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**FACTORS AFFECTING FOURTH FORM  
GIRLS' PARTICIPATION AND  
ACHIEVEMENT IN DESIGN AND  
TECHNOLOGY SUBJECTS  
IN SELECTED SECONDARY SCHOOLS  
OF ZIMBABWE: A CASE STUDY  
EXPLORATION**

A thesis presented in partial fulfillment of the requirements  
for the degree of  
Doctor of Philosophy  
in Education  
at Massey University,  
Palmerston North, New Zealand

Christopher Crispen Chimwayange  
2005

# DECLARATION

I declare that this study is my own account of my research and contains as its main content, work that has not previously been submitted for a degree at any tertiary institution.



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Christopher Crispen Chimwayange

## ABSTRACT

National calls for equality of opportunity have not been matched by reciprocal responses by girls to participate and achieve in design and technology subjects in Zimbabwean secondary and high schools. Current levels of girls' participation and achievement are of national concern. The study found that fourth form girls' low design and technology subjects enrolment and limited success have ensured a near all-male environment resulting in personal career progression limitations for girls and a gender segregated national socio-economic society.

It is acknowledged that outside Zimbabwe, models of student subject participation and achievement have been studied in the past resulting in the implementation of various motivational and retention strategies. Whilst accepting that girls' decisions concerning participation and achievement-related choices for or against design and technology subjects are individual and complex, some complex and interrelated contributory factors are explored. These are carried out in the context of Zimbabwe in this case study research which involved eight secondary schools of four different types targeting 321 fourth form girls, 26 design and technology subject teachers, eight principals, eight families and two education officers. The eclectic data collection approach chosen for the study relied on multiple sources of information being collected using a variety of techniques such as the student questionnaire, focus group interviews, in-depth interviews, lesson observations, and document and content analysis.

The effects of various overt and covert forms of home and school processes of difference, inequality and oppression were explored in the data and how these have affected fourth form girls' design and technology subjects participation and achievement-related decisions. In particular, the effects of home and school contextual and climatic factors have been found to largely militate against girls' 'fit' with design and technology subjects culture, staff and workshop environment. A model involving the student and school contextual and climatic dimensions, to explain girls' participation and achievement perspectives is suggested and explained encompassing sociological, psychological and gender perspectives. Findings in this study contribute to an understanding of girls' participation and achievement processes in design and technology subjects in the African context, a dimension that has been largely missing from mainstream debates on the subject.

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# CHAPTER ONE

## SETTING THE RESEARCH AGENDA

Jumping onto the bandwagon of gender studies in Zimbabwe raises suspicion from both males and females. For any male in Zimbabwe to delve into such affairs is inviting double edged cynicism: males attack you derogatorily as pro-feminist, feminist and perhaps disoriented to the male gender (otherwise why support the cause of another gender) whilst females are skeptical of your intentions as a ploy to pull the rug from under feminist gains and appropriate power for males from a privileged position of being a male (Millet, 1977). My dilemma is in this problematic location and the experience may leave me in the middle as discourses compete for space.

In spite of that, I take comfort in that politics has both enemies and allies. This raises questions, as asked by Bird (2004, p. 60), that being a man and therefore excluded from insider feminist history and experiences, “could men be feminists? Can they not...have an interest in gender?” Bird proposes striking a balance between patriarchy and matriarchy, and developing friends with men in a mixture of gendered identities and models. She perceives that to make inroads and win authorities’ (usually male) favour on gender issues, friends who “see themselves as fellow travelers, have an interest in the subject area... providing support, in favour of innovation” and, “believing in the principle of academic freedom” are needed wherever they can be obtained rather than women going it alone (Bird, 2004, p. 57-58). My personal journey in this research has been to explore and expose processes affecting fourth form girls’ “access to a performative space controlled by men”, that of participation and achievement regarding design and technology subjects: metal technology and design, wood technology and design, building technology and design and technical graphics and design (ibid, p. 53). This chapter sets the research agenda by elaborating my position and interest in the research project as well as highlighting the problem of why there are few fourth form girls taking design and technology subjects in Zimbabwe.

### 1.1 Self-location as Educator and Researcher

In 1979, I began my technical teacher’s training in metalwork, woodwork and technical drawing, as the subjects were known then. My observations revealed that in all these subject areas including building, none of the female students took the subjects. On the other hand, males shunned taking courses in the home economics subject area. Enrolment in the technical subject areas was stereotypically in technical subjects

considered appropriate for one's gender and which one had studied at secondary school. None of the trainee male teachers had done home economics at secondary school and none of the trainee female teachers had done metalwork, woodwork, technical drawing or building studies. Gender structuring of technical subjects seemed embedded in the system with an implicit assumption of distinct and different female and male technical subjects.

For eighteen years from 1982, I worked as a secondary school technical subjects teacher in three inner city co-educational state schools with diverse student populations, my first and last schools being multi-racial and middle class. The other school was in a high-density low socio-economic suburban area. For many years, it was an unquestionable norm to have girls enrolled in home economics whilst boys undertook metalwork, woodwork, technical drawing and building. Technical teaching, as I observed it, revealed rigidly gender structured technical subject areas where females and males did not mix. Nothing seemed amiss as everyone took everything for granted.

Little progress was achieved nationwide to encourage girls to take the traditional boys' subjects. This I discovered in the marking of national technical examinations, where almost all scripts were from male candidates. I became dissatisfied with the system after realising that all technical apprenticeships being offered by Government were going to male students owing to the traditional male subjects they had taken at secondary school which were prerequisites for these courses. Many jobs were advertised in the engineering, technology, agriculture and other science areas for which very few girls were qualified because of their subject backgrounds (Made & Lagerstrom, 1985). I perceived gender difference in the school system as a way of allocating different subjects and different life opportunities, with clear disadvantages against females. This was contrary to Government policy pronouncements on gender equality (Ministry of Education, Sport & Culture, 1984). None of the traditional female subjects led girls to the vast arena of training and job opportunities that boys enjoyed.

In 1986, six years after the Zimbabwean Government pronouncement of the gender equality policy in education, I became involved in encouraging girls to take traditional 'male subjects' with the initial success of three girls taking technical drawing and two taking metalwork for the first time in the history of the school. With the help of another metalwork teacher, we established metalwork and woodwork clubs open to all students in the school. This was simply a way of generating interest among girls to take the subjects. This liberal intervention nearly cost us our jobs as parents of the three girls came to the school demanding an explanation from the headmaster. One parent even suggested that the move was an initial step in luring the girls into relationships with the teachers. As far as I was concerned, these girls could do anything that boys could do and

achieve in any subject. While we survived the threat of losing our jobs, we lost the girls in the subject through parentally instituted forced withdrawals.

Several years later and in a different school, with the strong backing of the headmaster and the same concern for lost opportunities for girls, four girls in my class were successful in their ordinary level technical drawing school leaving examinations and this changed in many ways the way the subject was conceived by other girls, teachers and parents in the school. A few girls started enrolling in metalwork, woodwork, building and technical drawing. The four subjects have now been renamed metal technology and design, wood technology and design, building technology and design and technical graphics and design owing to curricular changes effected in 1990 when design became a core component in the teaching and learning of the subjects. Collectively these former technical subjects are now called design and technology subjects. The issue of technical and design and technology subjects is revisited in the next chapter.

## **1.2 The Problem of Girls Not Taking Design and Technology Subjects**

The level of girls' participation and achievement in design and technology subjects has remained an issue of concern to me culminating in this study aiming to identify processes affecting fourth form girls' participation and achievement related choices. Throughout my eighteen years technical teaching career, I have found that design and technology subjects continue to be taken on strong gender lines despite the Zimbabwean Government being signatory to some of the major world conventions on the elimination of discrimination against women such as the 1985 UNESCO Nairobi Forward Looking Strategies (FSL); the 1990 UNESCO Jomtien World Conference on Education For All; the 1995 UNESCO Beijing Declaration and Platform for Action (PFA); the 1997 and 1998 Southern African Development Council Gender Monitor. The urgency of the Jomtien World Conference on Education For All (1990), for example, was particularly underlined in the statement:

The most urgent priority is to ensure access to, and improve the quality of education for women and children, and to remove every obstacle that hampers their active participation. All gender stereotypes in education should be eliminated (p. 26).

While Zimbabwean Ministry of Education and Culture policies compel schools to accord equal treatment and equal access to both girls and boys in respect of all benefits, reality on the ground tends to tell a different story. During the passing of the Technical Education Act (1986), the then Minister of Education, Sport and Culture, Fay Chung,

revealed that despite legislation enactment and a few gains, female and male representation figures in design and technology subjects, scientific and technological labour markets in Zimbabwe remained heavily segregated by gender. In the secondary school technical curriculum, girls dominated certain disciplines, especially the arts and humanities, whilst remaining less visible in design and technology subjects.

Similar sentiments were echoed in the Nziramasanga Commission Report (1999) which revealed a general absence of girls in design and technology subjects and sciences especially as they progressed to ordinary level (year 11) and worse still at advanced level (year 13). Concern was also raised by Gwaunza and Nzira (1997) that there was little empirical scrutiny of even basic questions such as who takes what kind of courses in Zimbabwe and the subsequent consequences of students' course of study on their academic achievement and future educational and work opportunities. Gwaunza and Nzira perceived that such lack of national focus on important educational statistics had negative consequences on social and economic planning for people and industry in various spheres of Zimbabwean life. For example, Jasaan and Mwalo (1985) had argued earlier that the streaming of women into certain occupations such as nursing, teaching, office work, health care and personal services, reflected different educational preparation of women and contributed consequently to the male/female imbalances in certain occupations. In support, Morgan (1986) also argued that:

Subject choice in secondary school is crucial in determining a girl's future career and life options as under-participation in certain key subject areas excludes girls from entering a wide range of employment and training opportunities (p.7).

The Nziramasanga Commission Report pointed out that participation and achievement for girls in the sciences and, in particular, design and technology subjects bore social and individual consequences. For government, curriculum planners and educators, girls' low representation and low achievement in design and technology subjects tended to represent a failure of the school system to motivate girls to take the subjects and excel at both secondary and high school levels (secondary schools end at fourth form level whilst high school go to sixth form level). For society, the low representation and low achievement of girls had a tendency to breed a rigid and segregated society that viewed gender as a determinant of one's future role, education, training and employment. Individually, this has tended to deny girls a myriad of opportunities in education, training and work. Shashaani (1993) points out that society must not believe that technological understanding is primarily for males as this excludes a large section of the population from contributing effectively to society's advancement. With women comprising a majority at 51.8% of the estimated total population of 13.2

million people, Zimbabwe seems to be losing out on the benefits of women's potential talents (Ministry of Health, 1994, p. 180).

The continued problem of girls' low participation and achievement in design and technology subject areas seems not unique to Zimbabwe. O'Sullivan, Bucke and Richardson (1999) found that girls in mixed sex schools in Ireland were still under-represented in non-traditional subjects like technical drawing and construction studies despite a series of European Union intervention strategies aimed at increasing girls' participation in technology subjects. In developed countries like Britain, Australia, New Zealand and the USA, legislation on sex discrimination and, more importantly, the work of feminist researchers has raised government and teacher awareness of the extent and form of sex discrimination in schools and classrooms (Forgasz & Leder, 2001; Ma, 2001; Gilbert, 1998; Burns, 1997; Woolnough, 1994, 1995). Such legislation and research has provided the impetus for working groups such as the Girls Into Science and Technology (GIST) to make science a more girl-friendly subject and change the nature of the science taught (Matthews, 1996).

Fuch, Stebut and Allmendinger (2001) speaking of the German situation, argue that the low representation of girls could be indicative of the filtering processes to which women are generally subjected in science and technology areas whose roots may be traced to the school and other social processes at large. Eccles' (1994) extensive research in the USA on girls' participation and achievement in the mathematics, sciences, reading and sporting areas found that "many factors ranging from outright discrimination, to the processes associated with gender role socialisation may be contributing to these gendered patterns of educational and occupational choices" (p. 586). To her, this appears to have a spillover effect on training and waged employment where men dominate in science and technology courses and employment. Fuch et al. (ibid) observed that earlier studies in the developed world (although touching many dimensions of women's marginalisation) do not provide a systematic insight into the complex patterns that contribute to women's low enrolment and low achievement in technology studies in the developing world (p.186). To achieve full emancipation of women in the area of technology and science, Rosser (1993, p. 1-2) describes the Phase Model of Transforming science. She identifies six phases to full emancipation of women in science which are:

Phase (i) Absence of women is not noted.

Phase (ii) Recognition that most scientists are male and that science reflects a masculine perspective.

Phase (iii) Identification of barriers that prevent women from entering science.

Phase (iv) Search for women scientists and their unique contributions.

Phase (v) Science being done by women

Phase (vi) Science redefined and reconstructed to include both sexes

In the Zimbabwean situation, the Nziramasanga Commission Report (1999) recommends that phase (iii) concerning barriers preventing women from participating and achieving in traditional male subject areas and science be thoroughly investigated. This was as a result of the Commission's investigations that found a general absence of females in male-typed subjects and occupations. The present research targets phase (iii) and attempts to unravel processes affecting fourth form girls' participation and achievement in design and technology subjects such as metal technology and design, wood technology and design, building technology and design and technical graphics and design.

The study has difference located in sociological, psychological and feminist perspectives as its main theoretical framework. Two of the extensively researched models to explain subject and occupational choices: Eccles, Adler, Futerman, Goff, Kaczala, Meece and Midgley's (1983) expectancy-value model of achievement motivation and occupational choice and Woolnough's (1994) students' choice of science and engineering model are used in this largely qualitative and interpretive case study. Both models are explained in chapter four from psychological perspectives. This mainly qualitative research aims at a greater understanding of the problem of girls moving into design and technology subjects. Findings from the study aim to contribute to the understanding of girls' participation and achievement in design and technology in the African context, a dimension that is largely missing from mainstream debates on the subject. The audience for this research is the curriculum planning section of the Zimbabwean Ministry of Education, Sport and Culture and researchers in the gender and technology areas as well as researchers in cross-cultural environments. I provide an outline of the research in the next section.

### **1.3 Outline of the Thesis**

The thesis is divided into nine chapters. The next chapter (two) locates design and technology subjects in the Zimbabwean technical curriculum and examines local conceptions of design and technology. This is then compared to the British curriculum from which Zimbabwe's design and technology curriculum was developed and the New Zealand technology understandings, where the design and write-up of this research took place. Chapter three locates the study in the theoretical framework of difference embedded in pre-colonial, colonial and contemporary education systems. In chapter four, difference is discussed as located in three perspectives that have in the past been used to

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study girls into technology: the sociological, the psychological and the feminist perspectives (Ma, 2001).

The research design and processes are discussed in chapter five giving support to a case study as the most appropriate approach to understand processes affecting girls moving into design and technology subjects in this study. Data gathered during the first five months of 2003 is presented in chapter six showing girls' enrolment and achievement in design and technology and academic subjects from 1990 to 2001. In chapter seven, questionnaire and interview results are presented explaining 25 variables that have affected girls' participation and achievement in design and technology subjects in selected Zimbabwean secondary schools. Results are presented in an integrated manner, comparing and contrasting data from various participant groups, different school types and dissimilar provinces culminating in the proposed spider-web like student and school dimensions model to explain girls' decisions to take or not to take design and technology subjects. Chapter eight discusses the findings for congruence and non-congruence of data with the literature review. The concluding chapter nine explains implication of results for practice, policy and theory.

## CHAPTER TWO

### EVOLVING CONCEPTIONS OF ZIMBABWE'S TECHNICAL CURRICULUM

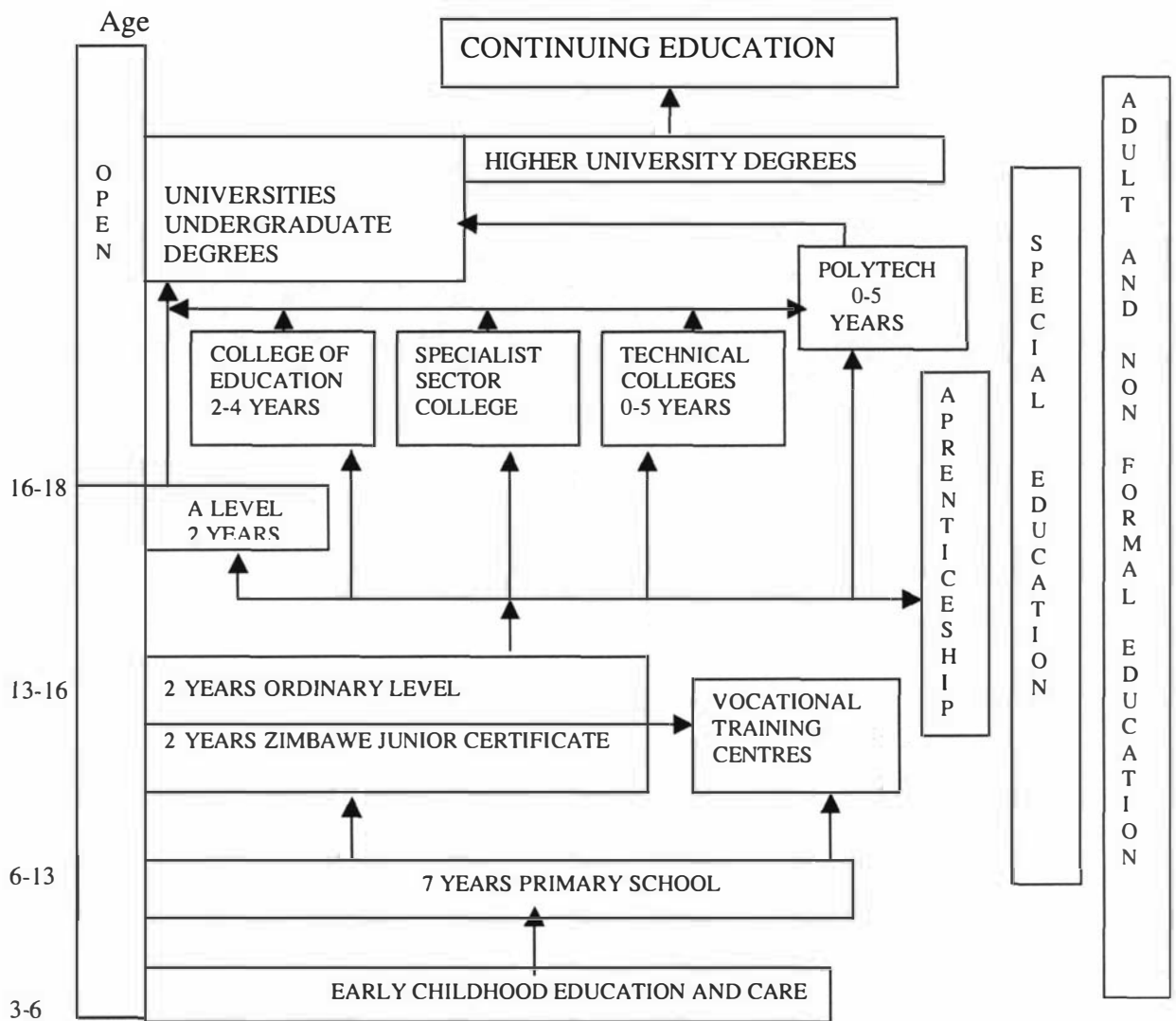
The development of the present technical education to reach design and technology status remains one of the major challenges confronting post-colonial Zimbabwe's education system. For the nation, design and technology is seen as an empowering tool for national economic development and keeping abreast of other economic developments elsewhere in the world. For industry, design and technology graduates are perceived as entering industry with broad skills relevant to the kind of work done there, thus reducing costs associated with employee training. For individuals, design and technology is viewed as an empowering subject for further studies in the technology field or self-employment (Nherera, 1998; Nziramasanga Commission Report, 1999). In an economy currently able to create only 10 000 to 12 000 jobs a year, the 350 000 plus school leavers every year are hard pressed to find a job and self-employment is viewed as a viable alternative.

This chapter provides perspectives on the development of design and technology subjects from traditional technical subjects and how design and technology has been conceived in Zimbabwe and its relationship and points of departure with other conceptions in Britain and New Zealand.

#### 2.1 The Zimbabwean School Curriculum

Primary school education in Zimbabwe begins at the age of six years and takes seven years to complete. The primary school curriculum is broad based offering the following subjects: mathematics, English language, Shona language or Ndebele language, social studies, environmental science, crafts (including home economics), physical education and music. Crafts usually follow gendered selections, where males take crafts and females study home economics. Because of fixed mindsets of gender role, many schools offer needlework in primary schools for girls and traditional crafts for boys following cultural and societal roles that men and women occupy in life which schooling tends to endorse. Currently 79 percent of primary school graduates enter secondary school (Nziramasanga Commission Report, 1999, p. 303).

Secondary schooling in Zimbabwe is divided into three two-year examinable sectors namely Zimbabwe Junior Certificate (ZJC), Ordinary level ('O' level) and Advanced level ('A' level) (see figure 2.1).



(Sizes of rectangles do not represent the proportion of participants)

Figure 2.1. Structure of education in Zimbabwe (Ministry of Education, Sport and Culture, 1984, p. 3).

The Zimbabwe Junior Certificate is a two-year course (form one and two or year 8 and 9) of study comprising academic subjects such as English language, Shona language or Ndebele language, mathematics, integrated science, history, geography, commerce, accounts, religious and moral education and French. In addition to these academic subjects, students are expected to choose two practical subjects from either the technical curriculum with subjects such as agriculture, art, computer science, food and nutrition, fashion and fabrics and typing or design and technology subjects comprising metal technology and design, wood technology and design, technical graphics and design and building technology and design. Differences between conceptions of technical and design and technology subjects are discussed in sections 2.2 and 2.3.

Form three and four (year 10 and 11 or ages 15 and 16) comprise the ordinary level two-year course leading to the school certificate examinations, which are used to

select students to enrol for advanced level courses. The same subjects taken at Zimbabwe Junior Certificate level are offered with the addition of physics, chemistry and biology as specialised sciences. To proceed to Advanced level, a student needs to have passed five or more subjects with a C grade or better. Each year about 25% girls and 44% boys complete ordinary level and only 8% girls and 11% boys progress to advanced 'A' level schools where there is a high degree of subject specialisation in preparation for university studies (Nziramasanga Commission, 1999). While all academic subjects are taken at advanced level, only food and nutrition, fashion and fabrics, technical graphics and design, art and computer science are included among the technical and design and technology subjects taken at advanced level. Agriculture, metal technology and design, wood technology and design and building technology and design all cease at ordinary level.

Advanced level (year 12 and 13) courses take another two years of study to complete after ordinary level. Students choose three subjects from arts, sciences or business studies. Arts subjects include Shona language, Ndebele language, history, geography, English literature, divinity, art and French. Science subjects include mathematics, biology, chemistry, physics, and geometrical and mechanical drawing/technical graphics. Business studies subjects include management of business, accounts, computer studies and economics. Since year 2000, the Zimbabwe Schools Examination Council (ZIMSEC) has examined all subjects in Zimbabwe. Previously, the Cambridge School Examination Council in Britain determined the curriculum and administered all ordinary and advanced level examinations for Zimbabwe.

## **2.2 Conceptions of the Technical Curriculum**

Before 1990, the Zimbabwean traditional technical curriculum comprised nine subjects namely food and nutrition, fashion and fabrics, typing, agriculture, technical drawing, metalwork, building, woodwork and art. Typing, fashion and fabrics and food and nutrition were considered as the domain of girls while agriculture, technical drawing, metalwork, building and woodwork were considered boys' subjects. Art was taken as a mixed gender subject.

The teacher in the Zimbabwean technical classroom held the knowledge and skills. The dominant pedagogy involved students as mere recipients rather than constructors of knowledge (see also Murphy, 2003). Emphasis was mainly on the development of motor skills and the production of products. The type of knowledge for learners was what McCormick (1997) called repetitive "procedural knowledge" and training which is of the "know how to do" type and which cannot be transferred to new unfamiliar situations (p. 143). Such knowledge stood in the functionalist model of

teaching and learning and produced learners who were active in recall and execution of routine tasks but who became aliens in unfamiliar situations. Supporting this view, Kemmis and Stake (1995) posit that technical knowledge is geared more to hands on knowledge of facts and the conditioning of learners in certain rituals. Such is the description fitting technical education in Zimbabwe.

Speaking against the constrained focus of technical education as hands on, Wren (1977) argues that education should provide opportunities for developing intellectual curiosity, social skills and cultural values. He contends that if learning is to be an active process, it needs to be more than "conditioning, skills training and memorisation" (p. 3). He furthermore contends that it is no longer sufficient to learn sequences and techniques as in the technical curriculum but for individual learners to be able to adapt, organise work, think and provide innovative answers to needs and problems without the necessity for constant supervision. Pacey (1983) is concerned at the long-term impact of specialist training and posits that it restricts people's approach to problems. As he puts it, "it breeds tunnel vision - a view of technology which does not look at other variables" (p.12).

Concerns about the narrow focus of the Zimbabwean secondary school technical curriculum that was restricted by its emphasis on knowledge of facts and skills conditioning made the Government curriculum planners consider the adoption of design and technology in its place. Through its Curriculum Development Unit (CDU), the Zimbabwe Government established four areas of concern that culminated in the Technical Education Act (1986) being law after realising that:

- only about 23% of the students were able to pass five or more academic subjects with a C grade or better at ordinary level (school leaving certificate) annually, hence the need to equip the 77% with technical or design and technology skills.
- the mainly academic curriculum was irrelevant to the country's development needs because it was examination driven and offered mainly recall skills while doing little to develop children's natural, creative and problem-solving talents that are considered useful in the local context.
- curriculum was narrowly constructed and failed to cater for the various skills areas that equipped students with practical and entrepreneurial skills to enable them to do self help projects.
- Zimbabwe would not be able to compete technologically on equal terms with other countries if the school population remained more technical than moving to conceptions of technology as practiced in other countries.

(The Technical Education Act, 1986).

The implication of the Technical Education Act was to offer a balanced academic and technical curriculum on one hand and an academic and technology-oriented curriculum on the other. It was perceived that the 77% school leavers unable to achieve in academic subjects, would be equipped with either technical or technology-related skills. The technical curriculum in its present form was however, found inadequate to meet the country's needs to develop children's technological literacy in line with developed countries like Britain, Australia and New Zealand whose models Zimbabwe wanted to eventually adopt. As a result, ideas of a design and technology curriculum were conceived.

### **2.3 Design and Technology Subjects in the Zimbabwean Technical Curriculum**

There would seem to be a contradiction of the terms technical and design and technology skills in the present use of these terms with the Technical Education Act (1986) document. This contradiction may have been created by transitional problems associated with which terms to use for which subjects. Technical skills continue to be associated with the old subjects such as food and nutrition, fashion and fabrics, typing, agriculture, technical drawing, metalwork, building, woodwork and art whose knowledge has been described in 2.1 as specialist training, conditioning learners in certain rituals, hands on, repetitive, procedural and of the know-how type. On the other hand, design and technology is associated with the four new subjects namely metal design and technology, wood design and technology, building design and technology and technical graphics and design which have now gone beyond learning sequences and techniques. The subjects now provide opportunities for learners to develop their intellectual curiosity, creativity and problem-solving talents that are considered useful in the local context to provide innovative answers to needs and problems.

Without doing away completely with the technical curriculum, the Ministry of Education, Sport and Culture thought of beginning the country's gradual shift to design and technology status by introducing design as a core component of the four subjects metalwork, woodwork, building and technical drawing. Design as creative problem solving was fused with workshop technology and concepts incorporating design and creativity, problem-solving and imagination were introduced into the four subjects. This fusion resulted in the names of the four subjects being changed to metal technology and design, wood technology and design, building technology and design and technical graphics and design to reflect the new creative problem-solving focus, content and approach to teaching and learning.

The design approach was adopted from curriculum developments in England and Wales in the late 1970s and 1980s where craft, design and technology had taken root. The word design has different meanings to different people but many agree that it is a creative process that gives students the experience and opportunity to discover and inquire. Kemmis, Cole and Sugget (1983) see design as a way of trying to build students' cognitive skills through creative and engaging tasks. This view is shared by Sandholtz (2001), who points out that the constructivist learning environment emphasised in design gives the learner opportunities to construct her/his own knowledge about the subject and brings about "opportunities to explore, reflect, collaborate with peers, work on authentic learning tasks, and engage in hands-on active learning" (p. 349).

In the Zimbabwean context, design is seen as a creative problem-solving activity leading to a product or a system. The design and technology curriculum concentrates on developing in the learner, design capability and technological knowledge and understanding through conceptualisation of the problem, synthesis of a solution and realisation (Ministry of Education, Sport and Culture, 1990). Design involves learning design and realisation skills in relation to materials and processes and applying them to local conditions. According to the Ministry of Education, Sport and Culture (1990), the aim is to foster creativity in problem solving, a team approach to learning and value judgment with a focus on the learner learning rather than on the teacher teaching. Beyer and Apple (1988) contend that this liberal-progressive approach compels teachers to be facilitators and to approach teaching and learning through setting challenges in the form of design briefs for individual or group activities. Beyer and Apple (*ibid*) point out that the whole idea is to avoid the pitfalls of "rote repetition, obedience and compliancy in technical learning methods as opposed to inquiry, self-governance or control and active involvement" in learning inherent in technology education (p. 185).

According to the Ministry of Education, Sport and Culture (1990, p. 3), the new approach to the teaching and learning of the four design and technology subjects should be the "promotion and development of curiosity, enquiry, initiative, ingenuity, resourcefulness and discrimination" in students irrespective of their gender. Key skills and elements to be developed within each of the four design and technology subjects are reasoning and problem solving, designing and practical applications. Various problem-solving models have since been used in the teaching and learning of design. The cyclic model shown in figure 2.2 has, however, been the choice to underpin the Zimbabwe design and technology curriculum.

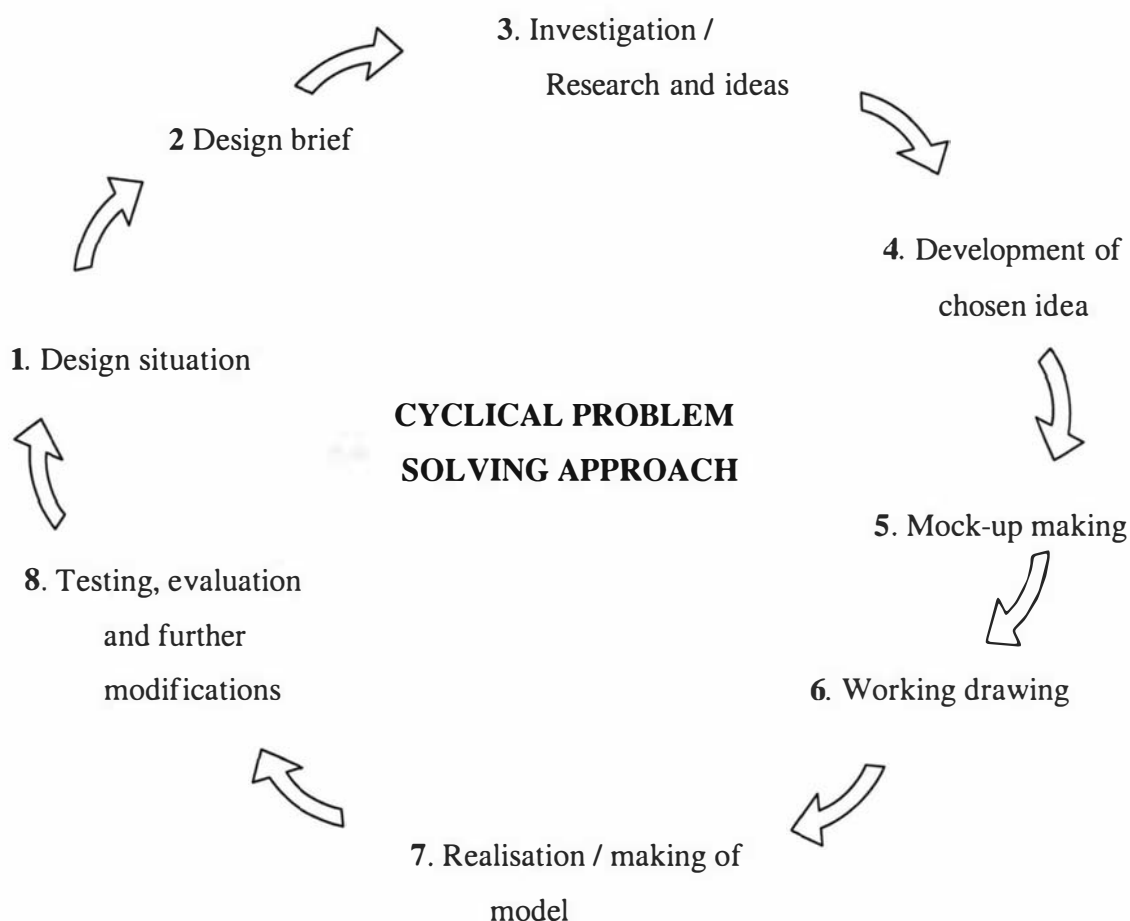


Figure 2.2. Design problem-solving process in Zimbabwe's design and technology curriculum (Ministry of Education, Sport and Culture, 1990, p. 8)

Ministry of Education, Sport and Culture (1990) argue that if all learners are to be given the educational tools to liberate their thinking from narrow conceptualisation of life and its problems, each has to be equipped with design skills. Over the years there has been little development of the design and technology subjects curriculum such that designing as a key component has been carried out routinely devoid of the thinking processes that were originally intended. McCormick (1997) however, is critical of the algorithmic procedures such as in the Zimbabwean design approach (figure 2.2). He warns that if people are not careful, design and problem solving may end up as another procedural and ritual activity devoid of higher order conceptual knowledge. When this happens, the approach would be no different from technical 'know how' or do it type of activity as is followed in the traditional food and nutrition and fashion and fabrics secondary school curricular in Zimbabwe. According to McCormick (1997), accounts concerning the classroom practice of design indicate that when it is taught as a step like process, students follow it like a ritual exhibiting only a veneer of accomplishment.

## 2.4 Conceptions of Technology Compared.

The Zimbabwean conception of design and technology is that of a fusion of design as creative problem solving and workshop technology. This is perceived as only the beginning in a route that is hoped to take the subjects to the level of understanding of design and technology and technology in other countries like Britain and New Zealand. In Britain for example, early attempts at a technology curriculum in the early 1980s involved incorporating design in stand alone subjects like woodwork and metalwork resulting in name changes to craft, design and technology in wood and craft, design and technology in metal respectively (McCormick, 1993). This seems to be the route taken by Zimbabwe presently as design and technology involves stand alone subjects like metal technology and design, wood technology and design, building technology and design and technical graphics and design. Later in 1988 in Britain, there was an attempt to bring together subjects such as art and design, business studies, craft, design and technology, home economics and information technology to become design and technology activities under three subjects: design and technology, information systems and technology (Department of Education and Employment QCA, 1999). The whole national curriculum was defined in terms of Attainment Targets (ATs) from Key Stages 1-4. These emphasise what students should achieve at 7 years of age (Key Stage 1), 11 years (Key Stage 2), 14 years (Key Stage 3) and 16 years (Key Stage 4). The Attainment Targets (ATs) for design and technology were as follows:

- AT 1: Identifying needs and opportunities for design and technological activities and investigating contexts associated with the “home, school recreation, community, business and industry”.
- AT 2: Generating a design specification, exploration of ideas to “produce a design proposal and develop it into a realistic, appropriate and achievable design”.
- AT 3: Planning and making of artefacts, systems, and environments. This included “working to a plan, identifying, managing and using appropriate resources, including knowledge and processes”.
- AT 4: Evaluation: involving “developing, communicating and acting upon evaluation of the processes, products” and effects of students’ “design and technological activities and those of others, including from other times and cultures”.

