P1 is more understandable for girls					
3. Between P1 and P2, P2 is more understandable for boys					
4. Technical Drawing a suitable subject for girls					
5. Girls can learn Technical Drawing the same way as boys					
6. The gender of the educator influence learners in Technical Drawing					
7. Girls are given equal opportunities as boys in Technical Drawing classes					
8. Machine Drawing is a difficult section for girl learners in schools					
9. Technical Drawing is a subject meant for boys					
10. Girls have lesser interest in Technical Drawing compared to boys					



TITLE OF THE RESEARCH PROJECT

Dear Participant

You are invited to participate in a research project aimed at (Learners taking Technical Drawing: Does gender make a difference in terms of performance at secondary school)

Your participation in this research project is voluntary and confidential. You will not be asked to reveal any information that will allow your identity to be established, unless you are willing to be contacted for individual follow up interviews. Should you declare yourself willing to participate in an individual interview, confidentiality will be guaranteed and you may decide to withdraw at any stage should you wish not to continue with an interview.

Accompanying this letter, is a document explaining (participant’s role in the research process)

The results for this study will be used to (outcomes of the research)

If you are willing to participate in this study, please sign this letter as a declaration of your consent, i.e. that you participate in this project willingly and you understand that you may withdraw from the research project at any time. Participation in this phase of the project does not obligate you to participate in follow up individual interviews, however, should you decide to participate in follow-up interviews your participation is still voluntary and you may withdraw at any time. Under no circumstances will the identity of interview participants be made known to [any parties/organisations that may be involved in the research process and/or which has some form of power over the participants].

Participant’s signature..... : Date: .....

Researcher’s signature..... : Date: .....