(Department of Education and Employment, QCA, 1999, p. 15)

At each AT stage, the structure of the programme of study (PoS) covering “content, skills and processes” to be studied was built around four foci:

- developing and using artifacts, systems and environments
- working with materials
- developing and communicating ideas
- satisfying needs and addressing opportunities.

(Department of Education and Employment, QCA, 1999, p. 19).

McCormick (1993, p. 19) points that Britain's focus in the 1990s was on information technology capability requiring students to be able to use information technology to: "communicate and handle information; design, develop, explore and evaluate models of real or imaginary situations, measure and control physical variables and movement". The importance of design and technology having strong links with other learning areas like information technology, mathematics, science and art to make contexts more applied and meaningful is also emphasised. Primley (2004) argues that ultimately, the English design and technology curriculum aims to impart seven design skills namely thinking, information processing, reasoning, enquiry, creative thinking and evaluation.

Technology is seen in New Zealand as applying knowledge, skills and resources to an activity in a "creative" and "purposeful" way in order to meet "needs and opportunities through the development of products, systems, or environments" within the local social contexts (Ministry of Education, 1995, p. 6-7). Instead of stand alone and optional subjects like in the Zimbabwean situation, New Zealand has organised its approach of how technological activities are carried out into seven technological areas namely biotechnology, electronics and control technology, food technology, information and communication technology, materials technology, production and processes technology and structures and mechanisms. Curriculum planners in New Zealand have tailored the technology education curriculum to develop in all learners three main strands of technological literacy: technological knowledge and understanding, technological capability, and technology and society.

The technological knowledge and understanding strand focuses on students gaining an understanding of how technologies function and are used. This includes knowledge and understanding of "...technological principles, systems and practices as well as strategies for the communication, promotion and evaluation of technological ideas" (Ministry of Education, 1995, p. 10). The technological capability strand focuses on identifying individual and group needs and opportunities by "generating, selecting, developing and adapting appropriate solutions" (p. 10) through "managing time, and human and physical resources to produce technological outcomes such as products, systems and environments" (p. 10). The technology capability strand also involves

“presenting and promoting ideas, strategies and outcomes” as well as “evaluating designs, strategies and outcomes” (p. 10). The technology and society strand seeks to understand how individual and group attitudes, beliefs, values and ethics accelerate or hinder technological development. This strand clarifies the way society and the environment have been impacted at the local, national and international level by technology in the past, present and future. The technology curriculum in New Zealand aims to develop eight essential skills namely communication, numeracy, information, problem solving, self-management and competition, social and cooperation, physical and work and study skills. These link technology with several other learning areas like languages, mathematics, science, social science, the arts and health (Ministry of Education, 1995, p. 18-19).

Zimbabwe's attempts at the technology curriculum in 1990 followed the English craft, design and technology example in the early and late eighties which included design as a problem-solving approach in stand alone design and technology subjects. The major aims of the Zimbabwean design and technology curriculum are:

- to develop in pupils determination, tenacity, flexibility, adaptability skills;
- to develop a degree of expertise in creative thinking;
- to promote the development of curiosity, enquiry, initiative, ingenuity, resourcefulness and discrimination.
- to enable pupils to use knowledge and skills to solve problems through a process of designing, making and evaluating;
- To stimulate value judgment of an aesthetic, cultural, economic and moral nature;
- to stimulate the development of a range of construction skills using natural and synthetic materials;
- to develop in pupils the ability to use hand and machine tools safely and effectively;
- to encourage self-reliance and commitment to community development;
- to encourage technological awareness, problem-solving and social responsibility in order to improve the quality of the environment; and
- to give pupils an understanding of economic and social factors in the world of industry and work.

(Ministry of Education, Sport and Culture, 1990, p. 3-4)

Key thinking skills developed through the Zimbabwean design and technology curriculum are enquiry skills, creativity and imagination, reasoning, information processing and evaluation which are similar to those of the Department for Education

and Employment, Qualifications and Curriculum Authority (1999) in the British design and technology curriculum. There are however, no key stages to be achieved in the Zimbabwean design and technology curriculum as happens in the British curriculum. Three areas are examined in each of the four stand-alone subjects and these are theory, design and communication and practical skills. Theory covers tools, materials and processes. Though limited in the Zimbabwean sense, this could be equated to the technological knowledge and understanding strand in the New Zealand technology curriculum. Design and communication involves a design folio with all the investigations, developments, thinking processes, design, drawing, realisation and evaluation skills following the cyclical problem solving approach to a given problem (see figure 2.2, p. 14). Practical involves the development of motor skills and techniques to produce products from natural and synthetic materials. Both design and communication and the practical components in the Zimbabwean situation could be equated to the capability strand in the New Zealand technology curriculum.

The English and New Zealand design and technology and technology curricula emphasise developing and using products, systems and environments, whilst the Zimbabwean conception of design and technology focuses mainly on artifacts and systems to a smaller extent. Emphasis on information technology in Zimbabwe has been limited by the non-availability of computers in many schools. Machinery use has also been limited to schools that have been electrified and those that can afford them. This means that the level of technological knowledge, understanding and capability of students at the same level of study differ with each school. Since the design and technology subjects are not well developed at all schools in Zimbabwe and do not cut across and link with many other subjects, they have remained optional subjects whereas in New Zealand and England, design and technology is a compulsory subject for students up to year 10.

While England's design and technology curriculum has evolved to bring together former individual subjects such as art and design, business studies, craft, design and technology, home economics and information technology with strong links to others across the entire curriculum, Zimbabwe's design and technology curriculum is still to evolve to include the three technology practice strands proposed by Pacey (1983, p. 6) which are the technical aspect, organisational aspect and cultural aspect. Zimbabwe's emphasis presently on subject theory, design and product making (technological knowledge and understanding and technological capability strands in New Zealand), is seen as restricted in its scope in Pacey's view of the definition of technology practice as it sits in the "technical aspect" only of the model (see figure 2.3). This view sees the organizational and cultural aspects of technology practice as external to it. The

movement to facets of technology practice administration and policy relating to designers and consumers has allowed the English and New Zealanders to move beyond mere technical aspects to connections between school activities and “technology experienced outside the school” (Martin, 2003, p. 79). The two countries have moved further to the broader view of technology practice encompassing “values which influence the creativity of designers and inventors”, while Zimbabwe still holds onto the “restricted meaning of technology”: the technical aspect (Pacey, 1983, p. 5).

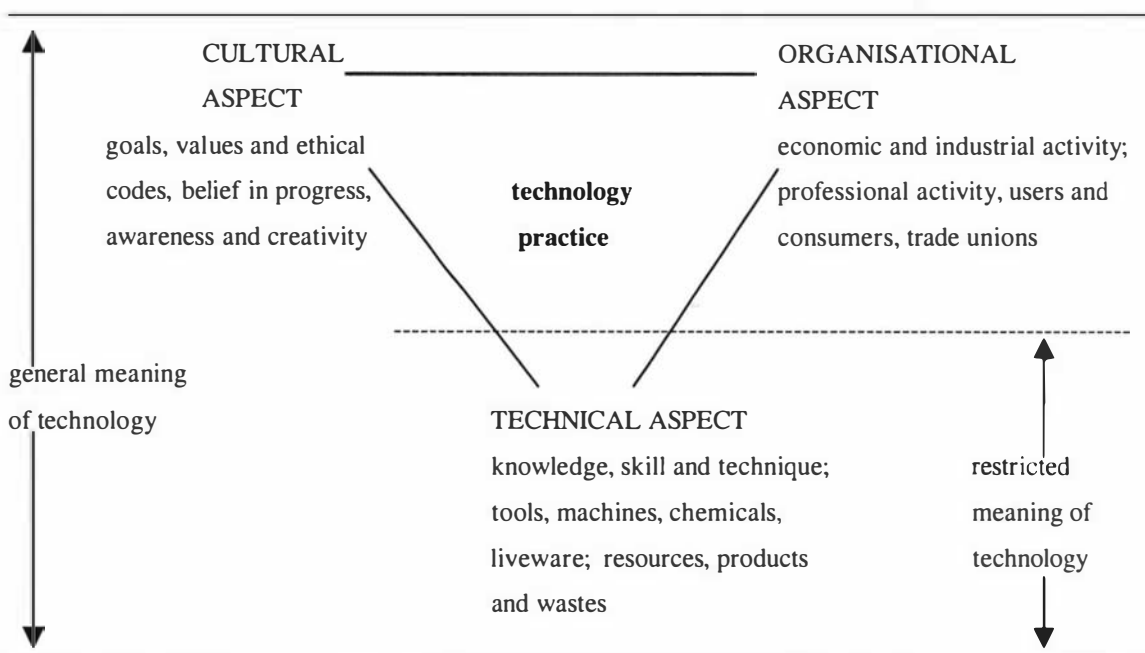


Figure 2.3. Diagrammatic definition of ‘technology’ and ‘technology practice’

(Pacey, 1983, p. 6)

Within the New Zealand curriculum framework, the broader view of technology has included the role of technology in society and how culture affects technology as well. The Te Kete Ipurangi TKI (2003) highlights this by saying that the cultural aspect is important in “...understanding the awareness of the relationship between technology and society”. The aims of the Zimbabwean design and technology curriculum imply commitment to the organisational aspect in “improving the quality of the environment” and “understanding of economic and social factors in the world of industry and work”; though in reality it is the technical aspect that is being practiced (Ministry of Education, Sport and Culture, 1990, p. 3-4). There is also peripheral reference to the cultural aspect in “value judgment of an aesthetic, cultural nature” though in practice this is not the case in Zimbabwe (Ministry of Education, Sport and Culture, 1990, p. 3-4). Pacey (1983, p. 3) argues that technology must be adapted to local conditions by saying that, “technology must fit into a pattern of activity that belongs to a particular lifestyle and set of values”. In this respect, technology cannot be culturally, morally and politically neutral. Such

dimensions may need to be recognised in Zimbabwe as integration of subjects is achieved to form one technology curriculum in the future.

Early determinist views on technology saw it as applied science. This view does not perceive technology as developing on its own or side by side with science or even as a precursor to science but emphasises that scientific knowledge must precede the development of technological products (Gardner, 1984; MacKenzie & Wajcman, 1999). Researches unearthing historical and philosophical understandings of technology have, however, rejected the Technology as Applied Science (TAS) view and science as a forerunner of technology (Gardner, 1984; MacKenzie & Wajcman, 1999). Recently, ecological perspectives have been added recognising technology and its social shaping through historical and social developments as well as its embeddedness and interactive nature with the natural world (Capra, 1997). This view recognises technology's existence, co-existence, dependability and influence on other systems and technologies.

## 2.5 Conclusion

This chapter examined design and technology as it is conceived in the Zimbabwean context and how the subject is slowly emerging and developing out of a traditional technical curriculum. Design and technology subjects are seen in the Zimbabwean context as stand alone former male only subjects such as metal technology and design, wood technology and design, building technology and design and technical graphics and design which have traditionally been craft and skills based. Since 1990, the subjects have now incorporated a design and problem-solving process approach encouraging creativity to generate solutions to meet product needs. The Zimbabwean design and technology curriculum is seen as evolving to conceptions of design and technology in Britain and technology in New Zealand. Developments in these two countries have seen the subject created being viewed as ungendered. The stand-alone subjects as in the Zimbabwean design and technology subjects have failed to break down the problem of gendered subjects. Change has only been in the design and problem solving approach incorporated and the subsequent change of subject names made while the culture and resources have remained traditional. Girls have thus continued to see the subjects as incompatible with their socialisation process and as part of the problem hindering their crossing over to study them despite policy seeking to "improve access for disadvantaged groups and improve gender balance" (Government of Zimbabwe, 1998, p. 45).

The next chapter examines the discourse of difference as located in the pre-colonial, colonial and post-colonial Zimbabwean society and how this has created differences between various classes in society and between males and females.

## CHAPTER THREE

### LOCATING DIFFERENCE IN PRE-COLONIAL, COLONIAL AND POST COLONIAL ZIMBABWE

Fairbairn-Dunlop (1991) argues that to understand women's experiences, one should analyse the situation in the context of "women's traditional roles (the cultural ideology), women's perceptions of their role today and their aspirations against the prevailing social, cultural and economic conditions (the contemporary ideology)" (p. 51). A view encompassing these two ideological factors is seen as identifying women's present status as a result of roles that were allocated to them within families and between families and how their contribution is valued by society as a whole.

This chapter highlights the discourse of difference rooted in traditional Zimbabwean Shona and Ndebele societies, and the colonial and contemporary Zimbabwean society. At the beginning of this chapter I discuss the Shona and Ndebele people of Zimbabwe's philosophy of African humanism (Unhu/Ubuntu), the dynamics by which it operates and the pattern of village and family life which results from this ideology. The Shona and Ndebele people are the largest ethnic groups in Zimbabwe. The Shona people comprise 71% of the 12.5 million people and the Ndebele comprise 16% while other groups make 13% (see appendix i). I then discuss the place of Zimbabwean women within Unhu/Ubuntu and some of the implications this holds for the place of women in Zimbabwean society today. In my discussion, I draw attention to Unhu/Ubuntu cultural gender role socialisation as situated knowledge and ideology shaping local people's perceptions, understandings and aspirations of the world around them. At the close of the chapter, I explore women's place in contemporary Zimbabwean society. The analysis highlights that difference is not only a western construct but has roots in African Shona and Ndebele societies. Albeit with slight variations, the advent of colonialism found a rich ideological ground of differential socialisation already prevailing in Shona and Ndebele societies making it ideal for Western ideological constructs to be assimilated into African thought. In some circles, difference has also meant inequality and oppression.

#### 3.1 Traditional Zimbabwean Ideologies and the Pedagogy of Difference

Notions of the pedagogy of difference have always pervaded Zimbabwean life. Bennaars (1995, p. 2) posits that the pedagogy of difference was and continues to be "a

way of educating that stresses the differences...rather than the similarities” between females and males. According to Wamahiu (1996), African society notions of difference, whether to the north or south of the equator, are premised on the belief that “men and women are biologically different”, are supposed to “occupy distinct, though complementary, social worlds” in their grown up lives and hence are supposed to “play separate though complementary roles in society” (p. 48). Earlier, Boserup (1970) argued that the distinct male and female social worlds granted each gender its own sphere of activity and power. To Boserup, the teaching of difference begins early in a person’s life and is internalised by participation in daily life as well as in various rituals and practices. African researchers like Kabira (1992), Wamahiu (1996) and Adeyemi and Adeyinka (2003) however, argue that the teaching of difference translates into differential status for women and men and is the root of all inequalities.

### ***3.1.1 Unhu/Ubuntu Ideology and the Pedagogy of Difference***

Zimbabwean Shona and Ndebele tribal groups’ ways of life are embodied in the philosophy of African humanism (Unhu/Ubuntu). ‘Unhu’, the Shona word and ‘Ubuntu’ the Ndebele equivalent, stand for a group’s expected way of life. Traditionally, this is the social and organisational system governing individuals, families, villages and chieftainship groups. The ideology focuses on a holistic education for group survival optimising the head, heart and hand to produce a healthy and balanced citizen. People are expected to think about group survival, to care for one another economically, morally and politically, to work for the group and to maintain group unity (Adeyemi & Adeyinka, 2003).

Writing about Samoan society, Fairbairn-Dunlop (1991) calls it a “system based on kinship and family ties in which every person has a place and each place has clearly defined rights and duties” (p. 165). The ideology implies that people operate within the bounds of communally prescribed behavioural norms. Accordingly, all behaviour is symbolic of group expectations based on gender, rank and precedence, which is manifested in a person’s conduct (tsika) among and away from others.

The Nziramasanga Commission (1999, p. 24) argue that Unhu/Ubuntu was, and continues to be the energising spirit in Zimbabwean education, the family, nation building and in international relations. Unhu/Ubuntu determines the organisational framework within which individual, family and village life is planned. It is also the traditional locus of control paramount chiefs and sub-chiefs have of censoring and rewarding individual and personal behaviour according to cultural expectations and values held by the group. In the context of this research, it is important to examine the effect Unhu/Ubuntu has had on women’s traditional roles, women’s perceptions of their

role today and their aspirations within prevailing social, cultural and economic conditions.

Unhu/Ubuntu philosophy is based on group behaviour and survival under the power of the paramount chief. Traditionally, only males could hold the executive or judicial authority of a paramount chief (mambo), sub-chief (ishe or sadunhu) and village head (sabhuku). Though women could theoretically ascend to political power, layers of attitudinal bias broke down women's ambitions to reach higher levels of political power (Afonja, 1981). Beliefs that women are born to leave their family home upon marriage have meant that they cannot be chiefs, as they cannot take their titles where they would be married. Their exercise of power is limited to advisory roles within their own families.

All power is vested in the paramount chief whose influence trickles down to sub-chiefs, the village heads and the family system (see figure 3.1). Chiefs and village heads in Zimbabwe, much like in Samoa, are "chosen by the family from candidates who have a claim to the title either through clan, blood or marriage" (Fairbairn-Dunlop, 1991, p. 69). Based on kinship and family ties, people falling under the village head are those of the same totem (family tree or mutupo) with the exception of their wives since it is forbidden to marry within the same clan. For example, the Lion (Shumba) clan have their own village under their own village headman and sub-chief. This is the same for the Heart (Moyo) clan, the Eland (Mhofu) clan, the River (Dziva) clan and the Leg (Gumbo) clan to mention but a few. These clans, based on totems or family trees fall under one paramount chief.

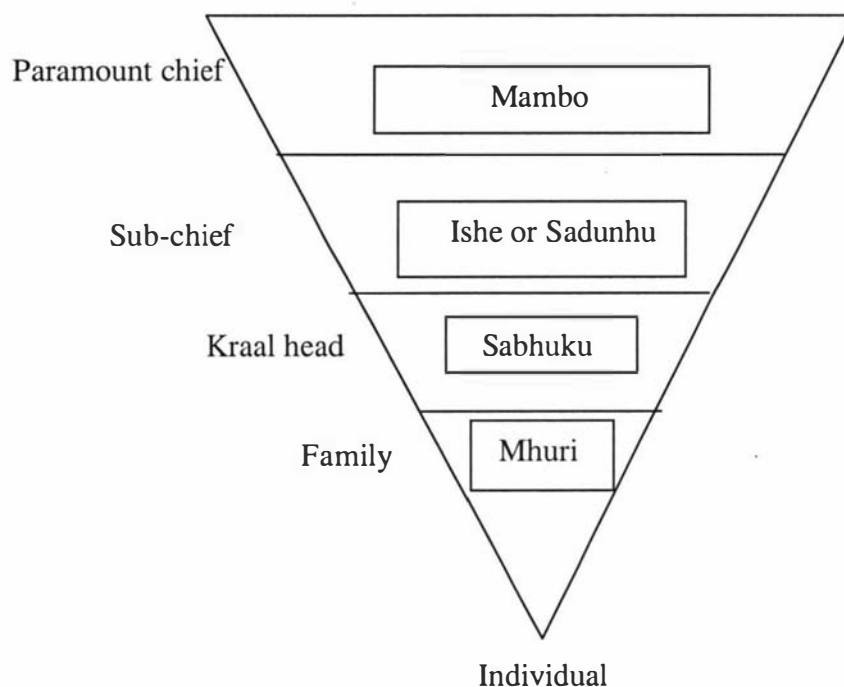


Figure 3.1. Power pyramid within the Shona and Ndebele people of Zimbabwe

Once chosen, chiefs and village heads become the custodians of culture ensuring generational survival of the people. The paramount chief mobilises his subordinates to work collectively for the good and prosperity of the chieftainship. One way in which chiefs mobilise collective effort for clan survival is through a tradition and concept of pooled grain resources called 'zunde ramambo'. Each family, having been allocated a piece of land for agricultural purposes, works hard to feed their own family members first and keep aside part of their yearly produce which is sent to be stored in a collective granary at the chief's home. While the chief also benefits from this pooled grain resource, the 'zunde ramambo' concept ensures village survival in times of strife, such as famine, wars and other natural and human-made disasters. At such times, families are able to withdraw the food they banked earlier in the 'zunde ramambo' granary storage to feed their starving families. Both men and women produce the food and carry it to the granaries in acts of unity of purpose and complementarity. It is also the chief's prerogative to mobilise men for the purpose of defending the chiefdom. In times of war in the past, men were sent to fight while women and children maintained their 'usual separate roles' in the village.

### ***3.1.2 Reciprocity and Complementarity***

In the concept of Unhu/Ubuntu, "family and village security is achieved by sharing resources and labour in acts of reciprocity" (Fairbairn-Dunlop, 1991, p. 70). No one has direct control over their own labour or goods because these are pooled together for family and village use. Adeyemi and Adeyinka (2003, p. 432) called this "communalism", where, "all members of the society owned things in common and applied the communal spirit to life and work". Reciprocity is manifest in the day to day sharing between families but is more visible in ceremonies such as family obligations to support each other during funerals, marriage, crop planting, weeding, reaping, threshing and winnowing. Acts of reciprocity are captured in the spirit of exchanging goods and this "represents a constant nourishing of family and village identity and allegiances" (Fairbairn-Dunlop, 1991, p. 71).

Shona and Ndebele women believe in the concept of complementarity where their work is seen as complementing that of their husbands and not as competition to it. They do not view their role as subordinate to men in contrast to Western feminist perspectives that view difference as inequality. Afonja (1981) posits that people live in an egalitarian way where complementarity equals equality of sexes. She comments:

The responsibilities of family members complement each other, which encourage cooperation for family and lineage survival rather than competition between sexes. Women contribute to the survival of the system, and such contributions are recognised in different ways (p. 306).

Accordingly, complementarity means that women have their own domains in which they wield power and exercise it for the good of the family, village or clan without challenging male authority. During funerals, all village men and women gather to pay their last respects to the deceased. Men yoke cattle, draw firewood logs for cooking purposes and to keep people warm, carry heavy rocks for burial and dig the grave. Women on the other hand, contribute food to be cooked at the funeral and, helped by village girls; they also fetch water, cook the food and serve it to men who will be burying the dead. Boys on the other hand, herd cattle; goats and sheep while these ceremonial activities take place. Beer for men and light beverages for women are served by women to respective rank and gender groups. During family helping ceremonies like crop planting, weeding, threshing and winnowing as well as happy festivities like marriage, male and female separate activities are seen as taking place in acts of family reciprocity and gender group complementarity.

### ***3.1.3 Religion***

The Shona and Ndebele people are God believing and fearing people despite European settler claims that they were non-religious. They believe in one God and that His powers and the spirits of people's dead ancestors influence all human activities. Their departure from Western concepts of religion is that they believe that God speaks to people through the spirit mediums (svikiro) who are full time living professional priests. Each Chief or an appointed person is considered part of this group of spirit mediums. The powers of the spirit mediums are considered to be inherited or to result from possession by God or a spirit being. Knowledge is received from God and passed on to the subjects who work to support the chiefly system.

Each family has a spirit medium representing it in family spiritual matters. In turn, ascending the political ladder, there are village and district spirit mediums each holding a different rank according to the level of political power they represent. Women's influence is particularly significant at the spirit medium level where several of them hold such positions alongside males. Women's powers are seen in the spiritually sacred ceremonies where they wield enormous power and influence over the course of social, political and economic events. For example, influential female spirit mediums such as Nehanda wielded enormous spiritual powers and rallied people to resist land

takeovers by settler Europeans in the 1880s. Nehanda's influence was recorded alongside that of a prominent male spirit medium, Kaguvi, both of whom were hanged by early settler Europeans for resisting the land takeovers. Thus women, though they have separate roles, also work alongside men complementing each other's efforts.

### ***3.1.4 The Family System***

The family system operates on the law of precedence and rank as well as age. Though land rights are presently for both male and females, in the past it was only males who owned land. Social practices of marriage render a married woman as the one brought into the family 'mutorwa', hence she could not own land rights. The ranking system allocates the husband as the head, provider of needs and protector of the family in case of trouble. The wife is seen as complementing the husband's efforts all the time with the children last in the command structure according to their ages. Family is taken to mean the immediate and all extended family to include everyone related to the husband and wife's families. When this is taken into consideration, the wife's position sinks lower in her husband's family as the aunts and uncles have more power over her even in her own home. The husband's position in his wife's family is that of a son who is able to help them in times of need.

Within the category of village women, wives and aunts do not hold the same status. The husband's sister (aunt/tete) in a family system is considered of higher rank than the wife even though she may be younger than the wife. Among the aunts, the eldest command the greatest respect and mobilise the rest to follow good manners (tsika) in all social conduct. Her duties extend to educating and socialising young family members especially her brother's daughters in the Unhu/Ubuntu concept of living. Even in times of family disputes men cannot pass decisions without the final say of the elder aunt (tete). The 'tete' however, wields this power within the bounds of her natal home since she will be someone's wife elsewhere. In her husband's home, her powers are limited and also kept in check by the husband and the 'tete' of her husband's family.

The aunt socialises family girls in the knowledge of chastity. Emphasis is put on female premarital virginity as a sacred marriage gift to the husband. The girl is raised to be separated from her family through marriage while the boy remains in the family home. Even after marriage, the boy is given his own place to build a house for his new family within the village. The marriage alliance symbolises a union between two families and is marked by the paying of a bride price (lobola/roora) by the husband's family. This is both a sign of respect to the girl's family and a token displaying thankfulness for them in raising the girl. Wamahiu (1996) argues that bride price is paid to signify the severance of the girl from her natal home, and entrance into a whole new world of being

a wife and mother. This gesture cements the relationships between the husband's family and the wife's family and also gives the husband conjugal rights over the wife.

No marriage in the Shona and Ndebele cultures can be sanctioned without the paying of the bride price. Only after such a ceremony is the new wife brought to her husband's home and the formal determination of the bride's virginity carried out as part of the marriage rituals. A girl's proven chastity brings more respect and honour to her parents' family while failing the virginity test brings severe shame to her and her family. The husband, when the wife fails the test, has the right to demand his bride price (lobola/roora) back and to send the wife back to her parents. Such demands are not enforced on the would-be husband though he is also socialized to respect the marriage institution by not engaging in premarital sex. A traditional ceremony (chimandamanda) is held as a way of thanking the parents of the girl for safeguarding the girl's virginity. The mother is paid her traditional 'mombe youmai' (cow paid as thanksgiving to the mother by the bridegroom's family). The father of the bride gets his traditional bride price (lobola/roora) of an agreed number of cattle and family ties are formally sealed between the two families. Once married, a woman assumes a subordinate status to her husband. The wife is accorded the lowest ranking adult status in the husband's family and village as in this new family, she is the 'outsider' (mutorwa) brought into the family by the husband.

Hospitality is considered an important component of the Unhu/Ubuntu family building way of life. It is a means by which the new wife displays her family upright upbringing and good naturedness (tsika) while in her new family and home. Wives and daughters are expected to be hospitable to family guests, cooking, feeding and showing kindness and respect. For a while, the new wife remains in the bridegroom parents' home being assessed and being taught her new roles in the new family by the 'tete' of the family. The mother of the bridegroom also helps induct the new person into their family life.

Conception is considered a process worth celebrating and the arrival of the baby is greeted with a sense of family and whole village welcome. If the child is a boy, a bull is slaughtered in a feast to welcome the new father of the family and to give special thanks to the wife for ensuring the intergenerational survival of the family's name. If the child is a girl, a goat is slaughtered and a smaller feast of celebration held. This differentiation signifies the lower status girls are given and the subordinate role they are expected to play throughout their lives. While girls are valued for the 'lobola/roora' they bring into the family upon marriage, boys are preferred for the intergenerational survival of the clan and family tree. However, women in the family and village celebrate the

coming of the girl-child more than the men as they say another helper in the home has arrived.

Despite the fact that married women's rank is considered low, many act with autonomy and flair within their jurisdiction of women's roles. It can be argued that the very separation of domains of responsibility gives women the chance to develop their own technologies to enhance their roles as housewives complementing their husbands (Afonja, 1981). Skilled reed mat weavers and basket makers are not uncommon among women whose products are exchanged for goats. Hence many skilled women become rich in goats and cattle. Women's technological prowess is seen in the clay pots they mould, baskets they weave and termite traps they design. Some grow traditional vegetables like 'munyemba', 'muboora', 'derere' and 'nyovhi' to mix with the meat hunted by the husbands. Women's hunting is only limited to catching mice (mbeva), beetles (mandere) and flying termites (ishwa) while men are expected to catch bigger animals.

### ***3.1.5 Life as Education and Education as Life***

Wamahu (1996, p. 48) argues that in Africa, "life and education is so integrated that it becomes difficult to differentiate the two." According to her, non-formal and traditional "education is effective because it is relevant, utilitarian, participatory and reflective of the implicit and explicit goals of society" (p. 48). Emphasis is on the "social group rather than the individual and the division of labour is based primarily on gender and generation" (p. 48). In this traditional and non-formal system, observation, imitation, initiation ceremonies, work, play, oral literature and participation are the key learning methodologies for social, political and economic transmission (Adeyemi & Adeyinka, 2003). This has changed little in the rural areas where such methods are still being employed. City life however, is gradually eroding some of the traditions.

Though initial childcare and education of children is the primary duty of mothers, the philosophy of Unhu/Ubuntu entails that this important responsibility is for everyone in the family and the village as the child is growing up. The saying that it takes a village to educate an African child, has its roots in collective responsibility of raising one of the family and village's own as seen in the role of the 'tete'. It is not uncommon for any misbehaving child to be disciplined by any older person in the community. Older people who fail to reprimand social malcontents and wayward behaviour in younger children in the society are themselves reprimanded heavily by the system.

According to Adeyemi and Adeyinka (2003), the division of labour is premised on the principles of preparationism and functionalism giving weight to the various unique roles each gender group is perceived to fulfil in life according to social needs. As they

put it, “the role of learning was to equip boys and girls with skills appropriate to their gender in preparation for their distinctive roles in the society” (p. 431-432). Girls and boys learn early in life that they have separate socio-economic roles to perform in society. Wamahiu (1996, p. 49) points out that gender role learning involves “acquiring knowledge of the physical and cultural environments, social and technological skills, morality and ethics including sex and religion, and the group’s history”. Emphasis, as early as the child can learn, is on instilling family and group behavioural norms and values (Unhu/Ubuntu). Children are taught moral norms of respecting older people, respecting other people’s property, and thankfulness. Respect can be seen in greetings where the young greet the older people first, in eating where the older people take precedence, and in helping the elderly. Moral authority, ceremony and hospitality are considered the preserve of females focusing on both daughters and sons. Wamahiu (1996) contends that:

The education of boys and girls...differ [sic] in terms of the gender of their teachers: while women are responsible for the education of both during early childhood, and continue with the education of girls even afterwards, men take over the education of boys after early childhood (p. 49).

Girls’ education is mainly in-doors especially in the kitchen, cooking and cleaning the home. Through the oral medium, observation and participation girls learn and internalise their roles. Young girls help their mothers collect firewood, fetch water from the village well and cook for the family. They are also taught to catch flying termites. Greater value is placed on issues of etiquette and showing good manners ‘tsika’ implicit with a well-raised Shona/Ndebele girl-child.

While girls are groomed to fulfill female roles by their mothers and aunts, boys receive a separate educational upbringing by fathers and uncles that prepares them for the future role of being fathers and leaders in the home and community. Boys are groomed to be fathers at the male meeting place (dare). At the ‘dare’, boys are taught blacksmithing, building and thatching huts, handiwork such as carving artifacts and tools such as wooden hoe and axe handles, making ox yokes and cooking sticks. Owing to their perceived possession of more strength than women, boys carry out heavy, outdoor and usually dirty work like cutting down trees and ploughing fields. Through oral folklore stories told at the ‘dare’, boys are able to internalise that their role is to be leaders in the home and community and to provide for their future wives and children. Boys are also taught bravery skills and how to fight and defend the family and village from invaders. Such invasions were not uncommon with the rivalry that existed between the Shona and Ndebele people in the past over resources and beautiful women.

### 3.2 Shona/Ndebele Women's Roles and Complementarity

The implication of complementarity in Zimbabwean traditional society is quite significant. For one, it casts a view that females and males are different. Wamahiu (1996, p. 47) argues that in the African situation, complementarity is a pedagogy of difference reflecting "a social theory of silencing, domination and subjugation" of women and girls. She further purports that complementarity perpetuates male dominance and the "integration of individuals into their social groups" (p. 48). While purporting to socialise individuals for their adult roles and status, traditional education is in reality a recipe for separate engagement, downgrading the female to a subordinate and subservient role to that of the male. It prepares women and girls to a perpetual life role of serving men hiding under the disguise of complementarity. This renders women and girls as second-rate citizens whose function in society is like mere operatives directed by males. To males, it gives them power and control over females through such social practices as 'lobola' paying where the woman seemingly is more of a commodity to be bought and owned. It is no wonder Zimbabwean men do not tolerate arguments or an alternative view from a wife they consider having paid 'lobola' for.

While advancing itself as a pedagogy harmonising and integrating society, complementarity is a social construct bent on maintaining the status quo rather than advocating for change. The mainly domestic roles assigned to women and girls are more routine and repetitive than challenging. They limit women and girls to narrow occupations of preparing and serving food in contrast with male outdoor and enterprising roles of blacksmithing, jewellery design and making, wood and stone carving, building and war (Wamahiu, 1996). Because of their narrow social engagements, women's technologies are confined to domestic ones of clay pot moulding, stone grinders of corn and small traps for catching mice and flying ants. Though women are the largest users of home technologies like pestles and mortars, mats, baskets, cooking sticks and floor rammers, skills to make these are mainly possessed by males.

Through the discussion in this chapter, it is apparent that role theory is actually embedded within a pedagogy of difference that is used to rationalise the continued disadvantage of women and girls in the Shona and Ndebele cultures. The traditional Shona and Ndebele system of leadership nourishes the economic, social and political inequalities through the tradition of authority, rank and subservience. The system offers little engagement for each gender group to venture into each other's perceived roles outside the confines of cultural expectations as this is considered taboo. Going against cultural norms meets with strong social disapproval and sometimes censorship. In all this, women end up the losers because of unscaled walls of social engagement.

Wamahiu (1996, p. 47) contends, "From a feminist perspective, the pedagogy of difference is discriminative, inequitable and therefore totally undesirable." In reality, women's preferences cannot be taken as naturally given. The fact that women do not question the customary ideal of separate domains of power does not mean that they support the existing institutional structures in society. Evidence of this is seen in the breaking down of some marriages (considered taboo in the African context) when some women's voices of dissent are considered contrary to male cultural expectations and established social structures. It has been argued that the strict clinging to traditional cultural sex roles by males, blocks alternative ways of looking at life, and prevents an objective assessment of whether such structures are for the benefit of all groups of people (Fairbairn-Dunlop, 1991).

### **3.3 Pedagogy of Difference and the Colonial Education System**

Fairbairn-Dunlop (1991, p. 17) postulates that in the development of the colonial African education systems, Western ideological constructs "may have found a similar ideological base in African society and thus may have reasonably been assimilated into African thought easily as they would have reinforced pre-existing patterns of social organisation". As Wamahiu (1996, p. 52) put it, "the gender ideology in colonial Africa propounded the view that male and female status and roles were divinely ordained and therefore immutable". This supported the traditional Unhu/Ubuntu ideology, which emphasised the teaching of differential gender roles for different social, political and economic roles in society, albeit with slight contextual differences.

Colonial essentialist methodologies supported difference to further the patriarchal agenda of settler Europeans with far reaching consequences for Shona and Ndebele women and girls' education as this further widened an already existing gender gap. For example, essentialist and biologically deterministic notions of difference were used by the settler Europeans to establish a colonial education system that not only segregated people by race, but also by gender. For a start, the invading Europeans took over the Shona and Ndebele land by force and followed this up by the establishment of political and administrative structures that excluded the indigenous Shona and Ndebele people. The Shona and Ndebele people were considered not only to be different to the settler Europeans, but also inferior. Skin colour and cultural dispositions were considered areas of major differences warranting separate political, social and economic engagement.

With the help of the strongly patriarchal Christian doctrine, ideological and physical battles were fought to suppress Shona and Ndebele cultures despised as backward, pagan and evil. The Shona/Ndebele people's skin colour was equated with constructs of blackness as opposed to whiteness, evil as opposed to good, ignorance as

opposed to enlightenment, inferiority as opposed to superiority and under development as opposed to European development (Zvobgo, 1994). According to Tikly (2000), these constructions which are typical of “Manichean allegory” (i.e. a field of diverse yet interchangeable oppositions) functioned as the “currency for the entire colonial discursive project and served to legitimate the economic exploitation of the colonised” (p. 611). Both biological and cultural essentialist notions were advanced to legitimate difference as inequality and promote the idea of separate engagement between Africans and Europeans, men and women. This was a form of cultural essentialism employed as a dominant discourse primarily to maintain the insider-outsider binary. As the Chief Native Commissioner H. S. Keigwin announced in 1918, the native should be trained not so much as a competitor with the white man in the business of life but as a useful auxiliary help in the progress of the country.

Having conquered the Shona and Ndebele on the battlefield, another battle to exorcise the Shona and Ndebele people from the ‘evil’ Unhu/Ubuntu culture followed. Early missionaries perceived that religious influence would provide an ideological arm for colonialism to spread the use of the English language and induct the natives with the best kind of civilisation (Zvobgo, 1994). This can be equated to what Bishop and Glynn (1999, p. 20) wrote about the New Zealand Maori history that, “the prevailing colonizer mentality of indigenous peoples was that of primitive, tribal people without a knowledge and technology of their own”. Bishop and Glynn (1999, p. 12), termed this “epistemological racism” or “racism that is embedded in the fundamental principles of the dominant culture”. A new framework: oppression of one race by another emerged as opposed to complementarity between sexes that existed prior to European settlement. In all this, the pedagogy of difference was manifested.

Separate development policies were passed to set up a racially and gender segregated education system. Zvobgo (1994, p. 16) identifies that a disproportionate emphasis was put by the capitalist colonial government from 1890 to 1980 in developing European education at the complete neglect of African education especially in the early colonial years. There was also emphasis on female and male subject areas to train for ‘inevitable’ separate roles later in life. Separate development was highlighted by the then Prime Minister of Southern Rhodesia Sir Godfrey Huggins in 1934. He visualized Europeans and Africans, men and women as “living side by side yet apart, each working in his own area not in competition with each other but complementary to it as in partnership” (Huggins, 1934, p. 4). In a direct speech to parliament in 1937, Huggins summed up the racial rhetoric in his separate education policy by saying, “...it is by allowing our race [Europeans] the very best education and bringing out latent talents there may be that we will enable our race to survive in Africa” (Huggins, 1937, p. 7).

Policy pronouncements, Acts of Parliament and Commissions set up, such as The Land Apportionment Act of 1930, The Industrial Conciliation Act of 1934, The Civil Service Act of 1937, The Fox Commission of 1936, The Education Act of 1938, The Commission on Native Education of 1951, The Beadle Commission of 1956, The Native Education Act of 1956, The Judges Report of 1962 and The New Education Plan For Africans of 1966, all reinforced difference and separate development and no departure could be found from earlier policies of European racial superiority over Africans. What all these Acts succeeded in doing was to reinforce social structure by creating a separate system of elite schools for the sons and daughters of the ruling class (Europeans), and another system for working class children (Africans) and, embedded within this structure, separate technical subjects for males (ruling) and females (complementing).

Throughout these policy pronouncements and Acts, the importance of girls' education was never mentioned whether for Africans or for Europeans. Girls' education was put in the same category as that of boys' education without regard of any differences that could have been in existence. According to Smock (1977), the limited education offered to girls by Christian missionaries and colonial administrators "frequently taught them domestic skills appropriate for an English housewife rather than preparing them to go to higher levels of the educational system" (p. 202). Such a system was nourished by events in the formal employment sector, where the 'missus' syndrome (white man's wife who was not supposed to engage in paid work) was propagated to have women stay at home while their husbands worked to provide for them. The argument was that a woman's place was exclusively in the home, within the kitchen, doing domestic duties.

Academic and skills apprenticeship training for whites was viewed as economically important to strengthen industry and commerce while African boys received basic woodwork, metalwork and building skills and knowledge of the English language which did not ensure them employment in industry. Africans were also kept out of high-income earning jobs through exclusion from apprenticeships and other training opportunities (Zvobgo, 1994, p. 61). According to Zvobgo, it was left to the few missionary settlers, through grants in aid set up in 1903 to educate the Shona and Ndebele people out of the shackles of what was termed a tribal, pagan and savage Unhu/Ubuntu culture and replace it with Christian values. Grants-in-aid extended to missionaries in 1903, not only helped missionaries to expand their Christian work, but masked a system to extend and sustain dominance over the Shona and Ndebele people through epistemological racism.

Zvobgo (1994) argues that missionaries provided a moral justification for imperialism and enabled the colonisers to present colonialism as a great civilising mission. For one, grants-in-aid were extended only to those African mission schools that

agreed to operate half the working day for African children and emphasised basic industrial rather than academic learning. This was in contrast to European education that had a strong academic subjects emphasis. Zvobgo (1994) argues that this was part of the overall white policy to ensure that Africans were not given an education which could bring them into competition with the whites. It was also impressed upon the Africans that they see “themselves as a distinct section of the society that did not qualify for the same rights and privileges as white Rhodesians” (Zvobgo, 1994, p. 16). Such racial stereotypes of the non-European ‘Other’ were constructed and presented as a God given natural order of things. Implicitly, colonialism created a society in which the people who controlled power and wealth were Europeans and those who worked to produce this wealth were Africans. The same treatment that Africans received from Europeans could be equated to the treatment given to women (ruled) by men (rulers) to prevent them being in competition with them.

Though the Shona and Ndebele people were at first sceptical about sending their children to the missionary schools, the subsequent conversions to Christianity of a number of local people, and benefits seen economically in employment for those educated, were enough to gradually erode traditional resistance. Gradually, it was the boys who benefited from early settler missionary education, as local parents did not want their daughters polluted by settler ideologies, lest they lost on the lobola. Many indigenous people argued that who would want to marry an educated woman? The treble disadvantage of Shona/Ndebele girls manifested itself in education where they were discriminated on racial lines by the settler Europeans, given separate subjects as a gender group and denied an education by their own African parents.

In the passing of time, however, local indigenous people began to realise that colonial education was a gateway to employment, cash and higher status within an increasingly money economy. The Western formal school system became the public perception of what education should be. With the slow and late sending of girls to school, females were disadvantaged and marginalized from the beginning. Men dominated the formal employment sector owing to their higher educational qualifications comparative to women. With the increasing adaptation of the money economy, the institution of marriage became commercialised as fathers began charging exorbitant amounts of money and cattle from wealthy sons-in-law to gain status in society. This further exacerbated the disquieting of the female voice in the home and the ‘missus syndrome’ took deeper roots. The technological skills base of women and men widened more as women assumed a back seat waiting upon their husbands to provide for them. Thus, “the roots of gender discrimination in contemporary African societies, and its perpetuation through the

pedagogy of difference, can thus be traced to both pre-colonial and colonial patriarchal ideologies” (Zvobgo, 1994, p. 54).

The passing of the 1966 New Education Plan for Africans did not improve the situation for girls. The creation of the F1 (formal education grade 1) and F2 (formal education grade 2) streams of secondary school education ushered in a new era in African Education. The F1 schools became the pure academic African schools for the first time and catered for the nation’s brightest 12.5% Africans to have a secondary academic education. On the other hand 37.5% of those who did not qualify for the F1 schools were absorbed into the F2 schools. The remaining 50% of African students dropped out of school altogether. The effect was to eliminate the majority of the African children from the school system and condemn them to a life of labourers in the same way female attrition in school is seen in the same light as condemning them to a domestic life. The F2 schools emphasis was on technical education for the Africans. Both girls and boys in these schools took subjects such as commercial arithmetic, general science, environmental studies, bookkeeping, and commerce. In addition to these, girls were required to do home economics subjects like fashion and fabrics, cooking and nutrition and typing while boys took metalwork, woodwork, technical drawing, building and agriculture, stereotypically consistent with their societal roles.

The lower status accorded to F2 schools had many parents seeking an F1 type of education which offered better academic education though still inferior to the curriculum offered to European children. In terms of resources, African education was grossly under-funded in comparison to European education. Rural students were disadvantaged more as most of these F1 and F2 schools were in towns and cities.

### **3.4 Pedagogy of Difference and the Colonial School Curriculum**

The colonial education system was developed from models espoused in the industrial societies of Europe as “methods of ideological and social control during the violent class struggles of the nineteenth century” (Zvobgo, 1994: 2). Zvobgo argues that while the system provided skills training appropriate to the needs of industrial capitalism, it also reinforced a class system favouring the children of the ruling class whose cultural capital was favoured in the national curricula. In colonial Zimbabwe all learning was in English and Shona/Ndebele education was more like learning the ways of the master. No wonder many Shona and Ndebele children failed in schools while Europeans occupied elite positions in the status continuum. Through the possession of requisite cultural and curriculum knowledge, the system evolved, retaining the same ruling class who

continued to dominate all state apparatus. Zvobgo (1994, p. 3) points that, “the school system reinforced the elite culture which bound the ruling class together...and gave a pretence of equal opportunity. If a person failed and remained poor, it was made to appear as their own fault and in no way the fault of an unequal and exploitative system”. Bowles and Gintis (1986) clearly characterise this unfair disposition in saying that if the ruled are made to accept their position as normal, natural and inevitable and fail to realise the true nature of their position, they will be unlikely to challenge ruling class dominance.

While it appeared as if the colonial education system was open to all, there were some subtle bottlenecks that triggered inevitable dropout of the ruled. The treble disadvantage of the Shona and Ndebele girl was apparent in restrictions emanating from the colonial political framework, the gender framework and the traditionally inhibitive taboos. Wamahiu (1996) observes that by the time boys and girls entered school, each group had already assimilated and internalised what it meant to be a girl or a boy, that is, schoolwork and more domestic work for girls and schoolwork and few male chores for boys giving them more time to study. She posits that girls and boys would have “different values and concepts of self-worth” (p. 55). Schools reinforced home roles for girls by allocating them domestic science subjects like sewing and cooking for practical work and actively excluded them from what was considered male technical subjects like metalwork, woodwork, building and technical drawing. Girls were portrayed in domestic science textbooks while boys featured in traditional male textbooks. Feelings of superiority in boys and inferiority in girls were reinforced by the presentation of the male as the active actor and the female as the passive actor in the textbooks. Colonial education thus portrayed and enacted girls’ and boys’ education not only as separate, but leading to different occupations in life. The critical absence of girls in subjects like mathematics and science made it impossible for girls to enter the traditional male occupations.

Wamahiu (1996, p. 54) concludes that the portrayal of girls in textbooks as “passive, dependent, weak, fragile, and even mindless, engaged in non-remunerative, low prestige occupations” had profound negative effects on females venturing into and achieving in traditional male subjects and occupations. Girls saw traditional male technical subjects as too masculine, too difficult, requiring too much strength to execute and too prestigious for a woman. She further contends that teachers on the other hand, as mediators between curriculum developers and textbook writers, fuelled the difference by their classroom conduct of “monologuing, a chalk and talk teaching style, encouraging rote memorisation and repetitious learning and the frequent use of corporal punishment in stark contrast to the traditional participatory methods of learning” (p. 55).

With a rigid and essentialist mindset, solidified by many years of silent and active socialisation and Western training, the teacher's worldview was, not surprisingly, patriarchal. This view affected the way teachers, both male and female, conducted their lessons and influenced their classroom decisions. In the highly authoritarian environment of the African classroom, the teacher was highly feared by both girls and boys, but perhaps feared more by girls than boys since girls' socialisation at home, was done by females. It was considered that when fathers intervened in any situation, it would be a serious matter requiring severe reprimanding hence, girls always feared male authority. Research carried out on gender differences in Kenya by Obura (1991) revealed male teachers' discriminatory behaviour in African classroom situations. She argues that teachers:

...not only denigrate female capability in academic achievement in general, and mathematics and the sciences in particular, but also transmit their perceptions of what constitute the correct behaviour and lifestyle for educated girls. Girls who deviate from the correct 'behaviour' risk being labeled 'abnormal' (Obura, 1991, p. 13).

### **3.5 Pedagogy of Difference and Contemporary Education**

The challenges of contemporary Zimbabwean education have been varied. For example, there have been concrete moves towards removing and replacing European dominant conceptions of reality and truths with new ones. Strategies were adopted to replace parts of the existing colonial "curriculum with new materials based on positive representations of Zimbabwean and African experiences and cultures" (Tikly, 2000, p. 614). Though previous governments had virtually ignored the plight of the girl-child, the present Zimbabwean Government manifesto on education outlines six cardinal principles as follows:

- (a) the abolition of racial education and the utilization of the education system to develop in the young generation, a non-racial attitude, a common loyalty,
- (b) the establishment of free and compulsory primary and secondary education for all children regardless of race,
- (c) The abolition of sex discrimination in the education system,
- (d) The orientation of the education system to national goals,
- (e) The basic right of every adult who had no or little educational opportunity to literacy and adult education, and
- (f) The special role of education as a major instrument for social transformation.

Ministry of Education, Sport and Culture (1984, p. 5).

A great deal of importance was given to technical subjects and sciences following the adoption of the concept of Education With Production (EWP) along examples in Socialist countries of Eastern Europe in 1982. The concept sought to integrate theory and practice in every aspect of the school curriculum. Zvobgo (1994) argues that EWP provided the 'do' part in every subject area for the "how aspect ...the linking of study and work, theory and practice" (p. 54). While children learnt academic subjects, they were to apply the skills in practical work. 'Theory' and 'Practice' became common slogans in education.

The legacy of school grouping that was inherited from the colonial past continued in independent Zimbabwe from 1980. Though changes were proposed and in some instances enacted, in many respects the school system in Zimbabwe remained largely unchanged after political independence. The event most welcomed by parents was the banning of the F2 system of education in preference for a uniform F1 academic system. However, vestiges of colonialism could be seen in the use of English as the language for business and classroom learning. Thus, the continued dominance and influence of imperial culture could not be doubted. Strict zoning systems carried over from the colonial period and based on residential area establishment designated as low-density for Europeans and high-density for African migrant labourers meant that residents of the high population density suburbs could not access former European (group A) and well equipped schools in the low population density areas. Only the few wealthy Africans who migrated to the low-density areas had their children attending these schools joining the high socio-economic European class. On seeing the influx of Africans in group A schools when non-racial laws were passed, Europeans circumvented this by building their own private schools where they charged fees beyond the reach of many Africans, thus perpetuating a segregated school system. Apart from for the building of more secondary schools in the rural areas and the introduction of free primary education, life changed little for most rural dwellers. After political independence in 1980, life was back to the same impoverished schools, inadequate facilities, a contingent of largely unqualified teachers and social village forces of differential socialisation.

The abolition of racial discrimination in schools meant that both former European and African secondary schools adopted the same school curriculum from Cambridge University in Britain. The continued use of colonially written educational textbooks and curriculum materials in the secondary school sector, however, meant that there were changes in policy only, not reflected in practice. It was the same coloniser who continued to provide the curriculum, learning materials and evaluation tools with the same European colonial norms and values in a new Zimbabwe. Even teacher education, though expanded, could not be said to have adopted a new focus. The orientation of the

education system to new national goals was seen as unattainable in this situation (Chivore, 1996; Zvobgo, 1994).

The abolition of gender discrimination in all subject areas began soon after independence and gathered momentum through various national, non-governmental organizations and international legislations on gender. Differences continue to be seen, however, not only in rural and urban pupils' attendance at both primary and secondary school but also between boys' and girls' participation in technical subjects that have been largely gendered (Mannathoko, 1999). Not only have girls continued their domination of traditional fashion and fabrics and food and nutrition subjects in both the primary and secondary school sectors, but attempts to have them cross over and take former traditional male subjects like metal technology and design, wood technology and design, technical graphics and design and building technology and design have resulted in little success because the acute gendering of subjects continues to be a problem.

### **3.6 Pedagogy of Difference and Women in the Workforce**

Although there has been a growing awareness amongst women and within government that the issue of women's role in national development should be addressed, reality in the Zimbabwean employment sector seems to indicate otherwise. The Ministry of Health (1994) lists that from an estimated population of 12.5 million, women in Zimbabwe constitute 52 percent of the population but only 7 percent of the entire labour force in the non agricultural sector are women. This low representation is attributed to the colonial system of migrant labour that forced men to work in industries and mines leaving women to till land in the rural areas. Coupled with their low educational qualifications, very few women were, nor still are, able to venture into towns to look for employment. Of the 7 percent women in the labour force, the majority were mainly employed in the food, clothing and textiles industries although a few are in the furniture, electrical and other industries where they are classified as semi-skilled or unskilled. Made and Lagerstrom (1985) note that the fact that Zimbabwean women are concentrated in the food and clothing and textile industries is made significant because "...the skills that women bring into industry are extension of their traditional roles in the home, that is sewing, cooking and cleaning" (Made & Lagerstrom, 1985, p. 16)

Palmer and Birch (1992) argue that Zimbabwean women face many obstacles in order to participate in industry and take former male careers. The lack of appropriate education and training, social and cultural traditions, negative attitudes, and women's own lack of confidence have been blamed for impeding women's progress towards change. Several women interviewed by Made and Lagerstrom (1985) expressed interest

in training and engaging in higher paying, esteemed and respected professions like medicine, law, engineering and accounting, to name but a few. They have however, established that the selection of subjects at school continues to direct girls and boys to different routes in training and employment. Gwaunza and Nzira (1997) note that while males feel comfortable in technology, mathematics and science subjects, females feel secure in the arts subjects whose instrumental value rarely lead to esteemed professions. As a result of subject choices made at school, most females end up in the teaching and public sector clerical work.

Similarly, Palmer and Birch (1992) argue that cultural norms and a general lack of education keep Zimbabwean women in a shy and self-effacing position, which works to their detriment in industry. They note that as Zimbabwe is a strong patriarchal society, men's attitudes of superiority coupled with women's own negative self-image are significant in understanding women's lack of assertiveness in the workplace. This negative self-image they say, causes women to react to situations in a crippling and self-defeating manner. Palmer and Birch point that women in industry would rather retreat in fear or keep quiet when more assertive actions are needed to demand change. For example, many women suffer sexual harassment at work in silence for fear of losing their jobs through bad reports from male supervisors. As one female industrial worker stated:

...when a woman refuses the supervisor's advances, she stands little chance in the factory. The supervisor will either give a bad report to (male) management about you or will ill-treat you in the workplace (p. 8).

Made and Lagerstrom (1985) argue that, in many instances, while women perform all the menial tasks, when the time for promotions comes, it is usually men who receive recognition. Though government policy stands for equal pay for equal work, many women complain that reality in the workplace discriminates against women. Employers are also hesitant to invest in any form of training in women because they say women are more migratory at work than men, especially unmarried ones. Single women change employment stations and towns when they get married, a situation that is not typical for men. Women are also accused by employers of taking critical paid time off during maternity leave at the expense of their jobs. Women's lobby groups are working tirelessly to have conditions of working women more favourable and to implore the Zimbabwean government to train more women in trade and higher skilled professions to stop women from being seen as cheap and unskilled labour that is ripe for exploitation.

### 3.7 Summary

It was established in this chapter that Western constructs of gender role found a fertile ground of similar constructs in the Shona and Ndebele societies resulting in a greater premise for female subjugation. Both systems embrace the notion that a woman's given role is in the private sphere of home especially the kitchen. Throughout colonial and contemporary Zimbabwean society, discussion in this chapter has shown that differential socialisation of females and males legitimises the subordinate position of women and girls in the education system, in employment and in the society as a whole. Patriarchy, racism, and caste are apparent in the differential socialisation of different groups of people. Education whether formal or informal, is perceived as an ideological apparatus inculcating values of superiority to others and subordination to others.

The impact of racist colonial constructions on the colonised and especially the learning experiences of girls are quite significant. Very few of the pronouncements and Acts of parliament give any attention to the plight of the girl child's educational disadvantage. The Shona/Ndebele girl child is trebly disadvantaged as she suffers from a European education system that segregates against Africans first, a gendered curriculum and a deeply gendered cultural system that sees women as second-class citizens. Apart from the gendered subject policy where girls are confined to domestic science and home economics subjects, their parents also deny them an equal opportunity to education as that given to boys. The skewed dropout rates between girls and boys are also seen as indicative of the weight of forces girls experience and finally succumb to. Wamahiu (1996, p. 47) for example, contends that, "from a feminist perspective, the pedagogy of difference is discriminative, inequitable and therefore totally undesirable". In chapter four, I outline approaches, theories and models that have been used to explain student subject participation and achievement. Arguments presented are mainly from international literature as little research on gender and education has been carried out in Zimbabwe.

## CHAPTER FOUR

### LOCATING DIFFERENCE IN PERSPECTIVES USED TO STUDY GIRLS AND TECHNOLOGY

The need to understand reasons behind action and motive in order to account for behaviour is critical in this research. The term motivation is derived from the Greek word 'movere', which means, "to move" (Beck, 2004, p. 3). According to Beck (2004), motivation is a theoretical concept that is used to explain what moves people to engage in particular actions at particular times. For this research, what drives girls to make choices and from what context are these choices made? How free are girls to act as they choose and whether in making choice decisions, do girls do this solely on their own or are there externally exerted pressures? If girls act alone, what is the premise of their drive and if there is pressure applied to them, what is the nature of the force and what does it aim to achieve? Critical to my probing of motivation theory is the need to understand why most fourth form girls in selected Zimbabwean secondary schools prefer not to take design and technology subjects when others do, and why girls' seemingly perform poorly in the subject areas. This chapter explores some theoretical explanations of these questions.

According to Ma (2001), the issue of participation and achievement in mathematics, science, technology and engineering can be approached from three different perspectives: sociological, psychological and feminist. Though each of the perspectives has its own different theoretical emphasis, they are related to one another and interact to affect students' decisions on subject participation and achievement. The three perspectives are discussed in the following sections of this chapter.

#### 4.1 Sociological Perspectives

Sociological perspectives place great emphasis on theories of difference and identity and in particular, the effects of differential socialisation of females and males on educational participation and attainment. Hoffer (1997) and Teese (1989) argue that the environment provided for children during their formative years is critical in moulding useful experiences necessary for the educational attainment of children in their future lives. In this respect, the sociological perspective views socio-economic status (SES) as a crucial determining factor for the pursuit or termination of academic programmes by students. Hoffer sees more design and technology, science and mathematics dropouts coming from female students from disadvantaged socio-economic backgrounds.

### ***4.1.1 Theories of Difference***

The basic premise of difference theories is that physiological makeup determines gender and since males and females are created differently, they should occupy different positions in the continuum of life. Contemporary feminist theory is careful not to distinguish between sex and gender. While Millet (1977) and Oakley (1972) argue that sex differences may be natural, biological and anatomical differences between men and women, poststructuralist and postmodernist perspectives have questioned the social construction of both sex and gender. For example, Humm (1995) argues that like gender, sex has social meanings since it has become a tool for the subordination of women by men. Gender is described as relating to social and cultural attributes and behaviours, relative to time and place that are ascribed to females or to males. Humm further argues that gender emanates from power politics of difference as inequality, identity and subjectivity that structure every society.

In the school system, biological theories of difference have been used extensively in Zimbabwe to separate boys' activities from girls' activities. This has resulted in the separate pursuit by males and females of technical subjects including home economics, fashion and fabrics, agriculture, wood technology, metal technology, building technology and technical drawing and design. The same trend has been noticed in the sciences where mathematics, chemistry, physics and biology have been strongly gendered in their enrolments. In sports, separate competitions have existed for men and women while in textbooks, prominence is given to male activities. Alton-Lee and Praat (2000) argue that essentialism, sex role, identity, social construction and cultural production and reproduction theories offer explanations concerning difference. These terms are discussed in the next sections beginning with essentialism.

Essentialism embraces the notion that creation has endowed males and females with "essentially and immutably biological, genetic or hormonal differences" (Alton-Lee & Pratt, 2000, p. 41). These endowments are perceived to manifest themselves in physiological differences. As a result of the differences, the essentialist view posits that male and female education should be tailored differently in response to these immutable differences (Smith, 1996). The essentialist view took root and informed much of the second half of the nineteenth century. Early research on physiological differences between men and women by Le Bon (1903) claimed that the male brain was bigger in size to that of a woman. Arguments were put forward historically contending that women's emotionality, supposed lack of reason and inferior intellect were related to their smaller brain size. Le Bon drew conclusions that because men had bigger brains, therefore they had superior cognitive capabilities and higher intelligence than women. Arguments toward the turn of the last century include research on how female and male

brains have been structured differently (McGlone, 1980, Gray, 1981). This line of thinking has linked cognitive tasks to biological differences in brain symmetry with male brains being perceived to be more suited to spatial functions than female brains. Research by Smith (1996) on the structure of the brain has also been used to suggest that females have a physiological disposition to a facility for language skills and men a disposition for spatial ability. Supposed inferior spatial abilities in girls have been suggested as explaining the relative poor participation and achievement rates of girls in the physical sciences (Gray, 1981; Alton Lee and Praat, 2000). Thus, genetic and biological differences in genitalia have been seen as biologically shaping the destiny of boys and girls.

In New Zealand, O'Neill (2000) suggests that some biological, physiological and neurological theories were historically closely linked to a number of global, cultural and racial fears. According to O'Neill, people in power justified the domestic roles of women by saying that if women used their brains too much, it would result in a number of physical weaknesses, including the "shrinking of ovaries and the weakening of the reproductive system" (p. 88). This was perceived to decrease fertility resulting in women producing sickly and unhealthy babies. This biological deterministic belief saw as innate that women were naturally suited to a domestic role and that they should, in view of perceived roles, receive some preparation for them. Accordingly, the education that women received well into the 1930s and 1940s was based on such women's predispositions to physiological and biological traits. O'Neill further argues that the notion of naturalness of female domesticity was founded on the common belief in the past that "in a nuclear family, based on heterosexual marriage, the father was the breadwinner while the mother was the nurturer of the family and the children were primarily dependent on the mother" (p. 88). It is argued in this research that similar essentialist discourses have been used in the Zimbabwean context in separating the roles of males and females as was seen in the last chapter.

Research critical of essentialism argues that biological explanations offer inadequate explanations of observed behaviours. While there may be anatomical differences of genitalia and hormones, Giddens (1997) for example, points that scientific evidence has not been found linking biological dispositions to behaviour of females and males. Similarly, Gilbert and Gilbert (1998) also argue that biological claims of behavioural difference based on brain sizes are inconclusive owing to lack of medical research evidence linking concrete and measurable brain and hormonal differences to observable behaviour. They posit that the body, being an open system, is more liable to be influenced by external environmental forces than by biological attributions suggested by essentialist formulations. In support, Abbott and Wallace (1995) argue that the

expected behaviour of “boys and girls is both encouraged and reinforced by adults with whom they come into contact and the institutions of which they are members” (p. 10). I count myself to be in this group and offer that institutional role socialisation offers better explanations of observed behaviours than biological attributions.

In relation to brain spatial differences, the suggestion that inferior spatial skills may be genetic or biologically determined has been widely rejected because differences between sexes may not be found in all cultures and cannot be perceived as universal (Maccoby & Jacklin, 1981). Furthermore, research by Linn and Hyde (1989), found that sex differences in cognitive tasks were too small to warrant any significance. More research has revealed that spatial skills are more a product of the social environment rather than internal brain and hormonal differences (Solomon, 1997; Brickhouse, 1994). In terms of girls’ and boys’ differential uptake of technology, Harding (1991) and Linn and Hyde (1989) reject biological explanations and claim that the problem of girls’ lack of participation lies not with the girls but with the way science and technology is practiced and projected in society. Social explanations for the differential participation and achievement of both girls and boys in science and technology thus become implicated. Harding, for example, perceived that it is science and technology as well as society that need to change.

#### ***4.1.2 Social Learning or Sex Role Theory***

According to Davies (1989), biological theories explaining differential treatment of boys and girls are grounded in functionalism and explain the way children acquire discursive practices of their society and learn to position themselves as male or female. Within institutional socialisation theory, each individual or group has a particular role in society so as to maintain an integrative, cohesive social system as was seen in the Shona and Ndebele societies. The acquisition of traits of role is governed by social structures within society and these constitute important determinants of the patterns of relationships that individuals will form over the course of their lives. Within social structural boundaries, social interaction leads to social positions with attached behavioural expectations and meanings. As a person internalises role, she/he identifies with that role and are expected to behave within the confines of that identity taken. Lee (2002) points out that when internalised, roles tend to become a person’s identity through which they act within and across situations.

Research by Freud (1960), Lacan (1977), Grosz (1989) and Irigaray (1977) focussed on the unconscious level of identity and role internalisation which support the internal psychological desire of a child to identify with the same sex parent, complete

with the power structures they wield in society. On the conscious level, Lee (2002) and Carver, Yunger and Perry (2003) argue that the effects of home and schooling socialisation processes are quite significant on behaviour. The conscious and unconscious levels of social conditioning, according to Davies (1989), are related mainly to the set of values and behaviour norms that society imposes on individuals through the family, society, school and major information media including television, the internet, cinema, magazines and newspapers. Davies further argues that it is through this mediation that society imposes feminine and masculine stereotypes that govern social behaviour.

According to Connell (1987), sex-role theory offers a framework of social analysis allowing a simple and straightforward account of the insertion of people into social relations. Within functionalist sex-role theory as espoused by Parsons, Bales and Olds (1956), the system structures knowledge according to the role played by each individual or groups of individuals in the society. As each member of the society learns their role and internalises it, they grow personality traits beneficial to that society. Each role is played according to individual and societal needs but meeting standard expectations and criteria set by society. Hence, people within a similar role have to display and have similar traits for them to function cohesively (Connell, 1987). This position supports the existence of complementary behaviours and patterns necessary for the smooth functioning of the society giving it stability, the breakdown of which results in confusion and malfunctioning. Davies (1989) and Connell (1987) are, however, critical of the limitations of sex-role theory particularly in regard to its inadequate tools for understanding individual agency.

Following on essentialist notions of difference, male sex roles and female sex roles are viewed as distinct, biologically based and complementary with each being necessary for the maintenance of stability and social order (Parsons, 1984). Through this deterministic focus, the different social positions that males and females hold in both the private and public spheres are considered natural. In the Southern African perspective, Mannathoko (1999) argues that:

Women's primary location is seen to be in the private sphere and men in the public sphere. ...The socialisation of children is viewed as preparation for their adult roles and work in the spheres appropriate for their sex (p. 447).

Nyati-Ramahobo and Mmolai (1992) write that there is an overarching traditional view that domestic work and childcare are appropriate provinces for females in Southern Africa. The two contend that women's private sphere is composed of an endless round of tedious, unpaid and undervalued activities linked to child rearing, housework and support

for adult men. Nyati-Ramahobo and Mmolai (1992) argue that reality has shown that it is in the public sphere that true rewards of social and economic life are found. In post colonial Zimbabwe, many women have been unable to be absorbed in science, engineering and technology areas of employment because they did not take subjects leading to these fields at school and university, perceiving that they were male subject areas. Thus, by pushing women out of the public sphere of life, men disenfranchise women from getting better jobs, status, power and self-fulfillment. Edwards (1989) argues that the emphasis on holding different social positions as natural ignores the power relationships that sex role theory serves and upholds.

Perceived social 'misfits' or 'deviants' emerge when people do not conform or meet certain laid down criteria befitting their role. For example, in the Zimbabwean case, the female sex role is of concern when a woman is infertile, chooses not to marry, chooses not to have children, wants a career, is unhappy with her role as wife and mother and when she wants to engage in male related behaviours (Gwaunza & Nzira, 1997). For males, sex-role is considered problematic when boys and men are effeminate or homosexual or show an inclination towards femaleness and behaviours considered by society as feminine. On the other hand, if women adhere too strongly to toughness and aggression associated with males, female sex-role is considered problematic. Various societies react to such 'misfits' with constraining behaviour to make them behave with conformity. In the African context, persistent behaviour in this respect may result in the individual being culturally ostracised or banished (Wamahiu, 1996). In this respect, sex role theory has been used as a regulating instrument in the production, generation and upholding of African stereotypes that society considers natural and necessary for the smooth functioning of society.

Criticism of sex role theory came from feminists who wanted to expose the biological essentialism and unjust political, social and economic relations established through it. While Wamahiu (1996, p. 48) posits that sex-role "grants males and females their own spheres of activity and power" in the African context, Bennaars (1995) argues that this arrangement benefits males more than females. For example, Bennaars argue that sex-role keeps men in positions of political power, owning land and developing outdoor technologies to entrench themselves in positions of power and control over women. Furthermore, the sex-role perpetuates the belief that males should be leaders through assumed headship roles of father as shown in the last chapter.

Connell (1987) points to the sexual division of labour in most capitalist modes of production in his critique of sex-role theory. He argues that traditional sexual divisions of labour mask economic relations and politics of class that serve to keep those with power and resources in a perpetual maintenance of their hegemony. To Connell, this is part of

the dynamics of the politics of gender based on patriarchal relations of the father as the breadwinner and the mother as nurturer of the family. Because women in the Zimbabwean situation are unable to access high-paying jobs in science, engineering and technology for example, they find themselves in routine low-paying and low esteemed clerical and hospitality jobs with rewards that have kept them in a low position compared to men.

Much of sex-role theory's emphasis tends to ignore historical changes taking place as a result of liberal notions of human rights, which argue that public life generally, be opened up more to women. The static nature of sex role theory creates the impression that the consumer majority and disadvantaged groups are in consent with what is taking place. Connell (1983) argues that:

They create the impression that the conventional sex-role is the majority case, and that departures from it are socially marginal and likely to be a result of some eccentricity, produced by inappropriate socialisation (p. 52).

This, of course, raises questions regarding whose interest social reproduction theories serve in upholding this normative standard case. Other African feminists like Wamahiu (1996), Benaars (1995) and Njau (1992) argue that while there may be physical biological differences between men and women, gender difference should be realised as a socio-cultural construct which can be deconstructed in a way that make girls aware of their potential and allows them to realise their abilities to the full. The next section looks at the influence of social constructionist theory on behaviour.

### ***4.1.3 Social Constructionist or Gender Identity Theory***

Gender identity may be described as the extent to which an individual sees herself or himself as assimilated to various societal stereotypes for one's gender. Carver, Younger and Perry (2003, p. 95), perceive gender identity as the extent to which an individual has internalised societal pressures for gender conformity as well as "a collection of thoughts and feelings one has about one's gender category and one's membership in it".

According to Lee (2002), when internalised, gender roles become identities. Gender identity theory is closely related to role theory but differs in that gender identity theory's focus is not static as in essentialism and role theory. It raises hope for a changing life because a person's identity may shift with exposure to new environments, new forms of knowledge and desirable personal interactions. According to Carver, Younger and Perry (2003, p. 96), gender identity constructs "carry implications for adjustment beyond self-perceptions of specific sex-linked competencies". Lee (2002) posits that when a person's social structures change, corresponding changes in self are anticipated.

Gender identity theory has been used to assess ways in which students' "social relationships and experiences affect their involvement in science and technology" (Lee, 2002, p. 349). For example, if new friends are less supportive of one's push to engage in a certain activity, this may lead the person to engage in other different activities leading to a shift in identity when she/he discovers personal talent in them. In whichever way it is used, the theory begins with a perception that patterns of relationships that a person forms throughout her/his life are a reflection of social shaping structures in that person's life (Stryker & Burke, 2000). The structures or socialisers as Eccles, Adler, Futterman, Goff, Kaczala, Meece and Midgley (1983) call them, are social agents shaping and moderating behaviours, expectations and values.

Practically, and following identity theory, a student whose many friends, parents and relatives expect her to pursue a career in fitting and turning is more likely sign up to study such subjects as metal technology and design and technical graphics and design than a student who may have only one person supporting such career intentions. Lee (2002) posits that when more and more people in our socialisation networks push for conformity to specified role, there will be a greater adherence to the role's identity. On the other hand, a student whose peers resent a certain subject area may motivate a negative attitude towards the subject in the student than a student whose sole friend encourages her to pursue a certain subject. Lee points that, "emotionally satisfying relationships centred on science, mathematics and engineering (SME) activities and discussions positively shape students' likelihood of thinking themselves in SME terms and of engaging in SME activities" (p. 349).

Social constructionist theory or gender identity theory appeals more to feminists owing to its shifting ground with new involvement in new relationships. This renders the theory constructionist and current with possibilities for shaping new identities and new ways of thinking. The learner is perceived as an active contributor to knowledge even as the environment impacts knowledge and cultural symbols of the society on her/him. It raises more hope for change than fixed determinations of essentialism and sex-role theory where no opportunity for change is perceived. Lee (2002, p. 353) posits that if the identity model is supported, educators should look to the impact of newer relationships on self-concepts to find some of the answers to why so many students drop out of science and technology studies. However, social constructionist theories have been criticised for negating gendered power relations within society that leave women in subordinate positions (Lee, 2002). The next section considers power relations and looks at cultural politics of production and reproduction and their social shaping of behaviour.

#### ***4.1.4 Cultural Production and Reproduction Theories***

Giroux (2000, p. 83) argues that school is the ideal time to “influence attitudes and build long-term loyalties”. Educational institutions in this respect are implicated in the processes of cultural and social production and reproduction of the dominant groups’ desired values and norms. For critical feminist educational theorists, the school curriculum reflects dominant group interests meant to be reproduced in the learner to perpetuate their dominance. According to Bowles and Gintis (1976) reproduction theory’s emphasis is on the production of class structure, while cultural production theory is concerned with mutations of class, knowledge and power relations. Both theories embrace the notion that student learning is shaped by their class position in society as well as experiences derived from their learning environment. Weiler (2000) supports this notion arguing that,

Students are shaped by their experiences in schools to internalise or accept a subjectivity and a class position that leads to the reproduction of existing power relations and social and economic structure (p. 6).

I will explore cultural reproduction and ideological reproduction in the following sections beginning with understandings of culture and the role that hegemony plays in cultural production and reproduction.

*(i) The meaning of culture.* The term culture has been widely used, and its meaning has often become blurred. Gramsci (1971) perceived culture as a field of competing interests in which the dominant and subordinate groups make sense of their circumstances and live within hierarchies of power and possibility. Applebaum and Chambliss (1997) see culture as the lens through which members of a particular group view the world. Other writers like Smith (2000), Kornblum (2000) and Bryman (2001) have referred to culture as shared understandings of symbols, myths, rituals, language, history, values and customs that are handed down from one generation to the next by means of communicative interaction such as speech, gestures, writing, buildings, and other communication among humans - rather than by genetic transmission or heredity.

Culture, according to Giroux (2000, p. 126), is “the shared and lived principles of life, characteristic of different groups and classes as these emerge within unequal relations of power and struggle”. Usually the socially and economically powerful control ideological and material resources, which they want transmitted to the popular culture by hidden and usually silent imposition of the media, education and the arts. Each generation following is taught to conform to patterns of the dominant group’s own culture with deviant behavior being severely reprimanded or punished (Kornblum, 2000).

I adopt Gramsci definitions for the purpose of this study as it focuses on difference as it affects power relations in the Zimbabwean society.

Questions of culture have become central to understanding how politics and power reorganise the political and economic forces that affect and regulate everyday life. Giroux (2000) posits that recognising the political value of defining culture as both a site of struggle and a sphere of education becomes central to political change. According to Giroux, culture's role is that of "an educational force for social and economic reproduction", working in such spheres or institutions such as the society, family, education, religion and the arts (p. 112). At home, culture is transmitted by children learning the everyday society-wide discourses, practices and values from older members in the family and society. In the school, culture is transmitted through the overt and hidden curriculum so as to legitimate the cultural capital of dominant groups while marginalising the views of subordinate ones. As a force for resistance, it is related to power, education and agency and is then a terrain of contest and struggle. Culture, thus, shapes the everyday lives of people and constitutes a defining principle for understanding how struggle over meaning, identity, social practice and institutional machinery of power can be waged (Entwistle, 1996).

While culture enables the dominant group to impose, direct and compel, it also constrains the subordinate group forcing them to internalise dominant group beliefs and values and to act within the confines of the impositions (Bryman, 2001). It represents a social order in that it exerts pressure on the individuals to conform to the requirements of the organisation. Apart from its social shaping, culture is subject to continuous transformation. Bryman (ibid) agrees that culture can be taken as societal habits and practices under construction and reconstruction. He notes that people create culture continuously in the same way they are shaped by it. Hair and dress fashions are seen as cultures continuously in the process of shaping, as are music and sexual habits. The next section looks at ways in which educational provision in capitalist societies works to retain structural divisions in society, which are useful to capitalism.

(ii) *Hegemony*. Gramsci (1971, p. 12) posits that hegemony has its meaning in organising the consent of subordinate groups to participate in "the general direction imposed on social life by the dominant group" in such a way that participants do so without protest. This consent given by the subordinate groups may not be actively organised in an open way, but masked by cultural beliefs and developed out of experiences by individuals as they interact with the environment consciously or unconsciously. Gramsci (1971, p. 12) accuses the structure of education, curriculum content, teachers and classroom discourses of hegemonic influences and uses the term

“common sense” to describe the silent enculturation into a system of values, beliefs and attitudes which eventually perpetuate the existence of virtues of patriarchy.

Apple (1996) views education as never neutral but deeply implicated in the politics of culture. He contends that education is always part of someone’s tradition, selection, vision and knowledge. Apple further argues that the idea or “decision to define some groups’ knowledge as the most legitimate, as official knowledge, while other groups’ knowledge hardly sees the light of day” says a lot about who has power in society (p. 22). As consent is not openly forced but culturally sanctioned, the dominant group’s intentions are usually hidden, masking efforts to exercise dominance. Feminists have argued that what has been considered as knowledge in the school system has always been male hegemonic education and male ways of knowing. This, they say, has potentially disabled females from realising their full potential as equal citizens in many societies as they have been silently directed, compelled and required to follow men’s ways of knowing.

The hegemonic curriculum, according to Connell (1987), involves the upholding of certain values by men, which women consent to unquestioningly. According to Connell, the issue of subjects for males and subjects for females masked in biological determinism appears plausible and reasonable only to the extent that it serves male interests. To Connell, it is only when women awaken to realities of bleak future employment prospects for them that they realise the shallowness in choosing to do only traditional female subjects as wide job opportunities are usually found in traditional male areas. Usually females will not be able to access these jobs without a sound grounding in traditional male subjects they may not have taken at school. In the next section, I analyse the work of the French philosopher Bourdieu concerning the school curriculum as cultural reproduction.

*(iii) Bourdieu and the curriculum as cultural reproduction.* Work by French philosopher Bourdieu (1974, 1977) has been critical in analysing the home and the school as strategic sites for reproducing existing power relations subtly through the “reproduction, distribution and validation of dominant culture” and “invalidating and disconfirming” other, divergent cultures (Hill, 2001, p. 110). Though the family and the school are generally viewed as neutral sites, Bourdieu sees them as symbolising ideological and repressive state apparatus functioning to promote grossly unequal products of society. This view is shared by Hill (2001), who argues that the issue of a national curriculum is a political decision whose origin rests with the ruling class culture.

In his theory of practice, Bourdieu (1977) sees the education system as far from being meritocratic when looked at from the position of culture and cultural capital. His extensive work on the relationship between education and cultural formations has revealed mechanisms that aim to maintain and legitimate a class divided society. He argues that in a capitalist society, the education of the students is tailored for them to fit into the stratified labour groupings according to their social orientation and class positions in society. His view of class stratification begins with the school as a middle-class run institution producing and transmitting forms of knowledge meant specifically for middle class children. Through the institution of school, concepts such as culture and cultural capital become divisive mechanisms assigning students various positions in a class-structured society.

Bourdieu (1974, 1977) argues that cultural capital may be expressed in forms of dominant group knowledge. Such knowledge may comprise historical facts and concepts, forms of literacy, music, art, geography or what has been referred to as “knowing that” (Hill, 2001, p. 103). Dominant group knowledge may also be expressed in “knowing how” which includes knowledge of the system’s practices, associating with the dominant group, speaking like them, behaving within the group, thinking and dressing like them in order to blend without raising questions. This knowledge or cultural capital becomes habitus or dispositions that influence a person’s actions. Bourdieu (1984) contends that cultural capital helps holders to be ahead of others as they will be in the know.

Mickelson (2003) sees cultural capital as developing from growing up experiences as one tries to fit into the social structure of life. Mickelson argues that,

By internalising one’s place in the social structure, a person comes to appreciate which adult statuses and ambitions are possible to reach and which ones are improbable. This perspective implies that men’s and women’s social actions take place in differently gendered fields (p. 374).

Bourdieu calls the setting in which the social action takes place “field”, and only people who would have grown in the field and been educated in the system and culture of the dominant group possess the special knowledge called cultural capital. However, the school system, according to Giroux (1983), presupposes that all people are familiar with dominant group linguistic and social practices to the extent of planning the same curriculum and setting the same examinations. Bourdieu calls this the arbitrariness of the school curriculum for the reason that it compels others or assumes them to be the same as the dominant culture group.

For Bourdieu, mechanisms of cultural reproduction within schools work through the formal curriculum with its assessment methods, the hidden curriculum and through a

form of educational apartheid of low, middle and upper class schools. Bourdieu argues that the formal school curriculum and its examination system, though appearing class-blind, neutral and fair, are only advantageous to the middle and upper class students whose cultural knowledge is taught and examined. Because everyone is taught this same curriculum and the same examinations are sat by every child in the school at the end of the course, it appears like it is everyone's knowledge and thus, fair competition. The very fact that lower class students are allowed in the school system and learn the same curriculum knowledge, tends to give justification that the results of the competition, that is examinations, are meritocratic. For this study, the school may assume that boys and girls hold the same design and technology background knowledge when examinations are set in traditional male subjects like metal design and technology. Bourdieu (1977) and Sullivan (2001) argue that far from this being true, knowledge is culture, and the same culture is not the possession of all students. Forms of subtle exclusion are at play for those whose cultural background, class position and knowledge systems are not represented. Students of the lower class who succeed in such examinations may only serve to validate claims that the schooling system is fair to all. As Hill (2001) put it:

Examinations and the curriculum clearly privilege and validate particular types of 'cultural capital', the type of elite knowledge that appears the natural possession of middle and in particular, upper-class children, but which is not 'natural' or familiar to non-elite children school students (p. 101).

Students lacking cultural forms of knowledge, which may be traced to the ethnic group or the individual's home, are often labelled deficient of dominant group values. According to Hill (2001), these students may be unable to fully integrate and achieve in the system. To integrate and achieve, the culturally deprived group or individual has to learn the dominant group values to the extent of usually forsaking their own. In the Zimbabwean case, there are rural council schools, government group B, urban government group A and private schools. Private schools are the well resourced elite schools accessed by the wealthy upper class of society. Government group A schools are former urban all European low-density middle class schools in former all European residential areas. Government group B are poor former all African urban high density township schools in an all African residential area while rural schools are district council operated schools in areas of extreme poverty and lack of resources. Without similar resources as private and government group A schools, poor rural students are expected to sit the same examinations. Bourdieu (1977) believes that such forms of educational apartheid structures society into classed subjects within the same country, educational system, curriculum and examination system. This stratification, it may be argued, sees

women's standing in a further subordinate position to that of men in various modes of production. If, for example, African boys do not succeed in a European design and technology male curriculum, in a private school with European cultural ethos, what could be expected of poor African girls in the rural area?

(iv) *Althusser and schooling as ideological reproduction.* Althusser (1971) analysed the institutional role of education as part of a conceived reproduction of class power. He contends that the school system is not neutral but an agency for cultural, ideological and economic reproduction embodying the dominant culture. Althusser argues that people in power, usually male middle to upper class in a capitalist society, maintain their stranglehold on power by manipulating schooling in order for it to reproduce in its subjects, male middle to upper class capitalism's desired economic, cultural and ideological system of values. Important in Althusser's analysis of the school as ideological reproduction is the differentiation of Repressive State Apparatus (RSA) from Ideological State Apparatus (ISA). To Althusser, RSAs and ISAs are manipulative and cohesive tools that are at the disposal of the dominant cultural group for the uncontested consent of the masses. These are apparatus that "sustain capitalism and capitalists" and are used on behalf of this elite ruling class to "maintain the existing economic and social relations of production" (Hill, 2001, p. 106).

While the police and the army may be used as direct cohesive force or Repressive State Apparatus (RSA) to discipline and control dissent through partisanship or ideologies of patriotism, subtle ways such as the family, schooling and education, religion and the media have been preferred by those in power as they are perceived to give more uncontested consent. Cultural forms in these institutions are usually considered 'natural' and of a common sense nature, hence they appeal more and are taken unquestioningly by the ruled. Hill (2001) argues that the task of ISAs is to battle for and to secure the widespread (hegemonic) acceptability of the ideas of the ruling capitalist class. The Education Ideological State Apparatus (ISA) is considered by the dominant group as the most sophisticated and modern way of earning hegemonic consent above the family system and the church which were critical apparatus in early capitalist forms of production.

Althusser (1971) argues that what is learnt at school as rules, behaviour and values is far from being neutral, but allocates class positions to learners from different family and ethnic classes. For example, children from the middle and upper class families learn the familiar cultural knowledge of their class while the lower class children struggle to learn the middle and upper class knowledge of the school system. According to Althusser, the result is usually success for the ruling class children and failure or

dropout for the low class children who may feel alienated from the system whose values are foreign to them. The failing of the lower class children perpetuates a constant supply of cheap labour to the capitalist modes of production. On the other hand, the almost guaranteed success of the ruling class children in the school, maintains a constant supply of future rulers to the capitalist system.

Althusser argues that all forms of State Apparatus whether repressive or ideological have built-in overt and covert ways of control and punishment. For example, Hill (2001) argues that non-promotion, transfers, suspensions, exclusion, dismissals and being out of favour may be forms of control and punishment to hone in on dissent or negative voices. Recent events in Zimbabwe (February, 2004) when heads of schools were suspended for raising school fees without government consent are examples to note. Channelling of students into subjects for males and for females has also worked to keep girls out of technology areas. Althusser concludes that the school and the church are systems to mould individuals into the straight jacket of ruling class culture though hidden as a form of enlightenment. Both the school and the church have knowledge forms and structures whose values pertain to a certain group of people, usually ruling class, to which other groups of people should fit in and abide with.

Critics, for example Giroux (2000), have castigated reproduction theories for their inability to counter hegemonic tendencies and offer hope and change through methods such as collective agency, resistance and emancipation. According to Giroux (2000), the unquestioning of conditions under which knowledge is produced and how subject positions are put in place, negotiated, taken up and refused raises questions of the theories' instrumental value. To Giroux, reproduction theories' lack of provision for alternative ways, meaning and possibilities through which people might imagine and define themselves as social actors and discover their own political agency, is seen as resignation to forces of influence without hope of retribution.

The focus of Bourdieu on cultural reproduction and Althusser on ideological reproduction as sharing similar vision to reproduce dominant class culture has been criticised as grand theorising by Gewirtz and Cribb (2003) who argue that Althusser and Bourdieu,

...overemphasised the idea of domination in their analyses and ... failed to provide any major insights into how teachers, students, and other human agency come together within specific historical and social contexts in order to both make and reproduce conditions of their existence (p. 259).

Gewirtz and Cribb further argue that grand theorising tends to bury local explanations of difference and related complexity with it and they have called for a reproduction theory

that encompasses “context sensitivity, agency and multiple hierarchies”. In the same mould, Giroux (1983) and Freire (1972) have argued for cultural production theories that offer improving human conditions from exploitative and oppressive ones at the same time offering possibilities for change through individual empowerment and social transformation. The two also argue that it is not only from the view of subjectivity and difference that social differences can be examined but rather, the struggles by the working class to dislodge domination and inequality and carve their own identities. Through the process of conscientisation, Freire (1972) aims to develop critical consciousness in his students to counter hegemonic tendencies and practices by dominant groups. He contends that it is through exposure to reality that subordinate groups become aware of what weighs them down and aim to break out of the culture of silence in which they acquiesce, to achieve emancipation. Freire rejects the banking concept in education where students are assumed to be empty vessels waiting for knowledge to be poured into them. Rather, he proposes constructive engagement by students through active participation and negotiation in constructing knowledge they learn in schools so that they become co-owners of the knowledge rather than mere recipients.

In this section, analyses from Bourdieu (1977) and Althusser (1971) were used to highlight the school as a critical site for cultural and ideological reproduction. With particular reference to design and technology, the subject knowledge and culture may be far from being neutral as this has, in the past, been male specific knowledge. Girls taking design and technology subjects in Zimbabwe may be experiencing such alienation to the subject knowledge to the extent of lacking motivation to take it. In terms of subject participation, Bourdieu’s (1977) cultural reproduction theory may be supported in that those students with subject background experiences may feel more motivated to pursue the subject to higher levels of learning and feel a sense of belonging compared to those learning a new subject and knowledge all together. Similarly, in terms of achievement, those students possessing the right cultural capital may be at an advantage compared to those who may be beginning the subject. Althusser (1971) on the other hand sees every system as having a hidden agenda and participation in it as being assimilated into its workings and culture at the expense of one’s own.

## **4.2 Psychological Perspectives**

Psychological perspectives derive from Bandura’s (1977) social cognitive theory suggesting that an individual’s internal belief system is a powerful indicator of her/his course of action. Pajares (1996) shares this view and claims that the individual’s internal belief system can be a more powerful tool for pursuit or termination of a task than a person’s knowledge, skills or prior attainment. Researchers employing the psychological

perspective, for example Eccles, Goff, Kaczala, Meece and Midgley (1983); Weiner (1985); Woolnough (1995) and Ma (2001), have proffered possible explanation of student related differences in subject choice to external environmental influences impacting on the student's internal belief system. They argue that the effects of the external stimuli on the individual result in internal decisions being reached by the person culminating in the rejection or adoption of a stance. The stance taken leads to the continuation or termination of the task, and achievement or under-achievement in the task. Eccles et al. (1983) further argue that past positive events in a task tend to be instrumental in the formulation of the individual's self-concept of ability which increases confidence, and repeated frustration in learning a task creates and strengthens a perception of learned helplessness that results in students dropping out of subjects or tasks. When students drop out of a task, Blum-Anderson (1992) declares that it is a self-recoiling process, usually exhibiting anxiety and adopted to avoid further unpleasant experiences.

#### ***4.2.1 Participation and Achievement Models***

Early psychological models explaining student participation and achievement-related choices, for example psychological hedonism, Heider's (1958) causal structure theory, Atkinson's (1964) expectancy-value theory, McClelland's (1985) need for achievement theory and Weiner's (1985) attributional theory of achievement motivation and emotion are premised on factors attributable to the individual and the external world of the person. Key to these factors is the pleasure principle positing that a student may, "approach goals, or engage in activities that are expected to have desired outcomes, and avoid events that are expected to have unpleasant or aversive outcomes" (Beck, 2004, p. 3). In other words, a positive happening in a person's life is expected to lead to greater engagement and achievement in that activity in the future. As Beck (2004) put it:

Thus, a person who has found test taking to be a rewarding experience is more likely to try hard on tests in the future. Conversely, if a person were punished for failing, a fear of failure could develop, and there would be a motive to avoid failure (p. 323).

This input/output and output/input model works on the strength that human behaviour can be understood and predicted with its causes and effects. Further to the cause and effect stance, the early theories, especially Atkinson's, proposed that individuals engage in achievement-oriented activities they currently value most and in which they have the greatest probability for success. In other words, if girls believe, based on current information they hold, that technology is less valuable to their perceived

future career aspirations and have less chances of succeeding in it than in History, they may consider not taking it and do the subject they consider valuable and have the greatest chances of succeeding in. According to Atkinson's (1964) and Weiner's (1985) quantitative studies, students tend to raise their probability of success with each success in an activity and failure tends to lower the student's aspirations to continue engaging in the same activity. Weiner (1985) believes that ability, effort, task difficulty and luck can be classified into three causal dimensions: locus of control, stability and controllability are critical elements of subject engagement.

All the early models mentioned have been criticised for taking behaviour as something that can be reduced to a deterministic cause and effect occurrence negating that there could be more than what we perceive as causes of the behaviour. Beck (2004) posits that not enough is understood about human behaviour to clearly map out causes and effects of events. Secondly, the overemphasis on motivation for success and fear of failure as critical determinants of participation and achievement in an activity tended to overshadow other possible attributions, thus rendering early theory rather inadequate. Researchers like Eccles et al. (1983), Woolnough (1994), Young, Fraser and Woolnough (1997) and Ma (2001) have gone on to expose other influential variables like affective factors, school contextual factors and demographic factors as affecting achievement-related decisions.

Thirdly, many of these studies' reliance on quantitative methods entailing figures and formulae tend to play down the importance of subjective narrations from those affected. Fourthly, students' choices may not be made individually as they are members of family units functioning in specific social, cultural and economic milieu. In a systems research approach, girls' experiences are a result of decisions made according to an interplay with those around them, such as peers, teachers, parents, relatives and the interaction of the family in the wider local, national and international arena.

Fifthly, background characteristics of individuals also differ to the extent that what is normal in one situation is considered abnormal in another, and what may be pleasant to someone, may be unpleasant to another. For example, in Samoa, women have resisted seeing their societal power relations with their husbands and men in terms of equality with them believing instead that gender relations in Samoa are founded on separate domains of power and the philosophy of complementarity, that is, complementing and not competing with their husbands and men in society. The implication of this finding is that complementarity as seen by Samoan women is equivalent to equality as opposed to Western feminist thinking of difference as inequality (Fairbairn-Dunlop, 1991).

Sixthly, many early experiments carried male biases as a result of leaving out women or assuming that women were included under men (Beck, 2004, p. 331). Seventhly, motivational behaviour may not always be interpreted as outcomes directed as in Weiner's model but as goal directed. Therefore, to emphasise that a student's perceived ending of an activity regulates subsequent behaviour may not hold true in all situations. Lastly, the early models tend to combine learners as if they are a homogeneous group with the same background, needs and aspirations, negating the fact that there are individual and group differences with unique experiences.

Two well-researched and developed psychological models have been chosen for detailed discussions in the next sections because of their direct relevance to this study. These are Woolnough's (1994) students' choice of science and engineering model and Eccles, Goff, Kaczala, Meece and Midgley (1983) expectancy-value theory of achievement motivation and occupational choice.

#### ***4.2.2 Woolnough's Students' Choice of Science and Engineering Model***

In formulating the students' choice of science and engineering model, Woolnough (1994) investigated 1180 eighteen-year old students who had completed their GCSE ordinary level examinations (year 11), had chosen specialist subjects they were pursuing at GCSE advanced level (year 13) and were planning to pursue careers in line with their advanced level subject choices at tertiary level. The investigation was driven by four hypotheses assumed to influence students' choices of science and engineering subjects: the student's ability and personality; the experiences the student had out of school; the experiences the student had in school; and, the value that society placed on science and engineering (see figure 4.1).

Woolnough's investigation sought to unravel the "relative significance of these different factors for different students" by largely quantitative methods (Woolnough, 1994, p. 661). The study found that no single factor could be generalised as being responsible for students' decisions to choose career paths as "different students were persuaded by quite different factors" (Woolnough, 1994, p. 672). He further argues that individual students are different and react differently to the same stimulus. The model of Students' Choice of Science and Engineering identified four influential factors each with its own sub-factors. The four influential factors affecting student choices of science and engineering are presented and discussed in detail in the following sections.

(i) ***Societal needs and demands.*** Woolnough assumes in the model that societal needs and demands act as pull factors drawing on students' group developmental paths. Students' career decisions are thus affected by school, external and personal factors and

are aimed at satisfying societal needs and demands. Woolnough argues that society attaches esteem and prestige values on some careers and this tends to attract students wishing for higher social class attainment. Future career status, salary and job satisfaction were also found to have a positive effect on students.

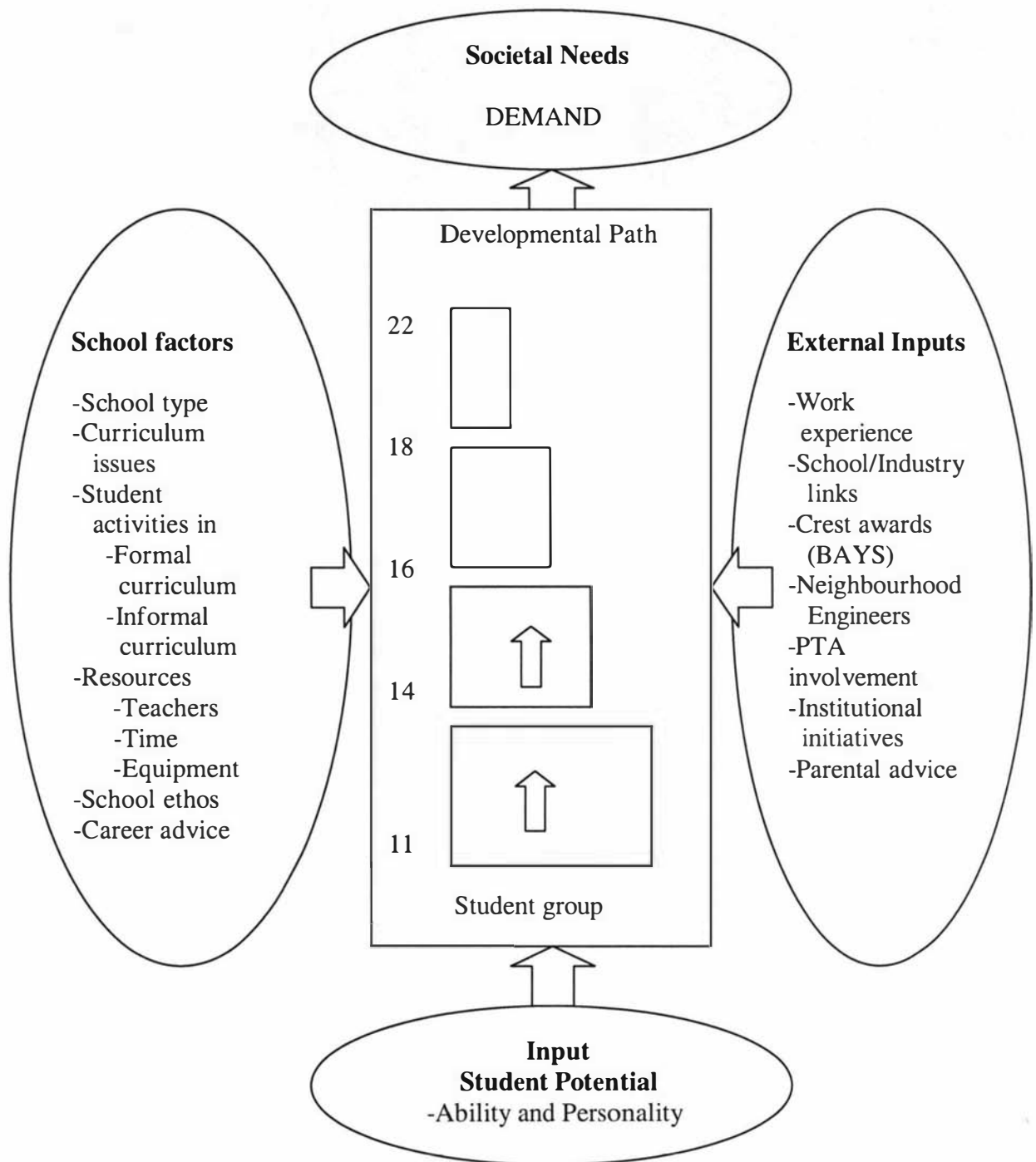


Figure 4.1. Model of Student Choice of Science and Engineering (Woolnough, 1994, p. 660)

(ii) *Student potential input and personality traits.* The study revealed that many of the potential scientists and potential non-scientists made their decisions to take a science career either before the age of 16 or just after GCSE ordinary level (year 11).

According to Woolnough (1994, p. 664), influence to take or not to take science and engineering subjects rests in part with the student's perceived ability in the subject. For example, the study revealed that students who chose to follow science and engineering subjects and careers, had higher ability in the sciences than those who chose to do the arts subjects. Ability was determined by the student's best seven subjects at GCSE ordinary level (year 11) and best three science subjects at GCSE advanced level (year 13). Non-scientists were found to avoid sciences and engineering owing to the perceived difficulty of the subjects and the amount of work involved. Students in this group preferred subjects demanding explanations as opposed to calculations.

Within the general student group, females showed greater preference for human relational and communicative matters while males showed an inclination towards scientific hobbies, sophisticated military technology and general "fiddling with gadgets at home" (Woolnough, 1994, p. 669). This tended to give males greater science mastery experience than females who found it hard to compete against boys at school. Woolnough further argues that females "saw themselves as communicating better with words rather than diagrams and graphics preferred by males" (p. 672). Generally, potential scientists regarded themselves as task and idea oriented, convergent thinkers and more graphical than potential non-scientists.

*(iii) School factors.* The effect of the teacher and the nature of the curriculum featured prominently among other factors identified by Woolnough (1994). Potential future scientists placed greater value on quality of science teaching and teacher encouragement as critical determinants for continued pursuit of science subjects and careers by students. Results also indicated that consistently good results in a subject area tended to influence more students to take the subject anticipating further success. In view of this, it was perceived as critical for school departments to set positive and credible precedents worthy of being emulated by future generations. Departments where students had a reputation for failing tended to have fewer and low academic students enrolling with them.

According to Woolnough (1994), potential scientists and non-scientists differed significantly in terms of preferred teaching and learning styles. Potential scientists valued more unstructured, task and student-centred, factual and experimental investigations compared to non-scientists who preferred teacher directed and structured work plans. Generally future scientists showed greater preference for "high quality stimulating subject teaching in class" (p. 675). Other factors that featured as influencing career decisions were the human intellectually stimulating nature of the subject, students' interests in practical work rather than purely theory lessons and extra-curricular club

activities like science. Woolnough however, found that school type such as private or government, did not affect student decisions concerning science and engineering.

(iv) *External inputs.* External factors such as subject background experience, growing up in a science and engineering rich environment, seeing significant role models in the areas of science and engineering, close advice from parents as well as significant relatives and scholarly inducements like company sponsored awards in certain subject areas were all found to have significant effects on students' choice of science and engineering. The lack of background experience affected non-potential scientists' interest in the sciences. Results showed that students who engaged in science hobbies and experimented with some home gadgets were likely to take science and engineering at school and as careers. In the Zimbabwean case, a student who practices metal welding at home would be most likely to find metal technology appealing than someone who would meet the subject for the first time at school. Similarly, students who grow up in a heavy industrial or mining environment where certain professions are valued for their prestige and remunerations are likely to be attracted to these professions.

Career aspirations were also found to influence a number of potential scientists to pursue science careers, especially those who wished to be engineers and chemists. Potential engineers in particular, were enticed to do engineering by the ease of entry to the course of study and the possibility of course sponsorship by engineering companies who would employ them upon completion of their study programme.

Criticism of Woolnough came from people dissatisfied with his disregard of school and tertiary sectors of learning, science and technology as being "patterned by male scientific ethos" (Fuch et al., 2001, p. 184). From a gender perspective, the central issue not addressed by Woolnough is how technology, science and engineering have become defined as exclusively male leading to a seemingly 'natural' association between masculinity and technical competence and femininity and technical incompetence (Gill & Grint, 1995). The model ignores the underlying factors attributing science and engineering as mainly 'male subjects and careers' which in turn may influence subject and career choices. Similarly, the treatment of boys as the norm and given in science, engineering and technology requires women to fit into such an environment and its embedded masculinity goes unchallenged (Gill & Grint, *ibid*).

It would be argued from the model's arrows (figure 4.1, p. 61) that three factors, namely school, external and student factors influence student group developmental paths towards fulfilling societal needs and demands. The arrows seem to indicate that all factors move towards satisfying societal needs and demands. This may be constrained in focus, as students may be motivated to engage in science and engineering by the lure of a

personally fulfilling career. On the other hand, it would be naive to assume that the state of society does not influence students' science and engineering choice decisions positively or negatively. This may be true considering that a country on a warpath to develop its economy like Zimbabwe may require more engineers. Society's perceived subject importance and career value may filter through to students and parents as an area with the greatest opportunity for training and employment.

Contrary to Woolnough's finding that school type showed no significant effect on student choice of science and engineering in his study, Ainley (1993) in Australia found school type as a significant determinant of subject choice. For example, the difference between an elite private school and a poor rural school may be seen in resources and curriculum quality and breath, both of which favour the elite private school. Student subject results may reflect the disparities in resources and curriculum quality and breath.

Male and female comparisons used by Woolnough (1994) in his research tend to pit girls against boys in a somewhat competitive way resulting in the loss of focus concerning females' stand alone achievements, ways of knowing and preferences. Male to female comparisons in this case, also tend to place males as the norm to which women must strive to match. Studying women without comparing them to men as in this study legitimizes their positive contributions and values them as independent actors. The question to be asked is why women make the choices they do as opposed to why they are not like men in the choices they make (Eccles, 1994).

### ***4.2.3 Eccles' Expectancy-Value Model of Achievement Motivation and Occupational Choice***

Eccles, Goff, Kaczala, Meece and Midgley (1983) expectancy-value theory of achievement motivation and occupational choice was developed to examine and understand the variables associated with women's subjectivities related to their underrepresentation and underachievement in mathematics as well as those subjectivities leading to women making gender-stereotypic choices. The model (figure 4.2) is driven by a motivation theory background and specifically "describes the variables that influence a person's expectation to succeed and the subjective value (expectancy-value) of a domain" (Oswald & Harvey, 2003, p. 133).

The major argument underpinning the theory is that "individuals' choice, persistence, and performance can be explained by their beliefs about how well they will do on the activity and the extent to which they value the activity" (Wigfield & Eccles, 2000, p. 68). In other words, if women do not expect to succeed in a certain subject area and place little value on the subject, then they are not expected to venture into the subject

area, persist on subject tasks, have vigor in carrying out the tasks and even perform well in them (Wigfield & Eccles, 2000). Since its proposal, Eccles et al.'s (1983) expectancy-value model of achievement and choice has been studied and applied successfully in the mathematics, reading and sport achievement domains. Expectancies and values in the model are assumed to directly influence achievement-related choices as well as performance, effort and persistence.

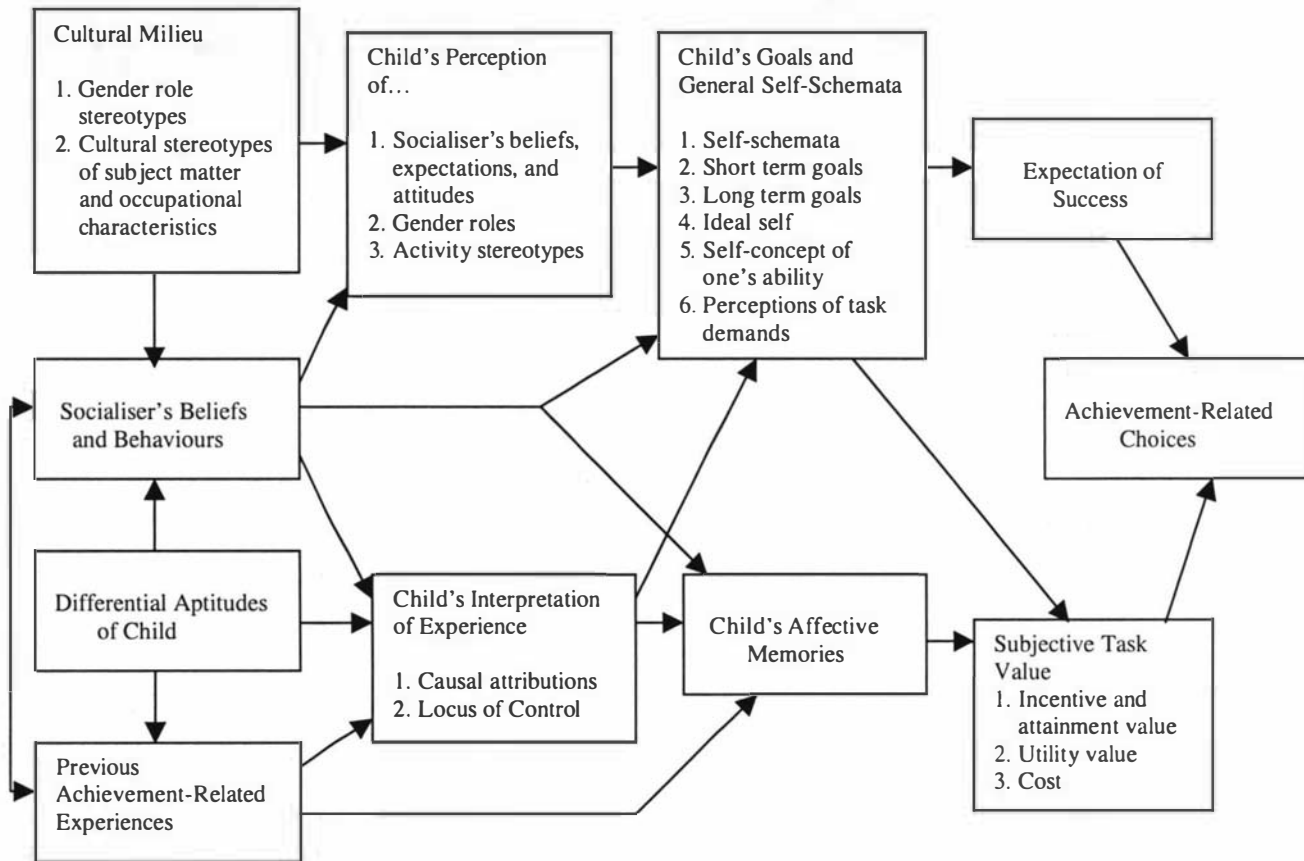


Figure 4.2. Expectancy-value model of achievement motivation and occupational choice (Eccles, Goff, Kaczala, Meece & Midgley, 1983, pp. 76-146)

Both expectation of success and subjective task value are believed to be influenced by the child's perceived interpretation of self or self-schema such as self-perception of ability, affective habits, short and long-term goals, and perceived task or domain difficulty or easiness (Wigfield & Eccles, 2000, p. 69). These in turn would have been influenced by cultural beliefs shaping both socialiser's beliefs and behaviours such as those of parents, peers, counsellors and teachers and as well as the child's identity and interpretation of role.

The model assumes that the cultural milieu is critical for the child's interpretation of her or his identity and perception of the world around her/him from lived experiences. It assumes that the child's socialisation behaviourally and cognitively, is culturally specific with its embedded stereotypes. In terms of cultural stereotypes, Eccles (1994)

argues that by the age of five, children have clearly defined gender role stereotypes regarding appropriate behaviours and traits. Such stereotypes continue to be reinforced by the socialiser's beliefs to the extent that the child begins to monitor her/his behaviour and aspirations in terms of these stereotypes. Eccles (1994) argues that:

...assimilation of the culturally defined gender roles can have such a powerful effect on one's view of the world that activities classified as part of the other gender's role are rejected, often unconsciously without any serious evaluation or consideration (p. 590).

Socialisers acting within the constraints of culture, are agents assumed to influence individuals' perceptions through providing and withholding support to force the individuals to behave in a manner consistent with their belief systems and usually favouring gender role stereotypes. According to Eccles et al. (1983), expectancy measures fall into two closely related categories: ability beliefs and expectancies for success while subjective achievement value measures fall into three categories which are intrinsic, utility and cost. These are explained in the next section. Measures can be domain or activity specific.

*(i) Ability beliefs.* Ability beliefs denote how the child perceives herself/himself as presently competent to perform a given task. Eccles and Wigfield (2002, p. 117) define ability beliefs as current "broad beliefs about competence in a given domain". They argue that a person's perceived ability in an area has crucial motivational consequences towards enrolment and succeeding there. When confronted with decisions of choice, Wigfield and Eccles (2000) argue that children weigh their present ability to successfully execute the task and their long-term survival in carrying out the task. When the task is perceived as difficult, this has negative consequences and children develop aversive tendencies towards it. Hollinger (1983) found a strong relationship between gifted girls' self-concept of ability in math and their desire to enroll in the subject. In a longitudinal study of gifted adolescents' confidence levels in gender-typed occupations, Jozefowics, Barber and Eccles (1993) found that females were more confident in the female-typed occupations like nursing than in male-typed occupations like engineering. This made them more likely to take female-typed professions.

Self-concept of ability may be compared to Bandura's (1977, 1997) self-efficacy theory. Bandura argues that efficacy focuses on choice and what the child expects to achieve by predicting their present ability against the task difficulty. In this way the child is able to predict the outcome of any attempt at the task and determine whether it will be worth attempting it. Weiner (1985) supports this assumption in his attributional theory.

For example, Weiner argues that if a person attributes success to her/his own ability, this has a positive future push factor towards further exploration of the area in the hope of further success. On the other hand if a person attributes failure to her/his own lack of ability, this has negative consequences resulting in subject or task aversion. Covington (1992), in support, argues that an individual's self-concept of ability is a precursor to perceiving self-worthiness in engaging in a task and achieving in it.

Wigfield and Eccles (2000) revealed that even early in schooling, children are aware of their ability and problem areas and what they regard as of value in life in different achievement domains. In the mathematics, reading and sports domains at elementary school, subjective values such as interest and utility value emerged as important factors. Generally it was found that "within a given activity, beliefs and expectancies for success factor together" (Wigfield & Eccles, 2000, p. 75).

*(ii) Expectancies for success.* A child's expectation of success in upcoming tasks falls into the expectancies for success category whose goals are in the future, predicting how well the child expects to succeed in a task or subject domain. According to Eccles, expectation of success in an area is usually associated with self-confidence and self-efficacy in subject ability. In other words, one has to rate her/his ability, personal preferences and personal importance high in a subject area or task to be able to participate and achieve in it. Martin (2002) supports this assertion by saying, "students who believe they are capable of mastering their schoolwork have positive expectations for success" (p. 38). Against the backdrop of these arguments, Oswald and Harvey (2003, p. 134) argue that women's "low self-efficacy, low importance rating and lower preference for math, suggest that women may have a low math self-schema". This is assumed to work in the same manner with other subjects.

*(iii) Subjective achievement value.* According to Wigfield and Eccles (2000), expectancies (to participate and to achieve) are associated with the value the child attaches to the task or subject area. For example, the subject's perceived future usefulness (utility value), the subject's perceived importance to an individual's goals (intrinsic value) and its cost (subjective worth) all have important motivational consequences. Research by Deci and Ryan (1985), Pajares (1996) and Bandura (1977) confirm that students enroll and perform well in domains and tasks they place a high utility and intrinsic value in. In particular, Bandura argues that self-efficacy or a belief that one will be able to achieve in a subject is a determinant of interest the child develops about the subject.

Eccles and Wigfield (2002) describe utility value as the degree to which a task relates to a child's current and future goals while intrinsic value refers to the pleasure derived from engaging in an activity. In other words, students tend to take subjects and do tasks that are useful and that fit well into their perceived future career plans. Children also engage in tasks in which they are interested in and derive the greatest enjoyment from. However, Eccles on the other hand argues that children may also take a subject just for its utility value though they may not enjoy doing it, but need to take it because it is a prerequisite for future courses. In relation to cost, Wigfield and Eccles (2000), argue that students tend to take stock of negative consequences associated with engaging in a task before engaging in it. They also weigh the fear of failure against benefits of success, amount of effort required in task involvement and lost opportunities should they fail as well as how the decision to engage in one activity as limiting access to other activities.

According to Eccles and Wigfield (2002), self-concept of ability predicts performance in a task and task values predict enrollment decisions. In a study of children's self-concepts of ability and values in relation to their performance and subject choice, Wigfield, Eccles and Pintrich (1996) found that self-concept of ability and expectancies for success were the strongest predictors of subsequent grades in mathematics. On the other hand, children's subjective task values rated high as predictors of decisions to enroll and to continue taking math. Similarly, Martin (2002, p. 38) also found that "when students see the utility and importance of what they are taught, they tend to be more engaged in these subjects and achieve at a higher level".

Eccles et al. (1983) also found a link between previous achievement and decisions to continue taking math to higher levels. Eccles (1994) argues that whatever achievement related choices that are made by the child are governed by "one's expectation for success in, and sense of personal efficacy for the various options, the relation of the options both to one's short and long range goals and to one's core self-identity and basic psychological needs, the individual's gender role schema, and the potential cost of investing time in one activity rather than another (Eccles, 1994, p. 592). Martin (2002, p. 38) sums up the expectancy-value model by saying that the interaction of children's expectation for success and "their valuing of a given task predict their motivation on it such that those with high expectations and who also value the task are most motivated to do it".

The Eccles et al.'s (1983) model has been criticised by Woolnough (1994) for placing too much emphasis on three sets of beliefs mainly, the individual's expectations for success, the value the individual attaches to a task and cost of pursuing one activity over another as critical factors underpinning achievement-related choices. Woolnough (1994) argues that no one isolated factor is responsible for the choices individuals make

but a combination of several closely related factors. For example, the effect of differential socialisation of girls and boys need not be overlooked and its long-term consequential influences on individual identity and subsequent behaviour. Similarly, to disregard the roles of contextual factors such as school and classroom contexts maybe overlooking areas that have recently been found to be of great influence to children's achievement related motivational choices (Stipek, 1998; Stipek and Seal, 2001).

The expectancy-value model of achievement choices is however, a well-researched and tested model for examining and understanding variables associated with children's achievement-related choices. While there has been extensive research on achievement-related choices in mathematics, reading and sport, the model has not been widely adopted in other areas. However, looking at the various structures in the model, it can be successfully applied to a domain like design and technology which this research is focused on. Unlike Woolnough (1994), Eccles et al.'s (1983) model assumes agency in the child. While the cultural milieu and socialisers beliefs shape the child's own beliefs, the child's self-concept of ability and subjective value shapes her/his future decisions affecting choices.

The models discussed in this section, while being mutually supportive in some sections, do not offer a unified perspective. Researchers have tended to look at each subject as isolated and not as research encompassing many subjects. This researcher focus has tended to create pools of knowledge from various sociological, psychological and gender perspectives leaving the focus disparate. In other instances, some models of subject participation and achievement like Eccles et al.'s (1983) have not taken on board some structural constraints also thought to influence participation and achievement such as motivation, schooling processes and especially the nature of the subjects. It is important in this research to find out how motivations for subject participation and achievement discussed in the two models apply to design and technology subjects which this study focuses on. The next section locates girls' participation in technology within feminist perspectives involving discourses of difference as inequality and oppression and incorporating sociological and psychological perspectives.

### **4.3 Feminist Perspectives: Discourses of Difference as Inequality and Oppression**

Feminist perspectives emphasise the various psychological problems, educational processes and social and cultural influences girls are subjected to when they make decisions about choice of subject just because they are girls (Ma, 2001). Feminist theories that focus on difference as inequality point to unequal opportunity structures

between genders that result in differential engagement and rewards favouring mainly those in positions of power. According to Abbott and Wallace (1995, p. 9) such ideologies in the main serve “to construct certain aspects of the social world as natural and universal and therefore unquestionable and unchangeable”. Supported by those in positions of power, especially men, this dominant ideology is able to survive through reproduction in the home and the school.

In the following section, I outline feminist contributions that have influenced much discourse in gender and science, mathematics and technology. With little research having been carried out in Zimbabwe on gender and technology, the bulk of examples are from international literature.

### ***4.3.1 Liberal Feminist Perspectives***

Liberal feminist voices (Made & Lagerstrom, 1985; Jassat & Mwalo, 1985) calling for equality with men in education, training, job opportunities and salaries began to be heard in the early 1980s after African political independence in Zimbabwe rendered unconstitutional and unjust previous European settler policies of separate engagement. In the secondary school system, Gwaunza and Nzira (1997) were able to highlight factors undermining the participation of girls in mathematics and science. The main thrust of these liberal voices was to fight for equal rights by highlighting forms of discrimination against women with the hope of legal reform being instituted. Such voices in the Zimbabwean context have been ignored or brushed aside by males in power as disgruntlement from unmarried women (Made & Lagerstrom, 1985).

Liberal feminist arguments are based fundamentally on the notion of recognizing women’s status as equal to men’s in both the private and public spheres of life. Such recognition encompasses fairness, justice, equality of opportunity and the elimination of possible barriers to women’s participation and achievement in prevailing social and political systems (Weedon, 1987; Andersen, 1988; Byrne, 1993). Liberal feminists reject the biological essentialist and determinist explanations of sexual difference and expose socially constructed inequalities such as the gender differentiated curricula, gender stereotyped subject choices, disproportionate resource allocation, male biases in teaching and hierarchical power structures favouring men in school administration.

Liberal feminists see education as the key to women’s quest for equality with men (Byrne, 1993). They premise their arguments on liberalism’s philosophy of human rights arguing that females have the right to receive the same educational opportunities as males. Liberal feminists argue that men have used exclusion as a way to predispose females from participating in institutional, social, cultural and political associations through socialisation into distinct gender roles. Explanations of the problem of girls’

participation and achievement in design and technology by liberal feminists pointed to exclusion, noting that had girls been granted admission to such disciplines as science, mathematics and technology, they could have been professors, engineers and statisticians (Rosser, 1993). The effects of sex role stereotypes have been shown to have implications for girls' futures. For example, Byrne (1993) draws causal relationships between subjects girls choose at secondary school and their later congregation in feminised occupations. She argues that for young women's potential to be fully recognized, they must not be denied the kind of education available to young men. For Byrne (1993), under-education for women means under-achievement and wasted talent from a significant proportion of the population. She argues that:

Without education, and especially without equal educational experiences or skill and qualifications, men and women alike of certain classes and social groups have over the years been condemned to inferior lives in their personal development, in their choice of work, as citizens and in their power to influence government, leadership, and the national decisions which affect their lives (p. 14).

Weedon (1987) argues that non-participation of women in the past was explained away by the claim that girls and women were somehow obstructed by social practices rendering men and women victims of the sex role socialisation system. Girls were perceived as disadvantaged because they were not permitted to develop independence, freedom, confidence in themselves, and competence; indeed all those affective variables that were deemed to contribute to higher participation levels. According to Rosser (1993), biological research has been and continues to be used to justify social and political inequalities and to prove the inferiority of women. Feminist critics have stated that some of the work in sociobiology (Bleier, 1988) and brain lateralisation (Bleier, 1988; Star, 1979) constitute the 20<sup>th</sup> century equivalents providing the "scientific justification" for maintaining the social status quo of women (Rosser, 1993, p. 3). Feminist scholars have vehemently rejected biological claims as conspiracies by those in power (usually men) to make these claims appear genuine, natural and God-given and yet are social constructions for men's continued dominance of women.

While liberal feminists view girls as disadvantaged, popular male culture sees them as deficient in traits and attributes boys possess. For examples, girls are seen as lacking the necessary social qualities needed to succeed in science, mathematics and engineering. Girls are seen as lacking confidence, self-esteem and assertiveness to achieve the same outcomes as boys, and women as lacking the drive and ambition to take up management roles in various sectors. Jones and Jacka (1995) comment that, "...girls are seen in the unrelenting negative terms as victims who need assistance and special

attention for something they lack” (p. 17). The deficit model typically sees male behaviour as the norm to which other groups have to strive to achieve. As such, it points to compensatory action being taken to bring girls and women to equal status with boys and men. Such compensatory action has already been built in some education systems to achieve equality of opportunity. For example, the enactment and passing of The Education Act (1980) in Zimbabwe has resulted in girls being allowed admission into the University of Zimbabwe with less the number of points boys are required to have to be admitted to the same programme. This is to compensate for the fewer number of girls admitted to tertiary institutions.

Liberal feminists have been criticised for their commitment to reform and elimination of discrimination while turning a blind eye to the nature of existing institutions and knowledge. Abbott and Wallace (1995) and Gilbert (1998), for example, argue that reform is almost impossible in the present world patriarchal system where men dominate all forms of language, knowledge and social systems. To them, it leaves the foundations of domination and subjectivity, such as what counts as knowledge, untouched. They argue that what is needed is sociology for women by women alongside ‘malestream’ sociology. Irigaray (1977) argues for a reformulation of psychoanalysis’ imaginary unconscious states of the mind that give birth to surface conscious manifestations such as language and behaviour that are already gendered.

Abbott and Wallace (1995) also point out that liberal feminist analyses of schooling based on functionalism and sex role cannot account for the power dynamics in social life. They argue that the wider social and economic context, of which schooling is part, is left unexamined. To Abbott and Wallace (1995), the complexity of gender relations including the links between gender and the economy and gender and sexuality continue to be ignored by policy makers in shaping the girl-friendly curricular. They also argue that the idea of biology as destiny is a socially constructed scheme aimed at disenfranchising women and benefiting men who hold power in society.

Gilbert (1998) points to how liberal feminist programmes have critiqued the notion of the male as a norm to which females should aspire. Like Irigaray (1977), she perceives that this perpetuates the notion of women as helpers to men. She further argues that the perception that females will only achieve equal power relations when they take up the ‘higher status’ male roles, will only make females strive to be like males and perpetuate beliefs of male superiority.

Criticisms that equal educational opportunities do not necessarily result in equal educational experiences and outcomes have been heard from Shashaani and Khalili (2001) and Gaskell (2003). They argue that owing to unequal economic backgrounds and other social and political impediments, educational experiences and outcomes for

children were likely to be different. Cultural impediments in Zimbabwe, for example, have been shown to affect girls' participation in science as some topics are condemned by parents for being too sexual, a topic that is taboo in most tribal groups (Gwaunza and Nzira, 1997). They also argue that when left unaided, girls have been found not to conform to the claim that equal educational opportunity will result in equal outcomes. For example, girls may not choose subjects such as technology, science and mathematics because they may need special encouragement and assistance. Others may just feel psychologically alienated from the experience of taking the subjects. These arguments show that apart from the positive foundational work done by liberal feminists, the problem of girls, technology and sciences has other dimensions that need further research and intervention strategies within. Liberal feminist perspectives are necessary in this research for exposing gender biases and areas that need equal opportunities between females and males.

### ***4.3.2 Marxist Feminist Perspectives***

Sayer (1991) contends that Marxism developed as a means of explaining the social inequalities that existed in the production of wealth between two social classes of people - the owners of capital and means of production (the bourgeoisie who included owners of land and industrialists) and the workers (the proletariat). The relationship between these classes of people is argued as one of difference and labour exploitation (Sayer, 1991). For example, when workers' production output is greater than the cost of labour, surplus value or profit results to the landowner or industrialist. Workers have little access to this profit except through their agreed wages, usually an insignificant proportion compared to the wealth produced by their sweat. By workers, Marx meant men in capitalist modes of production since women were not allowed to engage in paid employment. Paid labour for women was considered a threat to male workers by Marx who believed that women's labour was cheap and could be exploited by capitalists to replace male expensive labour thereby disenfranchising the male family wage earner. Capitalists working with labour unions in the nineteenth century aggressively lobbied governments to outlaw women paid labour to protect male labour, thus condemning women to the domestic sphere of home.

Engels, who was Marx's collaborator, analysed the family system in relation to capitalism. He argues that the bourgeois nuclear family came about because of the need to pass on inheritance to legitimate heirs in the family tree that exclude women. Engels argues that owners of wealth had to find ways of bypassing their wives by controlling them in the marriage system through a subtly devised male system of gender role socialisation and excluding them from paid labour. That way, women were rendered

without income of their own and resigned to socially assigned roles for their survival. However, capitalists saw a loophole in the system and began employing women as casual cheap labour bringing down labour costs and maximising their profits. Women's oppression thus began to have a material basis where women could be used as cheap labour for the same job as men but earning less. In the Zimbabwean family situation, men oppress women, but in a capitalist society, women feel the double burden under both men as a class and capitalism as a system. While men in the Zimbabwean colonial system were allowed to own land, women were prohibited. Whatever women produced in the fields did not belong to them even when the husbands were away in urban areas working. The husbands were free to spend the money they earned in waged labour and to dispose of the crop that the wives produced as they wished when they came back home (Made & Lagerstrom, 1985).

Feminists' development of Marxist theory was to link women's subordination and exploitation by men to difference and the economic system of capitalism through the avenue of Engels' nuclear family (familialism). Marxist feminists argue that capitalism pervades all forms of contemporary society life producing inequalities between those in positions of power and those who are ruled, between those who own the means of production and those who expend their labour for a reward in the production line, and between males and females (Barrett, 1980). Women as a class, in particular, are considered in unequal terms to men and subjected to various forms of oppression. These forms of oppression are considered to have taken the form of exclusion from paid labour as in Engels' nuclear family and unpaid domestic labour caring for men (the labour force) and raising children, who are the future labour force. By socialising women in their perceived roles as mothers, the system is able to reproduce itself and keep women away from the public sphere of life.

According to Barrett (1980) and Hartman (1978), the root of all women's exploitation begins in the home through the family structured system. To Barrett (1980), this family structure of the father as the economic provider of the family and the mother as the carer and provider of unpaid domestic labour appear naturally given but masks male tendencies for control. To Marxist feminists like Barrett, gender inequalities will only be destroyed when difference and class divisions are destroyed.

Marx's work has been criticised by feminists for its muted stance concerning gender inequality and oppression. Barrett (1980) and Mannathoko (1999), for example, have argued that Marx assumed a male waged labourer in all his writings. Others have critiqued the masculinity of Marx's writing as symbolising male domination and part of the problem of a male knowledge system that pervades modern capitalist society today. Marx's emphasis on social class division and capitalism in the oppression of women, and

its failure to give adequate or equal space to issues of patriarchy, has also been a target for feminist criticism. Another criticism has centred on the push for access and equality of opportunity. Research carried out in Zimbabwe and South Africa show that increasing access for girls to education does not necessarily guarantee significant life quality as culture and issues of socialisation have also been seen to limit girls' progress (Gwaunza & Nzira, 1997; Jassat & Mwalo, 1995).

### ***4.3.3 Radical Feminist Perspectives***

Feminist discourses of oppression have mainly centered on women's subjugation as a result of power relationships between men and women. Discontent with the thrust and limitations of liberal feminism, radical feminists established a revolutionary discourse focused on the "emancipation of women" (Abbott & Wallace, 1995, p. 33). Radical feminism is premised on the assumption that male power dominates women in every sphere of life and feminists aim to map out how this power is exercised and reinforced. The principal focus of radical feminists has been to characterize oppression of women as a group by men as a group, as a direct result of a system of patriarchy using socialisation and gender-role stereotyping as its critical vehicle. To radical feminists, every relationship is political and is born out of a hugely unequal and patriarchal system meant to oppress women through sex (whether forced or unforced), child bearing, sexual division of labour and the nature of knowledge as a whole. In all these, the family stands out as the prime instrument of women's oppression through the enforcement of a sexual division of labour.

According to Daly (1978), men benefit from women's subordination in ways that disenfranchise women. For example, Spender (1982) and Daly (1978) argue that men have devalued women's ways of knowing, thinking and doing things and presented masculinity as universal and the ideal which women must strive to be. To these researchers, this has meant the recognition of a male mono-knowledge system that has rendered women invisible in the public sphere of life. They argue that what is viewed as knowledge is in fact male knowledge. By arguing for women's ways of knowing, Spender (1982), Daly (1978) and Yeatman (1994) acknowledge differences between girls and boys in terms of their socialization experiences. These differences they argue, should be used as arguments for the need to include women's ways of knowing into the education system.

On the education front, radical feminists argue that the problem of girls' participation in technology lies in the nature and culture of the subject: the way the subject is developed, practised and presented in schools (Gilbert, 1998). Spender (1982) questions the neutrality of the education system and argues that it reflects a masculine

world-view of power politics and control. The superiority of men over women, she argues, pervades all forms of knowledge and women's experiences are not part of the knowledge. The social stereotyping of the technology subject area as a male domain has been found to be intimidating and alienating to girls. Burns (1997) argues that since science and technology are patterned by male scientific ethos, "the methods of logic and detachment espoused are alien to the socialisation of women" (p. 126). Resultantly, in the social organisation of science and technology, gender is seen as a barrier, dividing line or filter for ostensibly different subject and career aspirations, perceptions and participation where dropouts are disproportionately female. As a result of these arguments, radical feminists call for empowering and women-centred approaches to teaching and learning that value background experiences of girls' and their ways of knowing. For example, different female experiences, ways of knowing and learning strengths that girls' bring into the technology classroom must first be acknowledged and programmes be designed to take into account these attributes, strengths and differences in girls.

Slavin (1990) has called for the examination of the curriculum in order to change and include the background experiences of girls' as well as girls' preferred learning styles. Slavin found that girls' preferences are towards cooperative learning situations as compared to the competitive environment preferred by boys. Slavin also found that girls prefer collaborative settings, which is said to raise their self-esteem and instill cooperative work ethics. Furthermore, girls were found to prefer the social application of technology rather than the rigid knowledge and skills acquisition style preferred by boys. However, Yeatman (1994) posits that girls' preferred learning styles are made difficult to achieve by teachers, who like boys, prefer the competitive learning setting. Other researchers like Burns (1997) and Gilbert (1998) have called for radical changes that include change of the subject matter to rewriting of the body of knowledge from a female perspective. Such subject matter and knowledge take into consideration special needs for girls encompassing curricula relevant to girls' experiences and preferences in learning styles (Baker, 1995).

Radical feminist scholars have also exposed the domineering classroom attitude of boys in dealing with girls who opt to enroll in technology. Mahony (1985) and Jones and Wheatley (1988) for example, argue that male teachers often take boys' domineering attitudes and oppression of girls in classroom settings as normal at the expense of girls' freedoms. Radical feminists have, however, been criticised for focusing mainly on the schooling processes while turning a blind eye on out of school structural factors.

Radical feminists have also been criticised by postmodern feminists like Gilbert (1997), Harraway (1996) and Harding (1991) for their assumption that girls are always a homogenous group. To these postmodernists, radical feminists tend to ignore the

diversity within the group 'girls' including age differences, ethnicity, socio-economic class, religion, rural and urban location and individual differences. Arguments have also been put forward that radical feminism fails to take into account the variations in forms of patriarchal relationships in existence all over the world (Carby, 1982). The differences mean that what may be regarded as oppression in one society may mean a different thing to another. For example, Carby (1982, p. 217) commenting on the situation in the USA argues that "Black men have not held the same patriarchal position of power that white males have established". She argues that patriarchy should not have a universal 'male dominance' meaning attached to it nor should it be approached from one causal base, as this is reductionist and essentialist.

Abbott and Wallace (1995) argue that some radical feminists' acknowledgement of the existence of biological differences between females and males gives impetus to socio-biological theories to be developed, further thwarting efforts by feminists for a unified voice against male oppression. As a result, they argue that this may also strengthen the notion that there are biological differences between females and males, and women's roles should also follow as naturally given. This section highlights the need in this study to determine how power relationships in Zimbabwean society have affected their position, choices, motivations and life options available to them.

#### **4.4 Summary and Research Questions**

This chapter focussed on understanding reasons and motives behind actions in order to account for human behaviour. Various arguments presented in this chapter were aimed at providing an understanding of processes contributing to females' not taking design and technology subjects. Difference as gender inequality and the basis of female subjectivity and alienation from technological fields was located in three perspectives that have been used in recent times to explain girls and science and technology issues: the sociological, psychological and feminist perspectives (Ma, 2001).

The sociological perspective placed emphasis on the effects of female and male identity as difference. Difference was explained as affecting educational participation and attainment as a result of differential gender role socialisation. Essentialism, sex role, gender identity, cultural production and reproduction theories were explicated. The psychological perspective emphasised internal processes directing individual choice decisions as they are impacted by external environmental influences. Various models were proposed to explain behaviour with the major argument being that individual achievement-related choice can be explained by efficacy beliefs, subjective value attached to activity or task and cost. The feminist perspective was seen as inclusive of sociological and psychological perspectives and emphasised difference as inequality and

the basis of female subjectivity and oppression. Liberal, Marxist and Radical feminist perspectives were discussed under the gender perspective. Each perspective contributed to further understanding of women's subjectivities.

Theorising in the literature review chapters has demonstrated meaningful links between female disadvantage and various sociological, psychological and gender standpoints. No one perspective among the three perspectives is adequate on its own to explain the problem of why few fourth form girls participate and achieve in design and technology subjects in selected schools in Zimbabwe. The feminist perspective however, is selected for this study as it is inclusive of sociological and psychological views. It also includes Marxist and radical feminist perspectives which I see as of particular importance to this research to expose power structures within Zimbabwean society acting as barriers to fourth form girls taking and achieving in design and technology subjects.

The major question of this study is, "Why do so few fourth form girls participate and achieve in design and technology subjects in selected Zimbabwean secondary schools?" The decision to investigate fourth form girls was made because of my concern at the low enrolment numbers that took design and technology subjects. Statistics from the Zimbabwe Schools Examination Council (ZIMSEC) also showed critically low enrolments and low performance figures for fourth form girls across all the four design and technology subjects namely technical graphics and design, metal technology and design, wood technology and design and building technology and design. Secondly, fourth form girls would have had four years experience in the school so schooling processes would have had an influence on their decisions. Fourth form is also the level when students sit the ordinary level examinations in Zimbabwe. For many girls, this is the school leaving certificate examination as only those who achieve five or more subject passes with a C grade or better are allowed to proceed to do advanced level education. Thirdly, it was assumed that fourth form girls would be mature (age 16-17 years) and would have a much clearer picture of their career prospects than girls in lower forms. Three sub-questions were used to help understand the major question and these are:

1. How are fourth form girls represented and performing in design and technology subjects in Zimbabwean secondary schools and in the two provinces of Harare and Masvingo?
2. What are the reasons for Harare and Masvingo province fourth form girls' choice of design and technology subjects for study in selected secondary schools as perceived by fourth form girls themselves and significant others?
3. What are the reasons for Harare and Masvingo province fourth form girls' achievement in design and technology subjects in selected Zimbabwean secondary schools as perceived by fourth form girls and significant others?

Responses draw on the experiences of fourth form girls and significant others who include their teachers, principals, education officers and parents in selected Harare and Masvingo province secondary schools. The idea to include several sub-questions probing the extent of girls' participation and achievement and reasons for design and technology subject choices and achievement was to comb a large area to capture previously salient factors affecting girls' participation and achievement in design and technology that may be unique to Zimbabwe. Models by Eccles et al. (1983) and Woolnough (1994) are used to develop category of factors in this study. In the next chapter I present the research design and reasons for its selection.

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# CHAPTER FIVE

## RESEARCH DESIGN

This chapter discusses the research design and process. In the first part I define the research design and offer arguments for my selection of the case study. The second part gives an overview of qualitative research with its characteristics and explains why the approach is appropriate for this study. The distinctive qualities of qualitative and quantitative research are compared in the third part of the discussion. The fourth part argues for the employment of an eclectic approach that combines a number of techniques to collect, analyse and present the research data findings. Aspects of trustworthiness, dependability and consistency are discussed after the eclectic approach, with ethical issues and limitations of the research design being presented at the end of the chapter.

### 5.1 The Case Study Research Design

I perceive a research design to be a structure of how the research is to proceed. Harding (1987) describes research design as a framework that guides a particular inquiry. According to her, the research design focuses on what needs to be studied, why it should be studied and how it will be studied. Research design differs from data collection methods in that the latter refers to techniques for collecting information within an already adopted structure or research design. Accordingly, the methods selected to gather data should be compatible with the research design chosen.

The case study research design was chosen for the present study in order to explore, discover, compare, contrast, integrate and interpret the case of fourth form girls' participation and achievement in design and technology subjects. According to Stake (1995), case study research is a focus on a bounded system, an entity to be studied which may be a single person, an issue, an event or several individual cases needing situated comparisons or comparisons over a specified period of time. This study looks at the case as an issue or a phenomenon. Gall, Gall and Borg (1999, p. 290) argue that case studies are conducted in order to "shed light ...depict and conceptualise a phenomenon clearly" in its social context to "give readers a sense of the meanings and intentions inherent in that situation". Merriam (1988) posits that the case study is appropriate for examining educational practice with the hope of improving practice and for examining a social phenomenon for its significance to particular events or its relationship with self, others and society.

My justification for using a case study design in the present study lies in its concern with context, its ability to dovetail well with the eclectic data collection methods employed and its congruence with the qualitative research strategy adopted. This allows for the exploration of attitudes and perceptions and interpretation of subjective meanings concerning processes affecting fourth form girls' participation and achievement in design and technology subjects. My major question "Why do few fourth form girls participate and achieve in design and technology subjects in Zimbabwean secondary schools?" and its three sub-questions (see research questions on page 78) are interested in the world-views of study participants as members of certain social groups. In this case, a qualitative research strategy that is sensitive to having participants interpret their social world is appropriate (Bryman, 2001).

The case in this study is approached from the emic perspective of experiences, perceptions and attitudes of girls taking and not taking design and technology subjects, their design and technology teachers, principals, parents and subject education officers as data sources involved in an "iterative process of constructing meaning" (Kagan, Dennis, Igou, Moore & Sparks (1993, p. 428). This is carried out in eight secondary schools designated as private, government group A, government group B and rural in two geographical provinces of Zimbabwe: Harare and Masvingo.

Bryman (2001), Merriam (1998) and Guba and Lincoln (1985) argue that the case study is usually employed to generate an in-depth understanding of the situation and life interpretations by participants within research sites. Adopting this stance will enable me in this research to gain more insight into data similarities and points of difference. This allows me to get a comprehensive understanding of the problem from a wider scope and perspective than would be possible using a single data source and site offering. The method seeks to compare and contrast data sources so as to identify and isolate common themes and issues with the general thrust of understanding rather than generalising to other sites. Each group of participants is treated as a different data source to get an intensive, comprehensive and holistic description of events and processes affecting girls' participation and achievement in design and technology subjects with comparisons for differences and similarities being made within and across participant groups, school types and provinces (Stake, 1995). Interpretations and meanings of each participant group's own experiences in their schools and provinces are then brought together to explain the case. The schools and provinces are marked by differences in economic and cultural conditions.

In the next section I discuss the characteristics of qualitative research

## 5.2 Qualitative Research

Qualitative research is a multi-method approach involving an interpretive and naturalistic orientation (Denzin & Lincoln, 1994; McMillan & Schumacher, 1997). The approach is employed in ethnography, case studies, action, and interview research and seeks to make sense and meaning through the researcher studying and interacting with a phenomenon in its natural setting. The researcher in qualitative research usually spends an extended and usually intensive period of involvement in the social world being investigated becoming fully immersed into the social actors' world rather than being distant and "adopting a position of a detached scientific observer" as in quantitative methods (Blaikie, 2000, p. 242). This period of immersion in the social actors' world allows the researcher to interact closely with the group and allows them to feel comfortable with her or his presence thus opening up and revealing some of the everyday meanings and things that would normally not be told or seen by someone distant. The researcher is also able to observe social actions in context, unravelling the way social actors gesture and express feelings in different situations. The researcher's aim is usually to understand and explain phenomena based on social actors' constructed and interpreted reality by a process of abduction. In other words, the researcher takes the position of a learner seeking to be informed by the participants being studied and generates social scientific accounts from information provided (Blaikie, 2000). Cohen and Manion (1994) argue that the social world can best be understood from the perspective of individuals who are part of the ongoing action being investigated.

Qualitative methods are flexible, resisting impositions but allowing the unpredictable to manifest and opportunities for concepts, ideas and theories to evolve while following leads as they occur. Patton (1990) posits that allowing a bit of flexibility tends to accommodate the changing nature of a phenomenon as different relationships emerge and redefining becomes necessary. In this case, the researcher has to be adaptive to follow new leads and other sources of rich unexpected descriptive material. In support, Blaikie (2000), points, "qualitative data gathering is messy and unpredictable and seems to require researchers who can tolerate ambiguity, complexity, uncertainty and lack of control" (p.243).

To answer the present study's major research question, why few fourth form girls participate and achieve in design and technology subjects in Zimbabwean secondary schools, demands an interpretivist approach demanding narratives and interpretations of meaning which I perceive can best come from social actors' interpretations of their own lived experiences in their environment. According to Robertson and Hill (2001), it is crucial to grasp the meaning that actors attach to their actions and to listen to the

excluded voices themselves to explore their perspective of the exclusion process, in order to identify those characteristics that make some people more at risk than others. Bryman (2001) further argues that the social scientist must “gain access to people’s common-sense thinking and ... interpret their actions and their social world from their point of view” (p.14). It does not aim to generalize the results to the larger population but to understand and describe the social actors’ worldviews. Theory may be generated at the end of the research process from logical inferences gained from data.

The qualitative and interpretivist approach chosen for this study differs to the quantitative approach with respect to their epistemological and ontological commitments. While quantitative methods are often associated with research within a positivist natural science and objective epistemology, qualitative research is often associated with a naturalistic-phenomenological and subjective philosophy within the constructionist and interpretive epistemology (Layder, 1993; Kvale, 1996; Merriam, 1998, Bryman, 2001). For example, the election to use a self-completion questionnaire more or less drives the researcher to simultaneously select a natural science model and an objectivist and positivist world-view. Similarly, the use of participant observation and interview as is the case with this study is often taken to mean a commitment to interpretivism and constructionism (Bryman 2001). While quantitative research strategies work on and converge on one social reality in the search for solutions, qualitative research searches for and accepts the possibility of multiple social realities or worldviews. In other words, in qualitative research, it is accepted that in any social context, it is possible that people may possess different socially constructed realities which they use to interpret their own actions and the actions of others (Blaikie, 2000).

Bryman (2001) argues that quantitative researchers are often distinguished from qualitative researchers owing to their preferences for applying numerical data and measurement to explain phenomenon. This is in sharp contrast to qualitative researchers who prefer words as narrative tools for explaining phenomenon under investigation. However, qualitative researchers may also use numerical data as simple tables of frequencies and percentages to summarise some features of non-numerical data as was done in this study. As Blaikie (2000, p. 245) put it, “such counting in qualitative research can provide some support to the representativeness of certain features within a social group category”.

Often quantitative researchers mail questionnaires to respondents to complete, differing from qualitative researchers whose preference for closeness to the participants takes them to the research sites to discover events and processes first hand. According to McMillan and Schumacher (1997), this close involvement by qualitative researchers allows them to see and experience social phenomena in its natural setting, make sense of

it and interpret it from the meanings social actors bring. Bryman (2001, p. 284) observes that “the qualitative researcher seeks close involvement with the people being investigated so that he or she can genuinely understand the world through their eyes”. When researchers are distant such as in the case with quantitative questionnaire mailing, Bryman (*ibid*) argues that often the questionnaires are highly structured, rigid and inflexible for the researcher to be able to examine concepts and issues focussed in the study. Meaning as process is obtained when qualitative methods are used as opposed to static responses from questionnaires whose mechanistic orientation may miss variable changes and relationships over time.

While quantitative data can be generalised to similar situations, replication and generalisation is not the prime focus of the qualitative researcher who seeks contextual understandings of behaviour, values and beliefs (McMillan & Schumacher, 1997). Owing to the typically prolonged immersion of the researcher in the social setting, emerging data from qualitative research are seen as rich, deep data compared to the precisely measured “hard, robust and unambiguous data” collected and interpreted by quantitative methods (Bryman, *op cit.* 284). Bryman further argues that concepts and theory usually emerge from data collected in qualitative research while “...quantitative research typically brings a set of concepts to bear on the research instruments being employed, so that theoretical work precedes the collection of data” (p. 284-285).

Much debate has arisen over the issue of whether these distinctions are worthy of mention any more, considering the use in some studies of both quantitative and qualitative research strategies in the same research. For example, while quantitative methods are linked to the deductive and retroductive orientation of testing theory and qualitative methods with the inductive and abductive generation of theory, some researches point to an increasing testing of theory with qualitative methods and generation of theory using quantitative methods. Researchers like Kvale (1996), Merriam (1998), Miller (2000), Blaikie (2000) and Bryman (2001) acknowledge a viable partnership in employing both qualitative and quantitative methods. I adopt their argument and use mainly qualitative methods helped by quantitative data in this study. The use of descriptive statistics in qualitative research also shows an appeal by qualitative researchers for the use of numbers and figures as a research reporting method. On the other hand, Marsh (1982) points out that the widespread inclusion of questions about attitudes and the practice in much social survey research of asking respondents the reason for their actions suggests that quantitative researchers are interested in matters of meaning which have been the preserves of qualitative research. In the next section, I present the information gathering processes used for this study.

## 5.3 Description of Instruments

The case study approach chosen to answer the research questions relies on multiple sources of information being collected using a variety of techniques and is an essential feature of case study design. A combination of a student questionnaire, focus group interviews, in-depth interviews, lesson observation and document and content analysis is employed and perceived to obtain rich and deep data segments from various sources allowing a holistic interpretation of the phenomenon being investigated. At the same time, this allows the researcher to validate and cross-check findings (Patton, 1990). The five data collection methods used in this research are explained in the next sections.

### 5.3.1 *Student Self-Completion Questionnaire*

A structured questionnaire taking approximately 30 minutes to complete was designed to be administered to all fourth form girls at each of the schools that were targeted for research selection (see appendix xxii). In this study, the questionnaires were used to glean fourth form girls' personal information in order to identify appropriate candidates to participate in the focus group interviews, to find subject preferences for fourth form girls and reasons for the choices of subjects they made. Only nine questions were designed to answer the questions under study and were made short enough to avoid 'respondent fatigue' (Bryman, 2001, p.129). Questions 1 to 6(i) requested demographic background information of the girls while questions 6(ii) to 9 elicited information on reasons for subjects and career choices. Two categories of students are designed to emerge from the student sample (a) fourth form (year 11) girls who are not taking any of the design and technology subjects, (b) fourth form (year 11) girls who are taking a design and technology subject. The questionnaire was characterised by more closed ended questions than open ended ones, and was simplified structurally to enable the respondents to understand them and respond without any assistance other than built in or attached written instructions.

Pilot testing was carried out to gauge the appropriateness of the student questionnaire and focus group interview schedule for the targeted fourth form group of girls. Pilot testing was a two-stage process carried out in both New Zealand and Zimbabwe. The first pilot study was conducted on 28<sup>th</sup> November 2002 in Palmerston North, New Zealand with five migrant Zimbabwean girls in year ten and eleven at high school. Their level of education and studying in a multi-racial school in New Zealand was considered to be similar to multi-racial environments at private and Government group A schools in Zimbabwe. No problems in terms of set time and understanding of

the questions were encountered and the participants recommended that the questionnaire be used as it was.

The second pilot study of the same student questionnaire and interview schedule was conducted on 15<sup>th</sup> and 16<sup>th</sup> January 2003 in Zimbabwe at a low socio-economic Government group B school called Mari in the high-density black township of Masvingo town. The pilot study involved five fourth form girls picked randomly in a class of 25 girls. The researcher discovered that it took these girls about 40 minutes to complete the questionnaire that the Palmerston North girls had taken 25 minutes to complete. The main problem was that many of the statements and instructions in the questionnaire were not clearly understood in the English language. Almost all the girls needed help in completing the questionnaire. When the questions were translated into the local Shona language, the girls took 25 minutes to complete them and did not complain about misunderstanding anything. Deeper meanings were also found in interview responses where the conversation was in the local language than at first when we tried the interviews in the English language. The questions were then translated into Shona for use at predominantly Shona environments. The English versions of the questions were kept for use in multi-racial environments.

### ***5.3.2 Interview Instruments***

The interview method was preferred for the specific purpose of the researcher obtaining research relevant information from participants through face-to-face verbal interaction with individuals or groups. Kvale (1996) classifies the research interview as a specific professional form of conversational technique of getting information from participants. According to McMillan and Schumacher (1997), interviews are essentially vocal questionnaires that differ from other forms of inquiry in that they involve direct interaction between the interviewer and interviewee. In this study, the interview instruments were designed, pilot tested and administered by the researcher. Two interview methods chosen for this research were the focus group and the semi-structured in-depth which are discussed in the next sections.

*(i) Focus group interviews.* The focus group method was chosen in this study because it allows an in-depth exploration of a specific theme or topic so that meaning is jointly constructed by a carefully chosen small group (Bryman 2001). Usually the small group is purposively chosen because of their knowledge of the situation. According to Morgan (1998), focus group interviews can provide more dynamic interactions and stimulating discussions between the researcher and group members and among group members than structured or semi-structured interviews. The technique allows

remodelling of multifaceted interpretations of a phenomenon as participants probe each other for holding certain views. As Bryman (2001) argues:

Focus groups reflect the processes through which meaning is constructed in everyday life and to that extent, can be regarded as more naturalistic... it offers the researcher the opportunity to study the ways in which individuals make sense of a phenomenon and construct meaning around it (p. 338).

The researcher relaxes and passes control to the participants so that they freely bring out issues, challenging and revising each other's viewpoints. The present study employs the focus group technique for its ability to construct group knowledge and bring out multifaceted interpretations of a phenomenon.

Morgan (1998) suggests that the typical group size for focus group interviews should be 6 to 10 participants. Morgan, however, advises researchers to approach this issue with caution due to participants who do not turn up on the interview day and suggests that conscious over-recruiting would be a strategy worthy considering. When the topic is "involving, controversial or complex and when the gleaning of participants' personal accounts is a major goal", Morgan (1998, p. 75) however, suggests smaller groups of only three participants. In support, Fenton, Bryman and Deacon (1998), see a possibility of participants in very large groups forming a wall of silence over an issue they may know little about than small groups would react in a similar situation.

In this study and to minimize the negative effects of participants who do not turn up on the interview day, eight students per group of girls taking and not taking design and technology subjects would be randomly selected to participate in the focus groups. Since design and technology teachers, guidance and counselling teachers and girls' families groups were not likely to be big enough to have random sampling done, all members present would be asked to participate in the focus group interviews lasting approximately one hour.

The focus group interview schedules for girls taking and not taking design and technology subjects and that for parents had seven questions each while the teachers', principals' and education officers' interview schedules had nine questions each meant to give answers to questions two and three of the study's questions. Pilot testing of the focus group questions was conducted on 28<sup>th</sup> November 2002 in Palmerston North, New Zealand with the five migrant Zimbabwean girls in year ten and eleven at high school who had been involved in the pilot testing of the student questionnaire. No problems in terms of set time and understanding of the questions were encountered and the participants recommended that the focus group questions be used as they were. Table 5.1 shows how the questions were matched to answer study questions.

Table 5.1

How interview and questionnaire questions were matched to answer study questions

Research question number	Focus group questions and discussion themes
2. Reasons for design and technology subjects choices by fourth form girls.	<ul style="list-style-type: none"> <li>- Influences on girls' subject selection (all questions in appendices xxiii-xxvi, questions 3-9 in appendix xxii)</li> <li>- School's role in subject selection (questions 2 and 7 in appendix xxiii; questions 2 and 4 in appendices xxiii and xxiv; question 4 in appendix xxvi).</li> <li>- Career information and source (questions 2 and 7 in appendix xxiii; question 2 in appendix xxiv and xxv; question 7 in appendix xxvi).</li> <li>- Effect of culture on subject choices (question 1 in appendices xxiv, xxv and xxvi).</li> <li>- Why fewer girls take D&amp;T subjects (all questions).</li> <li>- Perceptions of D&amp;T subjects (question 3 in appendices xxiii and xxvi; question 6 in appendices xxiv and xxv).</li> <li>- Problems faced by girls in D&amp;T subjects (question 4 in appendix xxiii; question 8 in appendices xxiv and xxv)</li> <li>- Perceptions about girls taking engineering (question 4 in appendix xxiii; question 6 in appendices xxiv and xxv; question 3 in appendix xxvi).</li> <li>- Effects of Ministry policies on D&amp;T intake (question 9 in appendicesxxiv and xxv)</li> </ul>
3. Reasons for fourth form girls' achievement or lack of achievement in design and technology subjects.	<ul style="list-style-type: none"> <li>- Perceptions of D&amp;T subjects (question 3 in appendices xxiii and xxvi; question 6 in appendices xxiv and xxv).</li> <li>- Perceptions about girls taking engineering (question 4 in appendix xxiii; question 6 in appendices xxiv and xxv; question 3 in appendix xxvi).</li> <li>- Problems faced by girls in D&amp;T subjects (question 4 in appendix xxiii; question 8 in appendices xxiv and xxv)</li> <li>- Why girls perform lowly in D&amp;T subjects (all questions)</li> <li>- Effect of culture on subject achievement (question 1 in appendices xxiv, xxv and xxvi; question 2, 6, 8 and 9 in appendix xxii</li> </ul>

(ii) *In-depth semi-structured interviews.* Bryman (2001) and Merriam (1998) posit that unstructured and semi-structured interview questions are extremely prominent data gathering methods in case studies as they generate more information than closed or structured ones. Questions on the semi-structured interview schedules serve as basic conversation tools for use in guiding the interview discussion so that the focus of the research is not lost. However, there is greater flexibility in the way the questions are asked and responded to as compared to structured interviews. The questions may not be asked following the order and wording in the schedule and responses allow explanations of phenomena understanding, events occurrence, patterns and their relationships and forms of behaviour (Bryman, 2001). Probes for evidence, elaboration, clarification, attention and completion are employed now and then to elicit more supportive information and encourage participants to volunteer deeper meaning to detail when ambiguous responses to questions are given. Rubin and Rubin (1995) argue that probing is necessary to gain the necessary depth and dependability of the interview.

One of the most important skills that a researcher should develop is being able to establish rapport and trust with the respondents as this affects how much information the respondents are free to reveal (Bryman, 2001). He suggests that to gain rapport and trust, the researcher's attitude should not be judgmental during the interview but to show that she/he fully believed and appreciated the respondent's contributions and worth in a non-hierarchical relationship. De Vaus (1995) perceives that the most worthwhile activity for the researcher during in-depth interviews is to pay attention to meaning of messages spoken than mere words in the response.

Semi-structured interviewing was employed in this study for individual respondents, including school principals and education officers (appendix xxv), on whom the focus group interview was not appropriate to use. Questions one, three and six in appendices xxiv and xxv were influenced by the need to understand the effects of gender on roles males and females played in Zimbabwean society across cultures as theorized in chapter three. Questions two, three, four, five, six, seven and eight opened up to variables in and out of the classroom affecting girls' choices of and achievement in design and technology subjects. Question nine was informed by the need to find how policy decisions by Ministry as theorized in chapter two, three and four have affected fourth form girls' decisions for taking or not taking design and technology subjects. Classroom observation was the next data collection method used in this study and it is discussed in the next section.

### **5.3.3 Observation**

Mertens (1998) points out that qualitative researchers employ observation to record people's behaviours and activities as they naturally occur in the organisational setting. He maintains that observation usually offsets the gap between what participants may state in interviews and questionnaires with their actual behaviour. In this research, observation enabled me to see things first hand that participants themselves may not have been aware of or that they were unwilling to discuss. Observation aimed to uncover and add valuable information that the questionnaire and interviews could not obtain in order to answer research questions three and four.

Adler and Adler (1985) split observation into three parts: participant, peripheral and complete. Participant observation involves the researcher as part of the group being studied, participating fully in the group activities to gain an insider perspective of the phenomenon under investigation. Adler and Adler, however, argue that complete participation in the core activities of the group may not be possible for the researcher when she/he is engaged in short periods of time in the social setting as was the case with me in this study. In such instances peripheral observation is appropriate for the researcher to be part of the group only to the extent of understanding activities going on and forming an accurate picture to answer research questions. I employed peripheral observation because of the short period of time I had in each school (two weeks) and my partial involvement in the social group being studied. No specific observation schedule was used as the aim was to record as much detail on classroom behaviours and develop narrative accounts of the behaviour.

Two technical graphics lessons each lasting for two periods of 40 minutes at Riverdale and at Gemston high schools were observed. The criterion for choosing the classes for observation was determined by the gender mix of students at fourth form level in that particular subject. On the 19<sup>th</sup> January 2003 students at Gemston high school were observed learning and interacting in a lesson on the construction of polygons in technical graphics and design. At Riverdale high school students were observed learning and interacting in a lesson on the design process on the 6<sup>th</sup> March 2003. I was able to see events as they occurred in mixed girls' and boys' technical graphics and design classrooms such as the physical environment, teacher-student and student-student interactions. I had the chance to observe two staff meetings in progress at Mari Government group B and at Gemston Government group A school. Extensive notes and diagrams were used to record activities taking place and information transcription was done soon after the observation for continuous analysis.

### **5.3.4 Archival Documents**

Merriam (1998, p. 112) defined documents as a wide range of written, visual and physical material with direct relevance to the topic under study. In this research document analysis of student subjects enrolment and achievement and policy was employed to answer research question one and complement and validate interview, observation and questionnaire data and provide a holistic picture of the processes undermining girls' participation and achievement in design and technology subjects in the various schools under investigation. Four questions were used to interrogate the documents collected:

1. What is Ministry of Education, Sport and Culture policy for technical education?
2. How are schools and the curriculum supportive of technical education policy?
3. How are fourth form girls participating in design and technology subjects compared to other subjects?
4. How are fourth form girls performing in design and technology subjects compared to other subjects?

Important data such as the Education Act (1996); Annual reports of the Secretary for Education; Department of Research and Planning reports; National Manpower Survey reports, curriculum documents and enrolment figures by gender regulations, which were not accessible using the other methods were collected. Curriculum and textbooks were analysed to determine the nature of the subject and the subject positions that the secondary school design and technology curriculum constructs, supports and invites girls to take up. Previous researchers (Head, 1996; Pacey, 1993; Harding, 1987) have held the view that the nature of the subject could be the main reason why girls tend to avoid science and technology subjects. Ordinary level enrolment, examination and performance data by gender were requested from the Zimbabwe Schools Examination Council (ZIMSEC) in Harare ranging from 1991 to the present time. Data were to be categorized and analysed by school type leading to a comparisons with other different types of schools and provinces.

This section looked at the different methods that were employed to gather data for this study. The next section deals with the identification of research participants.

## **5.4 Sampling**

Since this study set out to explore the case of fourth form girls' participation and achievement in design and technology subjects in Zimbabwean secondary schools, my first task was to identify who the participants were. Purposive sampling method was used to involve only those participants who were perceived as possessing the kind of

information required for this study. The sampling frame of participants is presented in the next sections.

### ***5.4.1 Participating Provinces***

First, I needed two provinces with contrasting geographical, social and economic situations because of the need to include views of people in a highly urban population and those from a predominantly rural background. Harare and Masvingo provinces were selected because the former is a large metropolitan city with a large highly urban population and large manufacturing and service industries. Masvingo province is a predominantly rural province with one small sized town comprising a service type of industry and servicing a rural agro-based community. Previous studies in Australia (Ainley, 1993) and Nigeria (Ato & Wilkinson, 1983) suggest that school location has a significant effect on students' participation and achievement in some subject areas due to market demands of the provinces or states.

### ***5.4.2 Participating Schools***

Four different types of co-educational schools were selected from each of the two geographical provinces chosen. These were not treated as cases but as different data sites from where the case got its information from various participant groups. The Government of Zimbabwe (1996) classifies schools as Government and non-Government. For the purpose of this study, it was necessary to subdivide the two groups of schools into four owing to the non-homogeneity of the schools and girls attending these institutions. Government schools were subdivided into two categories: government group A and government group B while private schools were subdivided into elite and rural council. One school from each sub-category was selected for this study in each of the two provinces of Harare and Masvingo (see table 5.2).

The study included two private, two government group A, two government group B and two rural council schools. This school selection allows representative views from the four categories of schools and socio-economic sections of Zimbabwe society to be heard. The private elite schools category in this research comprise high socio-economic schools that are multi-racial in nature and characterised by high fee payment, adequate resources and a highly qualified staff. There are six of these schools in Harare and two in Masvingo province. Students from mainly European families and some rich Africans attend these schools because their parents can afford the high fees demanded.

Table 5.2

Participating schools (Pseudonyms have been used for names of schools)

School type	School name	Province	Enrolment		4 <sup>th</sup> form girls (N)	4 <sup>th</sup> form girls taking D&T (N)	D&T subjects offered
			Girls (N)	Boys (N)			
Private	Riverdale	Masvingo	270	258	20	3	TG
	Telford	Harare	265	286	28	1	Bui, Agri
Govt. A	Gemston	Masvingo	671	721	94	5	TG,WT, MT
	Denlow	Harare	389	398	34	0	TG,WT, MT
Govt. B	Mari	Masvingo	561	579	37	3	TG,WT, MT
	Tembo	Harare	427	410	23	0	WT,
Rural	Mau	Masvingo	229	267	50	0	BT, WT
	Mbizi	Harare	232	194	61	0	BT, TG
Totals			3044	3113	347	12	

Govt = Government; D&T = Design and technology; TG = Technical Graphics; MT = Metal Technology; WT = Wood Technology; Bui = Building Technology

Government group A schools are former white medium to high socio-economic schools in urban low-density areas. Eighteen of these schools are in Harare province alone while Masvingo has only one. Students from the middle class section of the society (both Black and White) attend these schools. Government group B schools are low socio-economic urban, high-density township schools that historically catered for urban black rural-urban migrant workers. There are 21 of such schools in Harare province and seven in Masvingo province. Rural council schools are extremely low-socio-economic community schools run by District Councils. Harare has 16 of these council schools in the peri-urban area while Masvingo has 44. Both government group B and rural schools are characterised by very poor learning resources as a result of extreme under-funding from government. Previous studies in the USA (Ma, 2001), Canada (Krugly & Smoska (1995) and in Australia (Teese, 1989) have shown that socio-economic status (SES) and social expectations of both the family and school affects students' choice of subjects and their subsequent performance.

An important factor that I considered in inviting schools to participate in this research was their accessibility in the limited amount of time available for data collection. Thus, the schools selected were in and around the two urban centres of Harare and Masvingo. Each of the schools invited to participate in the study was co-educational

so as to reveal the gender tensions affecting girls' access to and achievement in design and technology subjects.

### 5.4.3 Participating Students

All fourth form girls at each of the eight schools (N=321) except at Mbizi where random sampling was used, were asked to fill in consent forms agreeing to complete the student questionnaire and to participate in focus group interviews (see appendices xii and xiii). From the questionnaire results, two groups of girls were identified at each school: those taking and those not taking design and technology subjects (see table 5.3). There were fewer girls taking design and technology subjects and all were invited and gave their consent to participate in focus group interviews. A simple random probability sampling technique was used to select only eight girls from each group of girls not taking design and technology subjects to participate in focus group interviews since they were more than the eight girls I wanted involved in each focus group.

Table 5.3

Fourth form girls giving consent and selected for focus group interviews

School type	School name	4 <sup>th</sup> form girls taking D&T (N)	4 <sup>th</sup> form girls not taking D&T (N)	4 <sup>th</sup> form girls completing questionnaire (N)	Average age of girls (YRS)
Private	Riverdale	3	8	20	16
	Telford	1	8	28	16
Govt. A	Gemston	5	8	94	16
	Denlow	0	8	34	16
Govt. B	Mari	3	8	37	17
	Tembo	0	8	23	17
Rural	Mbizi	0	8	35 from a total of 61	17
	Mau	0	8	50	17
Totals		12	64	321	16 yrs 6 months

Govt = Government; Techn. = Technology; Sch. = School; yrs = Years, D&T = Design and Technology

All 321 girls gave their consent to participate by signing consent forms for the filling in of the questionnaire (see appendix xii) and focus group interviews (appendix xiii). Simple random probability sampling ensured that participants had an equal probability of being included in the sample. A large group of 8 girls was deemed big enough to cater for group 'no shows' or participants who are selected for focus group interviews but later do not turn up. The eight girls were selected by writing numbers on similar sized, shaped and coloured paper amounting to the number of fourth form girls at

a particular school and then mixing the papers in a basket. Without informing students which numbers would be selected, girls were asked to pick a single paper from a raised basket where they were unable to see inside. Girls who had picked numbers one to eight were included in the sample. Generation of random numbers as recommended in random probability sampling could not be done since the computer facilities were not available.

Only 12 fourth form girls from a total of 321 girls in all the eight selected schools were taking design and technology subjects. One black and two white girls taking the subjects were from Riverdale private high school. One black girl taking the subjects was from Telford private high school and five Black girls were enrolled at Gemston Government group A high school. The only low economic status school to have girls taking a design and technology subject was Mari in the high-density suburbs of Masvingo town. None of the 12 girls were enrolled to take metal technology, wood technology or building technology but were all taking technical graphics.

#### ***5.4.4 Participating Significant Others***

Though the study's focus is on fourth form girls, there are other groups of people and individuals in each of the eight schools who were selected to provide what Rubin and Rubin (1995) called perceptions of critical others. These people include design and technology teachers, guidance and counselling teachers, school principals, design and technology education officers and parents. Perceptions of these 'critical others' was considered important to include diverse views that would provide a deeper understanding of factors affecting fourth form girls into design and technology. For the teachers' sample, a decision was made to include all design and technology as well as technical subject teachers with two or more years teaching experience at each school to increase the number of teachers who were participating in the focus group interviews since the number of design and technology teachers were just too small to make a focus group in some schools.

Including both design and technology and technical teachers also gave the interviews an equitable gender balance as more females teaching home economics were able to participate. A total of 15 male and 10 female design and technology and home economics teachers signed the consent forms to be interviewed at the eight schools (see table 5.4). The teachers represented a diverse of teaching experience ranging from three to 27 years. Their teaching subjects included metal technology and design, wood technology and design, technical graphics and design, building technology and design, fashion and fabrics and art. Of the 10 female teachers, only 4 had bachelors' degrees in education while the rest had teaching diplomas. Of the 15 male teachers, 5 had bachelors' degrees in education while the remaining 10 had teaching diplomas. There was one

guidance and counseling teacher who declined to be interviewed alone and so joined the design and technology and technical subject teachers group.

Table 5.4

Design and technology and technical teachers participating in focus group interviews.

School type	School name	Teacher	Subject(s) taught	Qualifications	Experience	
Private	Riverdale high	1 female	Art	Dip. Ed.	6 years	
		1 female	Food and nutrition	B. Ed.	10 years	
		1 female	Counselling	B. Ed.	26 years	
		1 male	Technical graphics	B. Ed.	11 years	
	Telford high	1 male	Building technology and agriculture	Dip. Ed.	8 years	
Government group A	Gemston high	1 female	Technical graphics	Dip. Ed.	13 years	
		1 male	Technical graphics	B. Ed.	13 years	
		1 male	Wood technology	B. Ed.	22 years	
		1 male	Metal technology	Dip. Ed.	9 years	
	Denlow high	1 female	Technical graphics	B.Ed.	13 years	
		1 male	Metal technology	Dip. Ed.	27 years	
		1 male	Metal technology	Dip. Ed.	7 years	
		1 male	Wood technology	Dip. Ed.	9 years	
	Government group B	Mari high	1 female	Food and nutrition	Dip. Ed.	5 years
			1 female	Fashion and fabrics	Dip. Ed.	4 years
1 male			Metal technology	Dip. Ed.	11 years	
1 male			Wood technology	Dip. Ed.	11 years	
1 male			Technical graphics	Dip. Ed.	6 years	
Tembo sec.		1 male	Wood technology	B. Ed.	9 years	
Rural	Mbizi sec.	1 female	Fashion and fabrics	Dip. Ed.	8 years	
		1 male	Wood technology	B. Ed.	18 years	
		1 male	Building technology	Dip. Ed.	7 years	
	Mau sec.	1 female	Building technology	B. Ed.	3 years	
		1 female	Food and nutrition	Dip. Ed.	5 years	
		1 male	Technical graphics	B. Ed.	13 years	
		1 female	Counselling	B. Ed.	10 years	
	Totals		11 females	Art	1	B. Ed. 11
		15 males	Metal Tech.	4	Dip. Ed. 15	
			Wood Tech.	5		
			Tech. Graphics	6		
			BuildingTech	3		
			Fashion/fabrics	2		
			Food/nutrition	3		

Sec. = Secondary; Dip. Ed =Diploma in Education; B. Ed. (Ed) = Bachelor of Education

Though I had planned to include all eight principals at the eight schools selected in the principals' sample, I only managed to have five giving their consent to participate in in-

depth interviews. The other three principals were not available as they were away from their schools on official business during the time I visited their schools. The five principals who gave consent for participation were from a private school (1), from a Government group A school (1), from a Government group B school (1) and from rural secondary schools (2). The two rural principals were both female while the three male principals were stationed at urban schools. Three heads of schools including the two female principals were first-degree holders while the remaining two males had Masters' degrees.

Eight families were selected and gave their consent to take part in the family focus group interviews (appendix xviii) making it one family per each school selected (see table 5.5).

Table 5.5

Summary of families giving consent to participate in focus group interviews

School type	School name	People interviewed	No. of interviews	No. in group	Place of interview
Private	Riverdale	Musha family (father, mother and daughter)	1	3	Parents' home
	Telford	Rewa family (father, mother, son and daughter)	1	4	Parents' home
Government group A	Gemston	Hanga family (father, mother and daughter)	1	3	Parents' home
	Denlow	Joya family (father, mother, auntie and mother's sister)	1	4	Parents' home
Government group B	Mari	Mutema family (mother and daughter)	1	2	Parents' home
	Tembo	Bere family (father, mother, 2 uncles, 2 aunts)	1	6	Parents' home
Rural	Mbizi	Choto family (father, mother and daughter)	1	3	Parents' home
	Mau	Mumba family (father, mother and daughter)	1	3	Parents' home
Totals			8	28	

Sec. = Secondary; (Pseudonyms were used for all names)

Four families were from Harare province and four from Masvingo province. The eight families were selected only because their children had agreed to participate in student focus group interviews. Selection was done by random sampling of the girls who had given their consent to participate in focus group interviews. Family participation in interviews was perceived to validate and strengthen girls' contributions. A letter requesting the parents to participate in family interviews was sent with the student to the parents and students brought replies the next day and arrangements were made to carry the interviews at their family home.

## 5.5 Ethical Issues

This research was undertaken within the ethical guidelines and procedures outlined by the Massey University Human Ethics Committee and the Code of Ethical Conduct for Research and Teaching Involving Human Subjects (2001). Approval, PN Protocol 02/121 was granted by the committees after satisfaction that the research's intended conduct was not going to cause harm to participants, the university or the researcher (see appendix ii). Four main areas had to be addressed throughout the study as ethical concerns: avoiding harm to participants, informed consent, privacy and confidentiality, and avoiding deception. I understood ethical behaviour as expected appropriate conduct with participants including respecting their rights as citizens, cultural group, and as individuals.

The first consideration was ensuring that no harm befell participants who included fourth form girls, their teachers, principals, education officers and parents in their involvement in the study. Bryman (2001) argues that researchers must avoid studies that expose participants to "physical harm, harm to participants' development, loss of self-esteem, stress and inducing subjects to perform reprehensible acts" as this is unacceptable (p. 479). In this study, I was careful not to expose participants' private lives or classified information to public ridicule, for example, anything that would cause anger on participants, affect their self-esteem or induce stress. The first task was not to publish any participants' confidential information or transcriptions considered harmful. Secondly, effort was made by the researcher to value every participant and their contribution no matter how unimportant and irrelevant it was to the study. Thirdly, where there was only one girl being interviewed as in the case of Telford school, a female teacher was asked to be present during the interview. This gave the girl confidence to talk freely to me as a male researcher.

Bryman (2001) contends that for the research to be empowering and emancipatory, its aims and purposes should be communicated and understood by the participants before giving their written consent. Participants in this study had the right to

know what the study involved beforehand and to give their informed consent for participation in written form. The standard procedure for getting approval to carry out research in Zimbabwean schools is a top-down model beginning with seeking permission from the Secretary of Education, Sport and Culture. A letter seeking permission to carry out research in Zimbabwean schools (appendix iii) was written and posted to the Secretary of Education, Sport and Culture in September 2002 and permission was granted at the end of November 2002 while I was in New Zealand (see appendix vi). With this permission granted, all other avenues down the system were open for me. Equipped with an approval letter from the Secretary, I travelled to Zimbabwe in the first week of January 2003. The following week, I went to see Provincial Regional Directors of Education in Harare and Masvingo to seek permission to enter schools in the respective provinces and conduct research (appendix iv). Permission was granted (appendices vii and viii) and using these letters from the Provincial Regional Directors of Education, I wrote letters to principals (appendix v) seeking permission to carry out research in their schools. The letters were followed by phone calls to the principals concerned prior to my visits to schools. Only one school gave written confirmation for me to carry out research in the school while the other seven principals upon seeing the Regional Directors letters of consent confirmed participation by signing consent forms and giving me permission to carry out research in their schools (see appendix xvi). Consent from fourth form girls, design and technology teachers and guidance and counselling teachers was given through the participants' signing of consent forms (see appendices ix, x, xii, xiii, xiv, xv)

Consent for parents to participate in the study was secured by hand posting letters and study information sheets with their daughters who then brought back signed consent forms (appendix xviii) the following day. Consent from one Education Officer was secured by using the letter from the Regional Director of Education and the officer signed the consent form (appendix xvii). One Education Officer was not in his office during my visit to his office. For students' archival enrolment and performance data from the Zimbabwe Schools Examination Council (ZIMSEC), I first sent a letter (appendix xix) and followed it up with an electronic-mail to the Director while still in New Zealand and consent was given at the end of November 2002 to visit the department's offices in January 2003 (see appendix xx).

Participants' role while participating in the research was spelt out in the information sheet and consent forms which participants had to read, understand and sign upon agreeing to all conditions set therein including the right to withdraw from the study at any time and refusal to answer questions perceived as intrusive of their private social space (see appendices ix, x and xi). Issues of anonymity and confidentiality were

considered important in the study to avoid divulging any participant information that could be potentially harmful to them. Pseudonyms were used in this study for names of participating schools, focus group and in-depth interview participants during collection, transcription and writing of the results. Quotes were also selected to avoid identification of participants. All audiotapes and their transcripts were stored in locked cupboards and access to these was only limited to the researcher and thesis supervisors only. While every effort was made to conceal the identification of every school selected, it was not possible to do this on one government group A school in Masvingo because it is the only one of its type in the province. This issue was dealt with by the use of pseudonyms and abbreviations for reporting data (see appendix xlix). The other schools selected would not be able to be identified as they were randomly selected from a large pool of schools of their categories (see section 5.4.2).

Avoiding deception went hand in hand with informed consent. Bryman (2001) perceives that for any study to be considered ethically conducted, the researcher's own integrity, professionalism and personal accountability are important factors. In other words, the researcher has to avoid presenting "their research as something other than what it is" (p. 483) as deception harms the image of the researcher and credibility of the work. Openness and accuracy of information were thus of paramount importance for both the researcher and participants in this study from the beginning to the end. A letter of research approval was attached to all communication sent to participants to confirm authenticity of intention.

In the next section I present the information gathering processes for this study.

## 5.6 Instrument Administration

Fieldwork was carried out from 13<sup>th</sup> January 2003 to 29<sup>th</sup> May 2003 (see table 5.6.)

Table 5.6

Visits to schools and dates instruments were administered

School	School type	Province	Dates in school
Mari	Government group B	Masvingo	15-26/01/2003
Gemston	Government group A	Masvingo	27/01-08/02/2003
Riverdale	Private	Masvingo	10-22/02/2003
Tembo	Government group B	Harare	24/02-08/03/2003
Denlow	Government group A	Harare	10/03-22/03/2003
Mbizi	Rural	Harare	24/03-05/04/2003
	School holiday	10/04-05/05/2003	
Telford	Private	Harare	06-17/05/2003
Mau	Rural	Masvingo	19/05-29/05/2003

A student questionnaire, a focus group interview schedule and an in-depth interview schedule were the three instruments administered to explore and understand participants' lived experiences, perceptions and attitudes in respect of fourth form girls' participation and achievement in design and technology subjects. The processes involved in administering the instruments are described in this section.

### ***5.6.1 Student Questionnaire***

After receiving consent from the principal of each school selected (see appendix xvi), a questionnaire (see appendix xxii) comprising nine questions was administered by the researcher to fourth form girls on the first day of the visit. Fourth form classrooms were used at all schools except at Gemston where the researcher was asked to use the school hall to accommodate all the 94 fourth form girls and administer the questionnaire to all girls at once. A female teacher at each school was requested to be present in the classroom as per Ministry of Education rules in Zimbabwe and researcher protection. Each student was issued with the information sheet and the consent form first and I explained issues concerning the research purpose, consent, anonymity and how the information collected would be used and stored as per the Massey University Human Ethics Committee and the Code of Ethical Conduct for Research and Teaching Involving Human Subjects (2001). All the girls gave their signed consent to participate in the research. The questionnaire was then issued to each girl and they were asked to write pseudonyms instead of their real names for anonymity purposes. Participants were then instructed to fill in the questionnaire without consulting other students. Where participants had queries, they were asked to raise up their hands for the researcher to explain. In all schools, it took the participants about 30 minutes to complete the questionnaire.

The information gained from question five of the questionnaire about which design and technology subject each girl was taking this year was used to put participants into two groups to participate in focus group interviews: those taking and those not taking design and technology subjects.

### ***5.6.2 Focus Group Interviews***

There were five girls taking a design and technology subject at Gemston, three at Riverdale, three at Mari and only one at Telford (see table 5.3 on page 94). Since the numbers were less than the maximum eight I had planned, girls at each of these schools

formed a focus interview group with the exception of the one girl at Telford whose interview was changed to in-depth.

Girls not taking design and technology were more than the eight planned for focus groups in this study and random sampling had to be carried out to select only eight girls from each school (see section 5.4.3). Focus group interviews were carried out soon after the groups were identified and selected. The same processes of issuing participants' information sheets and consent forms and explaining issues concerning the research purpose, consent, anonymity and how the information collected would be used and stored as per the Massey University Human Ethics Committee and the Code of Ethical Conduct for Research and Teaching Involving Human Subjects (2001). The code was followed again with focus groups. All the girls gave their signed consent to participate in the research. A female staff member was asked to be somewhere in the interview room but further away from the group to allow the participants to respond without fear of being heard by the teacher but comfortable enough to know that the teacher was there for their protection.

Where there were girls taking design and technology subjects at each school, I had the focus group interview with them first before the group not taking the subjects. My interest was to know first of all what made some girls take the subjects, which were avoided by others. Each question was taken as a discussion theme (see appendix xxiii). Participants were allowed to narrate issues, probe each other's viewpoints, ask questions and contest some issues. Probes were pursued as issues were discussed and rich data touching on the social, psychological and feminist perspectives were obtained. At times I noticed that participants became rather uneasy and reluctant to offer more information. In such instances it was necessary to discontinue with the line of probing so as to maintain participants' interest in the discussion. This balancing act was maintained and worked at continuously to elicit the required information.

Four interviews with girls taking design and technology and eight with girls not taking design and technology were audiotape recorded and transcribed. None of the participants could be identified by name and each participant was allocated a pseudonym for anonymity. Tape recording was preferred because of the obvious advantage of recording the participants verbatim along with the added advantage of freeing the interviewer to participate in the dialogue instead of concentrating on note taking. Interviews took between 40 minutes and one hour to complete.

Focus group interviews were carried out with four teachers each at Gemston, Mau, Denlow and Riverdale, five at Mari, and three at Mbizi while in-depth interviews were carried out at Tembo and Telford where there was only one teacher each. The same processes of issuing participants' information sheets and consent forms and explaining

issues concerning the research purpose, consent, anonymity and how the information collected would be used and stored as per the Massey University Human Ethics Committee and the Code of Ethical Conduct for Research and Teaching Involving Human Subjects (2001). This was followed again with teachers' groups. All teachers gave their signed consent to participate in the research. Questions on appendix (xxiv) were used as discussion themes.

I had hoped to interview Guidance and Counselling teachers at the eight schools selected. However, these were available only at two schools. The teachers declined to be interviewed alone and joined the technical subjects' teachers group. All interviews were tape recorded and transcribed later. Each interview took between 40 minutes and one hour.

Parents' family focus group interviews followed the same ethical procedures as students and teachers. The interviews were, however, carried out at the parents' homes and the parents' interview schedule (appendix xxvi) was used. Rich data were obtained from family interviews mostly on cultural influences to subject selection at school. Each interview took between 40 minutes and one hour to complete and was tape-recorded and transcribed later.

### ***5.6.3 In-depth Interviews***

Principals of schools and design and technology education officers comprised the cluster of participants for in-depth semi-structured interviews. They too went through the ethics procedures before interviews could begin, and these interviews were held in their offices. Open-ended interview formats used generated rich data that were tape recorded and transcribed. Each interview took between thirty and forty minutes. Like the focus group interviews, tape recording was preferred because of the obvious advantage of recording the education officer verbatim along with the added advantage of freeing me to participate in the dialogue instead of concentrating on note taking. I had anticipated interviewing one Design and Technology Subject Education Officer in Harare province and one in Masvingo province. However, only the Masvingo Education Officer was available for the interview. The Harare Education Officer was said to be out of his office during my visit to Harare. Three of the eight heads of schools were not available for interviews as they were away from their schools on official Ministry of Education, Sport and Culture business.

## 5.7 Data Analysis

Bryman (2001) defines information analysis as strategies to arrive at and derive meaning out of the multiplicity of information gathered. This can be a difficult process for an inexperienced researcher as making sense of the rich field of qualitative information collected by multi-method approaches can be like “finding a path through the thicket of prose” (ibid, p. 388). There were no clear routes but many dangers existed such as being overwhelmed by the richness of the information and getting lost in it. Denzin and Lincoln (1994) perceive that research analysis and interpretation can be achieved by gradually drawing meaning from the information abductively and inductively as it is being examined and analysed, through reference to the literature reviewed deductively or through the application of abduction, induction and deduction. Analysis of results in this study applied abduction, induction and deduction.

A constant comparative approach was used in the organization and analysis of data in this case research. The case being focussed on was the few fourth form girls participating and achieving in design and technology in Zimbabwean secondary schools. The schools were the data sites and the various group participants were the data sources to explain the case. Analysis was then approached from the point of within particular group or data source compared to other participant group data sources, other schools and provinces drawing on similarities and differences (Huberman & Miles, 1984). These comparisons were drawn together to explain the case.

### 5.7.1 Qualitative Data Analysis

Qualitative data analysis entailed scanning within each data type including that coming from girls taking and not taking design and technology subjects, design and technology teachers, principals, parents and education officers followed by school type and provincial comparisons looking at differences and similarities and gleaning out contextual and climatic variables influencing girls’ low participation and low performance. This process was carried out following Huberman and Miles’ (1984) and Patton’s (1990) conceptual models of clustering or finding patterns and developing category systems guided by the research questions, objectives and literature review readings. Initial clustering or classification, categorisation and thematic grouping of data were done in Zimbabwe, as the data were being collected and transcribed. This meant that continuous conceptual categories were being generated as data continued to be gathered providing the opportunity for identifying weaknesses in the research process and data being gathered. Lofland and Lofland’s (1995) advice that the analysis of the qualitative data not be left until all the interviews have been completed and transcribed

was taken on board to solve the problem of piled up amount of text to be analysed. Both interview and observation data were scanned in order to identify the underlying themes. These themes were then sorted into tentative major categories into which further data were inputted.

I was able to analyse ten interviews and two observations while still in Zimbabwe, working, “back and forth between the data and the classification system to verify the meaningfulness and accuracy of the categories and the placement of data into categories” (Patton, 1990, p. 403). Huberman and Miles (1984) point out that this constant revision of data and emerging themes is instrumental in establishing connections between data through comparisons and contrasts across data sets. Emerging themes from the education officer, school heads, design and technology teachers, students taking and not taking design and technology subjects had slight variations compelling the formation of tentative categories for each data type.

Upon my return to New Zealand, the first round of analysis was completed going through all focus and semi-structured interviews, lesson observations, questionnaire data and archival documents manually. Each data set was analysed individually first and combined later with other data sets to get common meanings. After going through the data by the manual analysis method, I was then introduced to a postgraduate interactive group at Massey University and taught how to use the QSR N6 programme by one of the staff members. The second round of data analysis was thus done using the QSR N6 programme which worked through individual data sets in almost the same manner as the manual method of finding patterns and developing categories. The beauty of the programme was however, the ease of which similarly categorized or coded data were picked up and compiled from various pages and sections of the individual full transcript into a single page or two. Transcribed data is identified, given a code name known as a node in the process of coding, fractured and reassembled as different combinations of script supporting the node (see appendix xxxvi). The QSR N6 programme also displays the line number from which the coded data came from for quick location of data. Matching the manual and N6 analyses helped the results to be more credible (see 5.6.1).

Themes were compared against each data set, school and province by the constant comparative method (Silverman, 1993; 2000). This entailed working back and forth through the data by the manual and QSR N6 methods, identifying patterns and relationships, building, discarding and merging some themes. This process of thematic re-organisation resulted in the tentative formation of 32 themes initially with the manual method. Further working through the data using the QSR N6 programme, classifying and clustering by comparing and contrasting data refined and reduced the themes to 25 upon which the presentation of the findings were finally constructed. There were no prior

determinations of categories into which data were to be classified but rather, these emerged as data were being collected and analysed. McMillan and Schumacher (1997, p. 502) point out that the abductive and inductive analysis approaches include continuous discovery and identifying of tentative patterns in data throughout every stage of the study. Arguing for this method, McMillan and Schumacher (1997) posit that:

The technique of comparing and contrasting is used in practically all intellectual tasks during analysis; identifying data segments; naming a topic/category; and grouping each data segment into a topical category. The goal is to identify similarities and distinctions between categories, to discover patterns (p. 505).

The major themes drawn from information gathering processes in this study were the windows upon which research questions were answered and presentation of results premised. As far as possible, quotations in participants' own words were used to tell the story of their experiences so as to enhance the connection between data and the twenty-five themes.

### ***5.7.2 Quantitative Data Analysis***

Quantitative data such as enrolment and performance were analysed using descriptive statistics and reported as either frequencies or percentages of the total number of respondents (see chapter six). The spreadsheet programme was used to generate the frequency distributions. Percentage distributions, according to Bryman (2001), Alreck and Seattle (1995) and De Vaus (1995), are often easily interpreted and of more interest than the frequency distributions (the number of respondents that have chosen that particular scale category). They agree that percentages make comparability of groups even when based on different total frequencies and more importantly that the sample percentage can be used directly as an estimate of the percentage of total population. Data were categorised, compared and contrasted from school to school and from region to region for common or irregular trends and fed to support interview and observation data.

## **5.8 Adapting Validity and Reliability for Qualitative Research**

Validity has been used as a research self-check measure to determine whether the researcher is observing, identifying or measuring what the researcher intended while reliability indicates the degree to which research findings can be generalized across social settings (Bryman, 2001; Mason, 1996). However, qualitative researchers have often questioned the relevance of validity and reliability considering the epistemological and ontological differences between quantitative and qualitative methods (LeCompte & Goetz, 1982). Some qualitative researchers have suggested that for issues of validity and

reliability to be imported to qualitative research, it is necessary to change the terms in line with a non-positivist stance (Burns, 1994; Guba & Lincoln, 1994; LeCompte & Goetz, 1982). Guba and Lincoln (1994) propose trustworthiness and authenticity as two criteria that can be used for assessing a qualitative study in place of reliability and validity as used in quantitative research.

### ***5.8.1 Trustworthiness***

Trustworthiness deals with the extent to which the research has observed, identified or measured what it intended to measure as well as how the findings reflect reality in the social world. Merriam (1998) suggests that it is important for qualitative researchers to concern themselves with ensuring that their research is of an acceptable scholarly standard, believable and trustworthy. Since words are used to explain phenomena and understanding is the key to qualitative research, several meanings may be obtained from the same study unlike quantitative research that assumes an objective reality. Because of the multiple meanings that may be generated in qualitative research, establishing trustworthiness of results becomes necessary.

Bryman (2001) argues that the terms credibility, as equivalent to internal validity in quantitative research, transferability to external validity, dependability to reliability and confirmability to objectivity, are the four criteria that must be achieved in trustworthiness. For example, LeCompte and Goetz (1982) argue that establishing credibility may be achieved by the congruence of results from the many information collection techniques qualitative researchers use such as participant observation, interviews, checking transcriptions and other information with interviewees as well as the individual monitoring of the research process by the researcher. Feeding back of initial interpretations and information analysis to participants is important as it enables participants to comment on the accuracy of interpretations. For Bryman (2001), several converging accounts of a social reality backed by respondent validation provide strong factors for the study's acceptance by members of the research community.

One tool that has been used effectively by qualitative researchers to gain trustworthiness of research results is triangulation, introduced in social sciences by Webb, Campbell, Schwartz and Sechrest (1966) and elaborated by Denzin (1970). Denzin defines triangulation as the employment of several methods to analyse a study with the hope that the methods result in data collaboration and congruence. Bryman (2001) argues that multiple methods used to study the same phenomenon tend to give credibility to issues of trustworthiness of results by looking at consistence and congruence of data from these several techniques. By comparing the information derived from different techniques of data collection one is able to determine whether or not there

is information corroboration. Four types of triangulation have been suggested in educational research. These include data triangulation involving the use of a variety of data sources, investigator or researcher triangulation consisting of the use of several rather than solo researchers, theory triangulation involving the use of more than a single theoretical framework or scheme in the interpretation of data, and methodological triangulation which employs more than one method or technique to gather data (Fraenkel & Wallen, 1993; Denzin & Lincoln, 1994).

In this research, credibility issues were dealt with by employing triangulation including questionnaire, focus group and in-depth interviews, lesson observation and archival information as well as a variety of data sources such as fourth form girls taking and not taking design and technology subjects, their design and technology teachers, principals, education officers and parents which were all used to provide converging data explaining factors affecting fourth form girls' participation and performance in design and technology subjects. Congruence of results from all these sources and techniques had the potential to validate the research. It is argued (Denzin & Lincoln, 1998, p. 3) that a multi-method approach to the examination of phenomenon allows the researcher to draw more insight from the study than being confined to a single and sometimes non-interactive approach. Denzin and Lincoln (1998) argue that research methods must be used in combination in a manner that accentuates, harnesses and exposes the most results from the phenomenon under study.

Generalising results across social settings is considered problematic in case studies owing to the generally small samples and case study focus for establishing rich descriptive accounts of a phenomenon at a local setting which may not be comparable to other settings. However, Guba and Lincoln (1985) argue that transferability of information to other settings, though not the province of case study, may still be achieved by using the rich and thick local descriptions of a social setting as reference material or a database by those who may be in the same situation to compare their situation with situations in other settings and making judgments. This case study had exploration and understanding of fourth form girls low participation and low performance as the main goal.

Dependability as a parallel to reliability in quantitative research entails keeping all records of all phases of the research process for peer auditing to establish how far proper procedures are being and have been followed in conducting the research. In this case, all research procedures need to be described in detail including theories underpinning the study, and the position of the researcher to the research participants. Bryman (2001) argues for transparency, revealing even weaknesses in the research

process as important for information to be considered reliable as hiding or losing some parts of the study may be viewed by peer auditors as hiding inconsistencies and errors.

In this study issues of dependability were dealt with by ensuring records of all phases of the research process were kept including letters seeking permission and approval to carry out the research in schools, classroom observation notes, interview tapes and transcripts, archival data on enrolments and performance and field notes. The use of mechanically recorded data in this research meant that all interviews were audiotaped and transcribed in full emphasizing verbatim accounts of the discussions held with participants that are available for verification. Analysis of the data was strictly on these accounts. Archival statistics from the Zimbabwe Schools Examination Council (ZIMSEC) on national enrolment and performance for all fourth form students were secured and retained to confirm numerical figures, graphs and tables used in this study.

### ***5.8.2 Authenticity***

Authenticity deals with a set of issues concerning the wider political impact of the research like fairness and agency. In terms of fairness, Guba and Lincoln (1994) implore the researcher to include all the different viewpoints of the members of the social setting without bias so as to build reality from different angles rather than from one favoured viewpoint. Various viewpoints are more amenable to issues of trustworthiness. In this study, various viewpoints from fourth form girls taking and not taking design and technology subjects, their design and technology teachers, parents, principals and design and technology education officers were used to build an understanding of issues affecting fourth form girls participation and performance in design and technology subjects.

In terms of agency, Guba and Lincoln mention four authenticity factors considered feminist for their action focus: ontological, educative, catalytic and tactical. Ontological authenticity is concerned with helping the participants to arrive at a better understanding of their social environment and the forces affecting them. Bryman (2001) comments that ontological authenticity goes hand in hand with educative authenticity aiming to help participants to understand and appreciate the viewpoints of others in the social milieu. Once the participants have been made to understand their social environment and how it impacts upon them as well as learning to accommodate other people's views, Guba and Lincoln (1994) perceive that this knowledge should empower participants to engage in action to change their circumstances.

By discussing issues affecting girls' participation and achievement with the affected fourth form girls, teachers, parents, principals and education officers, the researcher was making them aware of circumstances they had taken for granted for a long time in Zimbabwe. Many participants thought that design and technology subject

were the province for males and not females and such awareness awoke their thoughts to issues of hidden messages of subjectivity, skills alienation and consequences for future job opportunity loses for girls.

## **5.9 Limitations of the Research Design**

The case study research design and the eclectic data collection methods adopted for this research were anticipated to give the study more insight into site similarities and differences as well as to corroborate information. However, the two weeks spent in each of the eight schools visited, might not have been enough for the researcher to be fully immersed into the social world of the participants to unravel most issues affecting fourth form girls' participation and achievement. Usually deeper data meanings are obtained from researcher prolonged visits and immersion into research sites. Kvale (1996) and Bryman (2001) however, argue that when observation is not the main method of data collection as in ethnography, the issue of prolonged time spend collecting information at a site might not be so important as enough and quality data collected. In this respect, I felt that I had collected enough information from participants during the two weeks I was at each school. Moreover, limitations of time meant that the five months allocated for fieldwork had to be divided among the eight schools.

Secondly, while the eight schools were selected to gain insight into site similarities and differences, too many schools were feared to pose problems of tying the results together with meaning being lost in the process. Information from the schools and various participant groups would be bulky and to take a long time to analyse. However, deeper meaning would be obtained from more schools than would have been possible if one school had been studied. Thirdly, the study covering eight different secondary schools in two geographical provinces of Zimbabwe meant costly travel between Harare and Masvingo provinces and between the schools in the limited budget I have.

Fourthly, I felt that only twelve girls taking design and technology subjects in three of the eight schools may not give a fair representation of processes affecting fourth form girls' taking or not taking of the subjects. I believe a more representative picture of events would emerge if there were more representation of girls taking design and technology subjects in all the eight schools. Girls not taking design and technology subjects were more than enough required for interviews and random sampling had to be done to choose participants. As a result, a more rounded picture of processes affecting girls taking and not taking design and technology subjects was obtained from these girls. The same goes for female teachers where only three of the eleven female teachers interviewed were teaching design and technology subjects with the rest teaching home economics and counseling. Though female teachers not teaching design and technology

subjects helped with general views, more female teachers actually involved in the teaching of design and technology subjects would have provided a more rounded picture of processes affecting girls taking or not taking the subjects.

Translation of questions into Shona in four of the eight schools where English was not a strong subject among the students could mean that meaning might be changed in the translation. There was also the problem of finding word equivalents in English and Shona languages and vice versa which could also mean lost meaning. Transcription translation in the same schools also posed the same problems. A thorough revision of each translation and determination of meaning was hoped to minimise the problem (Poland, 1995).

My first time use of the NUDIST QSR N6 programme might also have limitations of adequate and dependable analysis. Results from the analysis using the N6 programme were however compared with the manual coding method to give results trustworthiness, dependability and credibility.

## 5.10 Summary

This research considered a case study as the most appropriate means to understand processes influencing girls' low participation and low achievement in design and technology subjects. Though the research targeted mainly fourth form girls' experiences to tease out processes that undermine their involvement and success in these subjects, other voices like those of education officers, heads of schools, design and technology teachers and parents were included to give a wider view of relevant events and processes.

An eclectic or multi-method approach to data collection through focus and semi-structured interviews, lesson observation, archival data and content analysis not only allowed for a holistic interpretation of the events and processes undermining girls involvement and performance in the subjects but was used as a research self-check measure to validate findings and promote issues of trustworthiness and authenticity of research. Similarly, employing both the manual methods of data analysis and the QSR N6 software tended to give results trustworthiness and authenticity with congruent data. The fact that both methods corroborated in the final determination of the twenty-five major themes was ample evidence of research and method confirmability. Other strategies like the employment of mechanically recorded data, use of participants' own words and transcribing all tapes in full were incorporated in this research to enhance research credibility (internal validity). The following of ethical considerations as stipulated in the Massey University Human Ethics Committee and the Code of Ethical

Conduct for Research and Teaching Involving Human Subjects (2001) ensured research authenticity and fairness to all.

The research was conducted in New Zealand over a three and a half year period as shown on the research time frame (see figure 5.1). The research was divided into seven phases. Phases one to three spanned from August 2001 to December 2002 and were carried out in New Zealand. This involved research literature searches, proposal writing, designing and testing of research instruments. For phase four involving data collection fieldwork, I travelled to Zimbabwe. Data transcription began while I was still in Zimbabwe as further data were being gathered and continued upon the researcher's return to New Zealand to complete data analysis, writing of the thesis and submission.

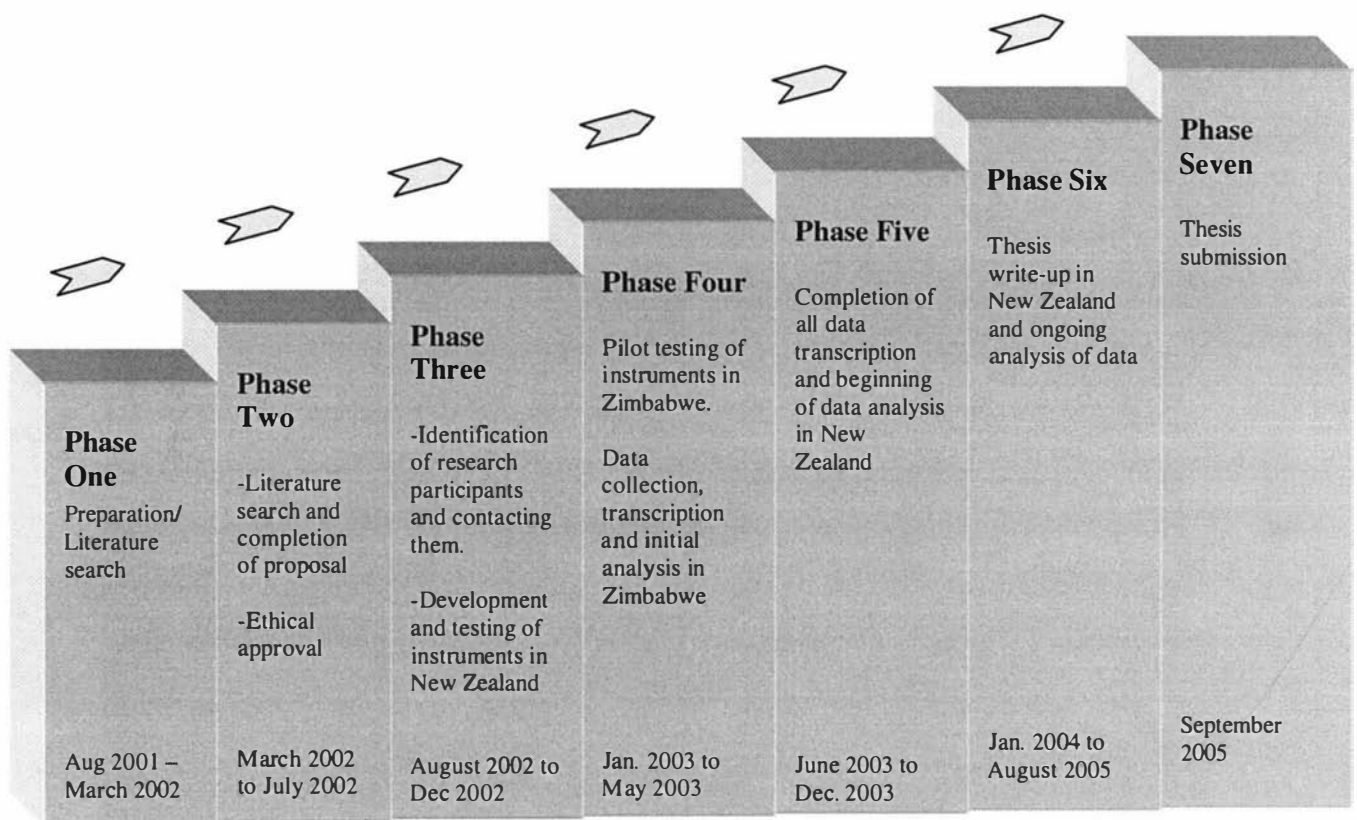


Figure 5.1. Research time frame

In the next chapter, I present the results of the study beginning with statistical information on subject enrolment and performance. Tables have been used to clarify information where necessary.

## CHAPTER SIX

### NATIONAL AND PROVINCIAL PARTICIPATION AND ACHIEVEMENT RESULTS

This chapter presents the research findings of archival data collected from the Zimbabwe Schools Examination Council (ZIMSEC) which was used to answer the first sub-question: how are fourth form girls represented and performing in design and technology subjects in Zimbabwean secondary schools and in the two provinces of Harare and Masvingo? National enrolment statistics are presented side by side with those for Harare and Masvingo provinces for comparisons. Students at fourth form level take only one technical subject from the design and technology curriculum (metal technology and design, wood technology and design, building technology and design and technical graphics and design) or from the technical curriculum (art, typing, fashion and fabrics and food and nutrition). In an examination-oriented system like that in Zimbabwe, fourth form (year 11) examination enrolment statistics were preferred for analysis rather than school enrolments in this study because they determine who finally leaves school with qualifications recognised for further study or employment purposes.

Statistical data on girls' participation in design and technology subjects were obtained from examination enrolment statistics at the Zimbabwe Schools Examination Council (ZIMSEC) from 1990 to 2001. English language was used as an indicator of total enrolment since the subject is compulsory for every fourth form student to enrol in it unlike other subjects that may be optional. Furthermore, it is a requirement that the mandatory five ordinary level passes required for any student to have a full school leaving certificate should have English language as one of the core subjects plus any other four subjects. Thus, enrolment in English language gives a realistic picture of total student enrolment provincially and nationally each year.

Independent percentages of girls as well as those for boys were calculated to avoid including girls in the greater proportion of boys enrolled at school in each of the seven years (1990, 1992, 1994, 1996, 1998, 2000 and 2001). Enrolment figures for 2002 were not yet available from ZIMSEC at the time of the study fieldwork. In this study, integrated science was chosen to represent the sciences, mathematics to represent numeracy subjects and English language to represent literacy subjects and fashion and fabrics to represent the traditional female subjects. I focus on fourth form girls and the four design and technology subjects since it is girls who are disadvantaged in apprenticeship training, tertiary courses and employment circles because they would not

have taken any of the design and technology subjects. Even though boys do not participate much in fashion and fabrics and food and nutrition, it is Zimbabwean men who dominate employment sectors associated with these subjects such as fashion and hotel catering. While women make up 51.8% of Zimbabwe's population, only 6 percent are employed in traditional male careers leaving them disadvantaged in both traditional female and male-oriented careers (Government of Zimbabwe, 1998).

## 6.1 Fourth Form Girls' Representation in Design and Technology Subjects

National and provincial statistics presented in appendix xxvii show a gendered student enrolment pattern for design and technology subjects for the years 1990, 1992, 1994, 1996, 1998, 2000 and 2001. When comparisons were made against core academic subjects such as English language, mathematics and integrated science as well as fashion and fabrics (appendix xxviii), fourth form girls' enrolment in technical graphics and design, building technology and design, wood technology and design and technical graphics and design is seen as very low. For the seven years sampled, girls' enrolment in the four design and technology subjects ranged between 0.02 to 0.7 percent compared to between 43% and 100% for English language, mathematics and integrated science and 1.9 to 10 percent for boys. The traditional girls' subject fashion and fabrics though having lower enrolment percentages compared to the three academic subjects, registered its lowest percentage as only 17% in 1994 and its highest in 2001 at 29% (see table 6.1). Boys lower participation in fashion and fabrics showed that the enrolment was gendered.

Table 6.1

Girls' national percentage participation in eight subjects compared

Subject	Year															
	1990		1992		1994		1996		1998		2000		2001			
	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %		
T/graphics	0.3	1.9	0.2	2	0.3	2.1	0.4	2.4	0.6	3.1	0.5	2.8	0.6	3		
Building	0.4	5.1	0.5	5.2	0.3	5	0.4	6.1	0.6	8.1	0.6	9.1	0.7	10		
W/technology	0.3	6.1	0.1	5.1	0.1	4.6	0.1	4.9	0.2	5.3	0.2	5.3	0.3	5.8		
M/technology	0.2	3.9	0.1	3	0.02	2.8	0.02	2.9	0.1	3.4	0.1	3.2	0.2	3.3		
English lang	100	100	100	100	100	100	100	100	100	100	100	100	100	100		
Mathematics	49	57	46	54	51	55	43	55	53	56	54	56	48	47		
Int/science	76	79	79	78	83	78	81	75	80	74	86	79	97	85		
Fashion/fabrics	18	0.2	17	0.3	17	0.3	20	0.3	24	0.5	26	0.7	29	0.8		

T/graphics= technical graphics and design, W/technology= Wood technology and design, M/technology= Metal technology and design Int/science= Integrated science

Girls' national participation in building and technical graphics and design was the highest over the seven years followed by wood technology and design and metal technology and design. Boys' average national participation was highest in building technology and design followed by wood technology and design, metal technology and design and technical graphics and design. Provincial participation rates for fourth form girls were no different from national ones in design and technology as they ranged from 0.01 percent to 0.6 percent during the seven years. On the other hand, English language, mathematics and integrated science enrolment rates for the same period ranged from 44% to 100% leaving a 43% percentage gap between the highest enrolment rate in design and technology and the lowest enrolment rate in academic subjects. Provincial fashion and fabrics participation ranged from 17% to 31% leaving a percentage gap of 17% between the highest enrolment rate in design and technology and the lowest enrolment rate in fashion and fabrics. I now look at girls' participation in each of the design and technology subjects.

### 6.1.1 Technical Graphics and Design

Nationally, only 161 girls representing 0.3 percent of a total English language (literacy) girls' enrolment of 64 407 took technical graphics in 1990 (see table 6.2). This percentage was much lower than the girls' national enrolment in mathematics (numeracy) at 48.9%, integrated science at 75.8% and fashion and fabrics as one of girls' traditional subjects at 18% (see appendix xxviii).

Table 6.2

#### Technical graphics and design enrolment

(English language has been used as an indicator of total enrolment)

Year	1990	1992	1994	1996	1998	2000	2001
	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total
National girls %	161/64407 0.3%	122/68098 0.2%	189/67464 0.3%	295/78395 0.4%	567/95177 0.6%	489/102220 0.5%	547/95177 0.6%
National boys %	1846/97669 1.9%	1976/99835 2%	2046/95454 2.1%	2533/103971 2.4%	3709/118342 3.1%	3472/125808 2.8%	3616/118342 3.0%
Harare girls %	-	-	-	111/13797 0.8%	242/15480 1.6%	231/16496 1.4%	190/17266 1.1%
Harare boys %	-	-	-	758/16594 4.6%	1191/17745 6.7%	942/18795 5.0%	923/19294 4.8%
Masv girls %	-	-	-	18/11211 0.2%	33/13811 0.2%	17/14219 0.1%	27/13509 0.2%
Masv boys %	-	-	-	190/15157 1.3%	260/18043 1.4%	248/18459 1.3%	297/17732 1.7%

NE= Number Enrolled, Masv = Masvingo

Girls' enrolment of 0.2 percent in 1992 represented a drop of 0.1 percent from the previous year. The 0.3 percent enrolment was lower than girls' enrolment of 45.9% in mathematics, 78.9% for integrated science and 17% for fashion and fabrics. In 1994

girls' enrolment in technical graphics and design was 0.3 percent. This percentage was 170 times lower than their enrolment of 51% in mathematics, 276 times lower than their integrated science enrolment of 82.8% and 56 times lower than their fashion and fabrics enrolment of 16.9%.

Fourth form girls' national technical graphics and design enrolment of 295 in 1996 was only 0.4% percent of the English language enrolment. This was however, 108 times lower than the mathematics enrolment of 43.4%, 202 times lower than the integrated science enrolment of 81% and 49 times lower than their fashion and fabrics enrolment of 19.8%. Technical graphics and design's 0.6 percent enrolment in 1998 was 88 times lower than the mathematics enrolment of 52.8%, 133 times lower than the girls' integrated science enrolment of 79.8% and almost 15 times less than girls' traditional fashion and fabrics enrolment of 24.3%.

In 2000, girls' national technical graphics enrolment of 0.5 percent continued to be low against mathematics (53.9%), integrated science (86%) and fashion and fabrics (25.5%). In 2001, fourth form girls national enrolment in technical graphics and design was 0.6 percent of total enrolment of 95 177. This enrolment was nowhere near the mathematics enrolment of 48.2%, integrated science of 97% and fashion and fabrics of 29.2%. These percentage statistics show that on a national scale, fourth form girls' are severely under-represented in technical graphics and design compared to other core curriculum subjects they take such as English language, mathematics, integrated science and fashion and fabrics.

Enrolment statistics for girls since 1996 when provincial statistics became available from the Zimbabwe Schools Examination Council (ZIMSEC) reflected a similar trend to national statistics where girls were poorly represented in technical graphics and design compared to English language, mathematics, integrated science and fashion and fabrics. The 0.8 percent technical graphics and design girls' enrolment in Harare province for the year 1996 was 77.5 times less than their provincial mathematics enrolment of 62%, 97 times less than the integrated science enrolment of 77.3% and 22 times less than the fashion and fabrics enrolment of 17.3%. In the same year, Masvingo girls' provincial technical graphics enrolment of 0.2 percent was also lower than the same girls' enrolment in mathematics of 43.9%, 78.7% in integrated science and 19.2% in fashion and fabrics.

In 1998, Harare province had 242 out of the 15480 girls' provincial enrolment taking technical graphics. This 1.6% was 46.6 times lower than the provincial mathematics enrolment of 74%, 47.5 times less than the provincial integrated science enrolment of 76% and 13 times less than the traditional girls' fashion and fabrics' 20.9% enrolment. Masvingo province, in the same year, had a much lower 33(0.2%) girls'

enrolment in technical graphics and design from a total provincial subject enrolment of 13 811. The 0.2 percent enrolment for technical graphics and design was far less than the 44.4% mathematics, 75.7% integrated science and 23.8% fashion and fabrics provincial enrolments.

In 2000, Harare province enrolled 231(1.4%) fourth form girls into technical graphics and design from a population of 16 496. Masvingo province, on the other hand, had only 17(0.1%) girls in the subject from a population of 14 219 fourth form girls. Harare province's 1.4 percent enrolment was 45 times lower than the 63% fourth form girls' enrolment in mathematics, 61 times lower than the 85.4% enrolment in integrated science and 14 times lower than the 19.8% fashion and fabrics enrolment in the same year. Masvingo's 0.1 percent fourth form girls' technical graphics and design enrolment was also a far cry from the 46.2% mathematics, 82.7% integrated science and 26.8% provincial fourth form girls' enrolments.

In 2001, Harare fourth form girls' 1.1 percent enrolment in technical graphics and design was 57.5 times lower than their enrolment in mathematics at 63.3%. The 1.1 percent was also 82 times lower than the 90.4% fourth form girls' enrolment in integrated science and 19 times lower than girls' 21.1% enrolment in fashion and fabrics. Masvingo province, on the other hand, had only 27 fourth form girls representing 0.2 percent of the total fourth form girls' enrolment of 13 509. The 0.2 percent was quite small compared to girls' enrolment in mathematics of 55%, 88.7% in integrated science and 31% in fashion and fabrics. These statistics clearly show that girls were severely under-represented in technical graphics and design enrolment when this subject's enrolment statistics are compared with English language, mathematics, integrated science and fashion and fabrics enrolments over the sampled seven years.

### ***6.1.2 Building Technology and Design***

Fourth form girls' national enrolment of 245 in building technology and design in 1990 represented 0.4 percent of the 64 407 fourth form girls in school that year (see table 6.3). Compared to mathematics enrolment of 48.9%, the 0.4 percent was 122 times lower. The integrated science enrolment of 75.8% was 189.5 times more and the fashion and fabrics enrolment of 18% was 45 times more showing clearly that fourth form girls were lowly represented in building technology and design in 1990 (see appendix xxviii). In 1992, only 315 girls representing 0.5 percent of the 68 098 fourth form girls in school were enrolled in the subject. This represented a percentage that was 92 times lower than the 45.9% for girls' enrolment in mathematics, 158 times lower than integrated science at 78.9% and 34 times less than the 17% fashion and fabrics enrolment.

Table 6.3

## Building technology and design enrolment

(English language has been used as an indicator of total enrolment)

Year	1990	1992	1994	1996	1998	2000	2001
	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total
National	245/64407	315/68098	177/67464	290/78395	525/95177	631/102220	678/95177
girls %	0.4%	0.5%	0.3%	0.4%	0.6%	0.6%	0.7%
National	5012/97669	5155/99835	4751/95454	6370/103971	9591/118342	11501/125808	12236/118342
boys %	5.1%	5.2%	5.0%	6.1%	8.1%	9.1%	10.3%
Harare girls	-	-	-	76/13797	91/15480	78/16496	68/17266
%				0.6%	0.6%	0.5%	0.4%
Harare boys	-	-	-	598/16594	602/17745	721/18795	730/19294
%				3.6%	3.4%	3.8%	3.8%
Masv girls	-	-	-	23/11211	48/13811	53/14219	5/13509
%				0.2%	0.3%	0.4%	0.03%
Masv boys	-	-	-	742/15157	1122/18043	1384/18459	1395/17732
%				4.9%	6.2%	7.5%	7.9%

NE= Number Enrolled, Masv = Masvingo

In 1994, only 177(0.3%) girls were enrolled in building technology and design compared to 4 751(5%) boys. The 0.3 percent fourth form girls' national enrolment that year was 56 times less than the 16.9% fashion and fabrics enrolment and significantly lower when compared against the 82.8% integrated science and 51% mathematics enrolments. Girls' enrolment rose marginally from 0.3 percent in 1994 to 0.4 percent in 1996. The 0.4 percent was however, a drop in the ocean when compared with girls' national enrolment in mathematics of 43.4%, the integrated science enrolment of 81% and the fashion and fabrics enrolment of 19.8%.

In 1998, 525 girls representing 0.6 percent of the English language enrolment took building technology and design compared to 9 591(8.1%) boys. Girls' 0.6 percent enrolment represented a figure 86 times lower than their national mathematics enrolment of 52.8%, 133 times lower than the integrated science enrolment of 79.8% and 40.5 times lower than the fashion and fabrics enrolment of 24.3%. Year 2000 saw only 0.6 percent fourth form girls enrolled in building technology and design compared to 53.9% in mathematics, 86% in integrated science and 25.5% in fashion and fabrics. Fourth form national girls' enrolment for 2001 was 0.7 percent compared to 48.2% in mathematics, 97% in integrated science and 29.2% in fashion and fabrics.

Provincial enrolment statistics were quite low for girls in Masvingo province than for Harare province from 1996. Harare recorded 76(0.6%) girls taking building technology and design in 1996 while Masvingo had only 23(0.2%). Harare fourth form girls' provincial enrolment percentage was 103 times less than their mathematics enrolment of 62%, 129 times less than the integrated science enrolment of 77.3% and 29 times less than the fashion and fabrics enrolment of 17.3%. Fourth form girls were

similarly under-represented in Masvingo province schools building departments at 0.2 percent compared to 43.9% in mathematics, 78.7% in integrated science and 19.2% in fashion and fabrics.

In 1998, there were 91(0.6%) fourth form girls enrolled in building technology and design in Harare province. The 0.6 percent girls' enrolment was 125 times lower than the mathematics enrolment for girls of 74.7%, 127 times less than the integrated science enrolment of 76% and 35 times less than the fashion and fabrics enrolment of 20.9%. Masvingo in the same year had only 48(0.3%) fourth form girls enrolled in the subject. Girls' percentage enrolment of 0.3 represented a figure 148 times lower than the mathematics enrolment of 44.4%, 252 times lower than the integrated science enrolment of 75.7% and 79 times less than the fashion and fabrics enrolment of 23.8%.

Harare province recorded 0.5 percent fourth form girls' enrolment in building technology and design in 2000 compared to Masvingo province's 0.4 percent. Harare's enrolment percentage was 126 times lower than their fourth form girls' mathematics enrolment of 63%, 170.8 times lower than their integrated science enrolment of 85.439.6 times lower than the girls' fashion and fabrics enrolment of 19.8%. Masvingo girls' enrolment of 0.4 percent was 116 times lower than their mathematics enrolment of 46.2%, 207 times lower than the integrated science enrolment of 82.7% and 67 times less than the fashion and fabrics enrolment of 26.8%.

In 2001, Harare province had 68(0.4%) girls enrolled in building technology and design. Masvingo, on the other hand, had only five girls or 0.03 percent of fourth form girls enrolled in English language in the province. The 0.4 percent enrolment for Harare fourth form girls was of the ratio 1 in 158 of fourth form girls' mathematics enrolment percentage of 63.3%, 1 in 226 of the integrated science enrolment of 90.4% and 1 in 53 of the fashion and fabrics enrolment of 21.1%. Masvingo fourth form girls' enrolment in building technology and design of 0.03 percent was way below the same girls' mathematics provincial enrolment of 55%, the integrated science enrolment of 88.7% and the fashion and fabrics enrolment of 31%.

### ***6.1.3 Wood Technology and Design***

A total of 181 girls or 0.3 percent of girls' national English language enrolment took wood technology and design in 1990 (see table 6.4). This percentage was 163 times lower than their mathematics enrolment of 48.9%, 253 times lower than their integrated science enrolment of 75.8% and 60 times lower than their fashion and fabrics enrolment of 18% (see appendices xxvii and xxviii). In 1992, the 90 girls in wood technology and design nationally represented 0.1 percent enrolment of all fourth form girls. Boys enrolment on the other hand was 5 086 representing 5.1 percent of national fourth form

boys' enrolment. Compared to the fashion and fabrics girls' enrolment of 17%, fourth form girls enrolment in wood technology and design was 170 times lower. When compared to integrated science enrolment of 78.9%, fourth form girls' enrolment in wood technology and design was 789 times lower while the mathematics enrolment of 45.9% was 459 times higher.

Table 6.4.

## Wood technology and design enrolment

(English language has been used as an indicator of total enrolment)

Year	1990	1992	1994	1996	1998	2000	2001
	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total
National girls %	181/64407 0.3%	90/68098 0.1%	69/67464 0.1%	86/78395 0.1%	164/95177 0.2%	210/102220 0.2%	307/95177 0.3%
National boys %	6012/97669 6.1%	5086/99835 5.1%	4470/95454 4.6%	5073/103971 4.9%	6257/118342 5.3%	6660/125808 5.3%	6867/118342 5.8%
Harare girls %	-	-	-	11/13797 0.1%	25/15480 0.2%	44/16496 0.3%	99/17266 0.6%
Harare boys %	-	-	-	1444/16594 8.7%	1914/17745 10.8%	1973/18795 10.4%	1961/19294 10.2%
Masv girls %	-	-	-	5/11211 0.04%	11/13811 0.07%	14/14219 0.1%	11/13509 0.1%
Masv boys %	-	-	-	320/15157 2.1%	445/18043 2.5%	542/18459 2.9%	553/17732 3.1%

NE= Number Enrolled, Masv = Masvingo

A total of 69(0.1%) fourth form girls were enrolled in wood technology and design in 1994. The 0.1 percent fourth form girls' enrolment in wood technology and design was a very low enrolment when compared to mathematics' 51%, integrated science's 82.8% and fashion and fabrics' 16.9%. Only 86(0.1%) fourth form girls' took wood technology and design nationally in 1996 (see table 6.4). Girls' national mathematics enrolment of 43.4% was of the ratio 434:1, integrated science was 810:1 and fashion and fabrics was 198:1 to that of wood technology and design.

Girls' percentage enrolment in wood technology and design in 1998 and 2000 was 164(0.2%) and 210(0.2%) respectively. Fourth form girls' national enrolment percentage of 0.2 in 1998 represented a ratio of 1 in 264 girls in mathematics, 1 in 399 girls in integrated science and 1 in 121 girls in fashion and fabrics. Fourth form girls' enrolment in 2000 represented a ratio of 1 in 269 girls in mathematics, 1 in 430 girls in integrated science and 1 in 127 girls in fashion and fabrics. In 2001, fourth form girls' national enrolment in wood technology and design was 0.3 percent of total fourth form girls' English language enrolment of 95 177. Fourth form girls' representation in wood technology and design was one in 160 of their mathematics enrolment, one in 323 of their integrated science enrolment and one in 97 of their fashion and fabrics enrolment.

Provincial enrolment statistics clearly reflected fourth form girls' low enrolment in wood technology and design in both Harare and Masvingo provinces. For Harare province, there were only eleven girls or 0.1 percent of fourth form girls' English language enrolment who took wood technology and design in 1996. In the same year, there were only five girls' or 0.04 percent of fourth form girls' English language provincial enrolment in this subject in Masvingo province. Comparisons made in Harare province between wood technology and design (0.1%) and fourth form girls' mathematics (62%), integrated science (77.3%) and fashion and fabrics (17.3%) enrolments pointed to a critically low wood technology and design girls' enrolment. Masvingo fourth form girls' enrolment of 0.04 percent was of the ratio 1:1098 to girls' mathematics enrolment of 43.9%, 1:1968 to their integrated science enrolment of 78.7% and 1:480 to their fashion and fabrics enrolment of 19.2%.

In 1998, only 25 Harare girls' were enrolled in wood technology and design from a fourth form English language provincial enrolment of 15 480 (see table 6.4). This represented 0.2 percent of the girls' enrolment. In Masvingo province, only 11 fourth form girls out of a fourth form girls' English language enrolment of 13 811 took the subject in 1998. This was 0.07 percent of fourth form girls' enrolment provincially. Both Harare fourth form girls' 0.2 percent and Masvingo girls' 0.07 percent enrolments showed serious under-representations of girls in wood technology and design when these percentages were compared against other subjects. For example, fourth form girls' mathematics enrolment in the same year was 74.7% for Harare and 44.4% for Masvingo; integrated science had 76% for Harare and 75.7 for Masvingo while fashion and fabrics had 20.9% for Harare and 23.8% for Masvingo reflecting huge enrolment differences.

Harare province in 2000 had only 44 girls from a girls' enrolment of 16 496 who were taking wood technology and design. This was 0.3 percent of the English language enrolment. Meanwhile, only 14 Masvingo fourth form girls representing 0.1 percent enrolled in the subject. Girls' wood technology and design participation pales into insignificance when compared with their mathematics enrolment of 63% in Harare province and 46.2% in Masvingo province, their integrated science enrolment of 85.4% in Harare and 82.7% in Masvingo and their fashion and fabrics enrolment of 19.8% in Harare and 26.8% in Masvingo.

In 2001, Harare had 99 girls enrolled in wood technology and design out of a fourth form girls' enrolment of 17 266 while Masvingo had only 11 out of a fourth form girls' population of 13 509. Harare, in this case, had only 0.6 percent girls enrolled in the subject while Masvingo had 0.1 percent girls. Statistics revealed a low fourth form girls' wood technology and design enrolment in the two provinces when the provincial percentages were compared with other curriculum subjects. For example, fourth form

girls' mathematics representation was 63.3% in Harare province and 55% in Masvingo province, integrated science enrolment was 90.4% in Harare province and 88.7% in Masvingo province and fashion and fabrics enrolment was 21.1% for Harare province and 31% for Masvingo province.

### 6.1.4 Metal Technology and Design

Metal technology and design was the least preferred design and technology subject by fourth form girls when the national fourth form girls' percentage enrolment is compared with three design and technology subjects from 1990 to 2001 (see table 6.5 or appendix xxvii). For example, while girls' metal technology and design enrolment in 1990 was 110(0.2%), wood technology enrolment was 181(0.3%), building technology and design was 245(0.4%) and technical graphics and design was 161(0.3%) from the same population of 64 407.

Table 6.5.

#### Metal technology and design enrolment

(English language has been used as an indicator of total enrolment)

Year	1990	1992	1994	1996	1998	2000	2001
	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total	NE/Total
National girls %	110/64407 0.2%	48/68098 0.1%	18/67464 0.02%	21/78395 0.02%	86/95177 0.1%	121/102220 0.1%	200/95177 0.2%
National boys %	3762/97669 3.9%	2496/99835 3.0%	2718/95454 2.80%	3003/103971 2.90%	3977/118342 3.4%	4063/125808 3.2%	3872/118342 3.3%
Harare girls %	-	-	-	2/13797 0.01%	39/15480 0.3%	57/16496 0.3%	97/17266 0.6%
Harare boys %	-	-	-	1211/16594 7.3%	1725/17745 9.7%	1591/18795 8.5%	1666/19294 8.6%
Masv girls %	-	-	-	4/11211 0.03%	5/13811 0.03%	1/14219 0.007%	6/13509 0.04%
Masv boys %	-	-	-	87/15157 0.6%	215/18043 1.2%	226/18459 1.2%	259/17732 1.5%

NE= Number Enrolled, Masv = Masvingo

In 1992, 1994, 1996, 1998, 2000 and 2001, girls' enrolment in metal technology and design continued to be lower than in the other three design and technology subjects. The 0.2 percent girls' national metal technology and design enrolment represented a ratio of 1:244.5 of girls' mathematics enrolment, 1:379 of girls' integrated science enrolment and 1:90 of girls' fashion and fabrics enrolment.

In 1992, only 48(0.1%) fourth form girls enrolled nationally (see table 6.5). Metal technology and design's lack of appeal to fourth form girls is clear when seen when the 48(0.1%) girls' enrolment is compared with the mathematics enrolment of 31 273(45.9%), the integrated science enrolment of 53 669(78.9%) and the fashion and fabrics enrolment of 11 585(17%). Fourth form girls' 1994 national enrolment in the

subject was only 18(0.02%) girls. There were far more fourth form girls enrolled in mathematics (34 401 or 51%), integrated science (55 857 or 82.8%) and fashion and fabrics (11 435 or 16.9%) than in metal technology and design.

The 21(0.01%) fourth form girls enrolled nationally in metal technology and design in 1996 meant that there were 41 287 more girls enrolled in mathematics, 63 466 more girls in integrated science and 15 536 more girls in fashion and fabrics. In 1998, 86 fourth form girls were enrolled representing 0.1 percent of fourth form girls' English language enrolment of 95 177. This fourth form girls' percentage enrolment was 1:528 to girls' mathematics enrolment of 52.8%, 1:798 to the integrated science enrolment of 79.8% and 1:243 to the fashion and fabrics enrolment of 24.3%. In 2000, fourth form girls' enrolment in metal technology and design was 0.1 percent of total fourth form girls' enrolment. The 0.1 percent enrolment for girls was 539 times lower than girls' mathematics enrolment of 53.9%, 860 times lower than their integrated science of 86% and 255 lower than their fashion and fabrics enrolment of 25.5%. Two hundred fourth form girls or 0.2 percent of the total fourth form girls' English language enrolment of 95 177 took metal technology and design in 2001. This percentage was 1:241 to fourth form girls' mathematics enrolment of 48.2%, 1:485 to the integrated science enrolment of 97% and 1:146 to the fashion and fabrics enrolment of 29.2%.

Provincial enrolment statistics reflected similar trends to national statistics with girls seriously under-represented in metal design and technology from 1996 to 2001. In Harare province, only two girls took metal technology and design in 1996. This was 0.01 percent of the fourth form girls' English language provincial enrolment of 13 797. Masvingo province in the same year had only four girls (0.03%) taking the subject from a fourth form English language girls' enrolment of 11 211. Harare fourth form girls' high participation in mathematics (62%), integrated science (77.3%) and fashion and fabrics (17.3%) indicates problems with girls into metal technology and design which had only a 0.01 percent enrolment. In Masvingo province there were 4 914 more girls in mathematics, 8 815 more girls in integrated science and 2 148 more girls in fashion and fabrics than those four enrolled in metal technology and design in 1996.

Harare province had 39 girls or 0.3 percent of the English language enrolment taking metal technology and design in 1998. Five girls or 0.03% percent of the English language enrolment took the subject in the same year in Masvingo province. The other three subjects being compared with, that is mathematics, integrated science and fashion and fabrics, all had over 20% girls' participation in their subjects that year. While Harare province recorded 0.3 percent girls' enrolment in metal design and technology in 2000, mathematics had 53.9%, integrated science had 86% and fashion and fabrics had 19.8%. Masvingo on the other hand, had only one fourth form girl or 0.3 percent enrolment in

metal design and technology in 2000, while mathematics, integrated science and fashion and fabrics all had over nineteen percent girls' representations in their subjects. In 2001, Harare province had 97 girls in metal technology and design while only six girls were taking the subject in Masvingo province. This represented percentages of 0.6 and 0.04 of total English language enrolments respectively. In the same year, fourth form girls' representation in mathematics, integrated science and fashion and fabrics was all above 21% (see appendix xxviii).

Results show overwhelming support that fourth form girls are under-represented in design and technology subjects when these subjects are compared with core curricula subjects such as English language, mathematics and integrated science.

## **6.2 Fourth Form Girls' Achievement in Design and Technology Subjects**

Fourth form girls' achievement in design and technology subjects was analysed for the years 1990, 1992, 1994, 1996, 1998, 2000, and 2001 against their performance in academic subjects and fashion and fabrics (see table 6.6). Secondly, national and provincial comparisons are made for each of the four design and technology subjects. Little comparison is made between girls' and boys' achievement as the focus was on fourth form girls mainly. To compare girls' performance against that of boys was perceived to pose some nuisance variables considering the varied nature of motivations and background experiences between the two genders. For example, boys may feel that metal technology and design is their traditional area of study and may have the subject background experiences from home. On the other hand, girls may suffer anxiety and feel alienated by the new experiences and may not have the intrinsic motivations that boys.

Results in table 6.6 show that among the four design and technology subjects, fourth form girls performed consistently lower in building technology and design. Their performance in this subject ranged from eight to seventeen percent in the seven years sampled compared to 14 to 40 percent for technical graphics and design, 11 to 56 percent for wood technology and design and 19 to 44 percent for metal technology and design. Girls' performances in the four design and technology subjects compared well with their performances in three academic subjects where percentages ranged from 18 to 34 for English language, 11 to 18 for mathematics and 14 to 23 for integrated science. Results show that girls performed lower than boys at national level in all four design and technology subjects.

Table 6.6

Girls' national percentage pass rate in eight subjects compared

Subject	Year													
	1990		1992		1994		1996		1998		2000		2001	
	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %	Girls %	Boys %
T/graphics	14	41	20	47	38	55	34	55	40	59	26	53	34	50
Building	9	37	8	33	10	37	9	44	17	41	13	31	12	33
W/technology	22	66	11	35	33	75	56	76	40	70	35	74	32	74
M/technology	0	26	25	46	44	54	48	55	19	55	33	61	25	59
English lang	18	19	19	21	25	22	29	26	26	24	34	27	26	24
Mathematics	14	29	17	30	18	29	13	24	11	22	11	20	12	21
Int/science	14	32	16	33	20	37	23	39	23	36	20	35	20	36
Fashion/fabrics	37	26	39	38	44	44	43	31	45	40	30	23	48	34

T/graphics= technical graphics and design, W/technology= Wood technology and design, M/technology= Metal technology and design Int/science= Integrated science

Fourth form girls' achievement in fashion and fabrics was however, higher than in any of the eight subjects compared. This could signify their sound grounding in the subject knowledge as this is traditionally a subject for girls. However results show no gendering in this subject as boys competed slightly lower than girls. In the next sections, I focus on girls' achievement in each of the design and technology subjects.

### 6.2.1 Girls' achievement in Technical Graphics and Design

Despite widespread cultural and biological leanings among Zimbabwean Shona and Ndebele people that girls' do not possess the intellect to achieve traditional male areas like design and technology subjects, results in this section speak differently. Though the percentage of girls taking design and technology subjects is small, the few who enrol can and are passing these subjects and the performance gap between girls and boys is closing. Results show that the performance gap between girls and boys started wide in 1990 with a 27% difference between the two genders, but in recent years this has been narrowing with a 24% difference by 2001 (see table 6.7). Only 23(14%) of the 161 girls passed technical graphics and design in 1990. Fourth form girls achieved 14% pass rates in mathematics and integrated science and 18% in English language in the same year thus, making their achievement in technical graphics normal (see appendix xlii). In 1992, fourth form girls performance was 18% of their enrolment of 122 making this achievement slightly lower than their English language (19%), Mathematics (17%) and integrated science (16%) enrolments. Girls who chose the traditional fashion and fabrics (39%) seemed to excel more than those who took technical graphics and design. The fact

however, remained that girls could achieve in technical graphics and design just like they did in any of the core academic subjects.

Table 6.7

## Technical Graphics and design girls passing with grades A, B and C

Year	1990	1992	1994	1996	1998	2000	2001
	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total
National girls %	23/161 14%	22/122 18%	71/189 38%	99/295 34%	229/567 40%	127/489 26%	184/547 34%
National boys %	759/1846 41%	878/1861 47%	1121/2046 55%	1380/2533 55%	2195/3709 59%	1853/3472 53%	1810/3616 50%
Hre girls %	-	-	-	22/111 20%	59/242 24%	24/231 10%	45/190 24%
Hre boys %	-	-	-	350/758 46%	633/1191 53%	435/942 46%	420/923 46%
Masv girls %	-	-	-	9/18 50%	23/33 70%	9/17 53%	16/27 59%
Masv boys %	-	-	-	136/190 72%	170/260 65%	158/248 64%	202/297 68%

NP=Number Passing, Masv= Masvingo, Hre= Harare

Results show that in 1994, 71(38%) girls passed the subject nationally. This was only a 17% difference with boys' pass rate of 55%. Girls' 38% pass rate in technical graphics and design was more than the English language pass rate of 25%, the mathematics pass rate of 18%, the integrated science pass rate of 20% but slightly below fashion and fabrics with 44%. In 1996 there was a 21% difference between girls' percentage of 34% and boys' 55%. Girls' 34% outperformed their English language, mathematics and integrated science achievements but was 10% shy of their fashion and fabrics pass rate (see appendix xxx). Girls' 40% technical graphics and design performance in 1998 was 19% shy of boys' performance, four percent lower than the fashion and fabrics percentage pass rate but well above Mathematics (11%), English language (26%) and integrated science (23%). There were no marginal performance differences in the five subjects being compared against in 2000 and 2001. The 26% and 34% achieved by girls nationally in the two years respectively were competitively near girls' performances in English language (34% and 26%), mathematics (11% and 12%), integrated science (20% and 20%) and fashion and fabrics (30% and 48%). These statistics show that fourth form girls' were achieving well nationally in technical graphics and design in the seven years when the subject's pass rates for girls were compared against English language, mathematics, integrated science and fashion and fabrics.

Provincial performance statistics were no different from national statistics in that fourth form girls in both Harare and Masvingo provinces showed that they were achieving well in technical graphics and design despite all the pressures against them.

Masvingo fourth form girls performed better than Harare girls in the subject from 1996 to 2001. While Masvingo girls had 50% pass rate in 1996, Harare girls' achievement was 30%. Of particular interest was that Masvingo girls' achievement was even better than Harare boys pass rate of 46% refuting traditional claims that girls could not achieve in this subject. In 1998, Masvingo fourth form girls outperformed Harare girls' achievement by 70% to 24%. Harare boys' percentage pass rate was also beaten by Masvingo girls by 17%. Masvingo girls' dominance over Harare girls and boys continued in 2000 when their 53% pass rate was higher than Harare girls' 10% and Harare boys' 46%. In 2001, Masvingo girls' 59% was 35% higher than Harare girls' performance and 13% higher than Harare boys' performance. This showed clearly that given the chance to take the subject, girls were able to achieve better results than boys.

### 6.2.2 Girls' achievement in Building Technology and Design

Fourth form girls tended to perform quite low in building technology and design when their national percentage performance was compared with that of boys from 1990 to 2001. It is interesting to note however, that though girls performed lower than boys, statistics show that while the performance gap between girls and boys was 27% in 1990, it had narrowed to 21% by 2001 showing that more and more girls were now achieving in the subject. Considering the different nature of participants, social pressures, motivations, and subject background factors affecting girls and boys in the sample (discussed in chapter seven), girls' performance was commendable. The nine percent that girls' achieved nationally in 1990 was only six percent lower than their mathematics and integrated science pass rates of 14% and nine percent lower than their English language pass rate of 18% (see table 6.8).

Table 6.8

Building technology and design girls passing with grades A, B and C

Year	1990	1992	1994	1996	1998	2000	2001
	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total
National girls %	23/245 9%	26/315 8%	17/177 10%	27/290 9%	89/525 17%	79/631 13%	81/678 12%
National boys %	1843/5012 37%	1699/5122 33%	1751/4751 37%	2775/6370 44%	3941/9591 41%	3535/11501 31%	4090/12236 33%
Hre girls %	-	-	-	0/21 0%	17/91 19%	9/78 12%	7/68 10%
Hre boys %	-	-	-	95/142 67%	147/602 24%	120/721 17%	146/332 44%
Masv girls %	-	-	-	1/6 17%	89/525 17%	5/53 9%	4/59 7%
Masv boys %	-	-	-	371/742 50%	469/1122 42%	441/1384 32%	406/1395 29%

NP= Number Passing, Masv= Masvingo, Hre= Harare

Eight percent girls passed the subject in 1992 revealing a 25% gap between girls' and boys' performances. This percentage was arguably low compared to girls' English language performance of 19%, integrated science performance of 16%, mathematics performance of 17% and fashion and fabrics performance of 39%. It however, reflected the determination of the few girls enrolled in the subject to defy traditional opinion about girls taking former boys subjects and achieving in them. The ten and nine percent pass rates that fourth form girls achieved in 1994 and 1996 were 27% and 35% lower than boys' achievements of 37% and 44% respectively. Girls' performance was also more than two times lower than their English language, mathematics, integrated science and fashion and fabrics percentage pass rates.

In 1998, girls' achievement of 17% narrowed the gap between girls and boys achievement to 24% nationally. The 17% that girls achieved was above their mathematics achievement of 11% but below English language (26%), integrated science (23%) and fashion and fabrics (45%). The same thing happened in 2000 when girls' building achievement of 13% was one percent higher than their mathematics achievement but lower than their achievements in the other three subjects. In 2001, though fourth form girls' achievement was 21% lower than that of boys, it equalled their achievement of 12% in mathematics.

Regional achievement percentages reflected similar low achievement trends for girls in building technology and design from 1996 to 2001. Though the number of girls enrolled in the subject was low each year, Harare girls performance was higher than Masvingo girls' in 1998 (19% compared to 17%), in 2000 (12% compared to nine percent) and in 2001 when Harare had 10% passing compared to seven percent for Masvingo province. The most important factor in these comparisons is that though fewer girls enrol in building technology and design, they can and do pass the subject.

### ***6.2.3 Girls' achievement in Wood Technology and Design***

The achievement gap between girls and boys in wood technology and design narrowed two percent from 44% to 42% between 1990 and 2001 (see table 6.9). This may be small but it shows that girls are achieving more in wood technology and design than they did in 1990 though the numbers taking the subject remain small. This makes it difficult to make adequate comparisons between the large numbers of more willing boys' participants against the few perhaps less willing, less motivated and subject knowledge alienated girls who might have been channelled into the subject. It remains however, important that girls are showing interest in the subject and are achieving.

Table 6.9

## Wood technology and design girls passing with grades A, B and C

Year	1990	1992	1994	1996	1998	2000	2001
	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total
National girls %	39/181 22%	10/90 11%	23/69 33%	48/86 56%	66/164 40%	74/210 35%	97/307 32%
National boys %	3908/6012 66%	1761/5086 35%	3339/4470 75%	3864/5073 76%	4385/6357 70%	4920/6660 74%	5080/6867 74%
Hre girls %	-	-	-	4/11 36%	6/25 24%	11/44 25%	27/99 27%
Hre boys %	-	-	-	958/1444 66%	1111/1914 58%	1299/1973 66%	1310/1961 67%
Masv girls %	-	-	-	4/5 80%	6/11 55%	5/14 36%	8/11 72.7%
Masv boys %	-	-	-	280/320 88%	361/445 81%	452/542 83%	455/553 82%

NP= Number Passing, Masv= Masvingo, Hre= Harare

Girls' 22% pass rate in the subject in 1990 was higher than the girls' percentage pass rates in English language (18%), mathematics (14%) and integrated science (14%) but lower to fashion and fabrics which was 37%. This makes wood technology and design no different from these subjects but an achievable subject by anyone despite different backgrounds. In 1992, there was a 24% achievement performance gap between girls and boys. Girls' performance in wood technology and design that year was lower than their achievement in the four subjects being compared with. In 1994, girls had a 33% pass rate in wood technology and design making this performance above that of core subjects such as English language (25%), mathematics (18%) and integrated science (20%) (see appendix xxx). Girls tended to excel more in the traditional girls' subject of fashion and fabrics in the same way boys were excelling in their traditional boys' subjects such as technical graphics and design, wood technology and design, metal technology and design and building technology and design.

In 1996, the performance gap between fourth form girls and boys was only 20% in boys' advantage. Girls' percentage pass rate of 56% in wood technology and design was the highest in the seven years sampled and was higher than any of the three core academic subjects as well as fashion and fabrics which was 43%. In 1998, there was a 30% performance gap between girls (40%) and boys (70%). This was also a remarkable achievement for girls as this percentage was higher than their English language (26%), mathematics (11%) and integrated science (23%) achievements. This again proved that girls can achieve in traditional male subjects just as they do, if not better than in academic subjects. In 2000, there was a 39% performance gap between the two genders but still, the 35% girls' achieved in this subject was higher than their achievements in the

other four subjects including fashion and fabrics with 30%. The 32% fourth form girls achieved in 2001 in wood technology and design was again higher than their achievements in English language (26%), mathematics (12%) and integrated science (20%). Girls' superiority was however, evidently higher in fashion and fabrics with a pass rate of 48%.

Provincial statistics showed that girls in Masvingo province were achieving more in wood technology and design than those in Harare province. Though numbers taking the subject were small in both provinces, Masvingo had 80%, 55%, 36% and 72.7% pass rates compared to Harare's 36%, 24%, 25% and 27% in 1996, 1998, 2000 and 2001 respectively.

#### **6.2.4 Girls' achievement in Metal Technology and Design**

Metal technology and design was the only design and technology subject where the performance gap between girls and boys widened from 26% in 1990 to 34% in 2001 (see table 6.10). The number of girls in the subject were however, too small to give irrefutable evidence of their low achievement compared to that of boys.

Table 6.10

Metal technology and design girls passing with grades A, B and C

Year	1990	1992	1994	1996	1998	2000	2001
	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total	NP/Total
National girls %	0 / 110 0%	12/48 25%	8/18 44%	10/21 48%	16/86 19%	40/121 33%	50/200 25%
National boys %	960 / 3762 26%	1151/2496 46%	1468/2718 54%	1640/3003 55%	2193/3977 55%	2460/4063 61%	2283/3872 59%
Hre girls %	-	-	-	1/2 50%	3/79 8%	21/57 37%	41/97 42%
Hre boys %	-	-	-	528/1211 44%	793/1725 46%	863/1591 54%	828/1666 50%
Masv girls %	-	-	-	4/4 100%	1/5 20%	0/1 0%	1/6 17%
Masv boys %	-	-	-	62/87 71%	169/215 79%	182/226 81%	181/259 70%

NP= Number Passing, Masv= Masvingo, Hre= Harare

The few girls that participated complete with social and structural drawbacks, achieved a 25% pass rate in 1992 against 46% for boys. This was after all the 110 girls who enrolled in metal technology and design did not achieve a passing mark in 1990 for various reasons and factors.

Only 18 fourth form girls enrolled in metal technology and design in 1994 and only eight of these or 44% passed the subject compared to 54% for boys. The girls' percentage pass rate equalled that of fashion and fabrics but was above that of English

language (25%), mathematics (18%) and integrated science (20%) that year. This again showed that metal technology could be achieved by girls like any other subject, if not better. In 1996, 10 of the 21 girls or 48% who enrolled in the subject achieved a pass. This percentage was well above achievements in the other four subjects being compared with in this section including fashion and fabrics (see appendix xxx). The fluctuating performance of girls as reflected by the 1998 results may be the effect of support structures for girls learning in the subject or student variables of the girl cohort group of 1998 which caused them to achieve only 19% in metal technology and design compared to 55% for boys. This was not unique as only small percentage differences were seen when compared with English language girls' achievement of 26%, mathematics 11% and integrated science 23%.

Twenty-eight percentage points separated girls' and boys' performances in 2000 with girls achieving 33% against 61% for boys. Girls' 33% achievement rate compared well with their English language achievement that year of 34% but was higher than mathematics (11%), integrated science (20%) and fashion and fabrics (30%). In 2001, there was a 34% percentage pass difference between girls and boys with girls on the lower end achieving 25%. The national statistics show that girls were achieving in metal design and technology to almost the same levels of performance as in other subjects with little indication of difference. It is however, acknowledged that the characteristics of girls taking design and technology subjects might be different from that of boys in terms of motivation and background experiences.

Provincial statistics reflected very few girl takers of the subject to have adequate and valid performance comparisons to be made. Indications were however, that the few girls who enrolled were achieving in the subject.

### 6.3 Summary

On both national and provincial scales, the low enrolment of girls in design and technology subjects compared to English language, mathematics, integrated science and fashion and fabrics enrolments was indicative of filtering processes and barriers for girls in the design and technology subject areas limiting their participation which seemed absent in academic subjects. These barriers are presented in chapter seven and eight.

Indication were also that there were more Harare girls participating in design and technology subjects than Masvingo girls perhaps because of greater numbers of enrolled girls in Harare. The reverse was however, true for girls' achievement where Masvingo fourth form girls did better in metal technology and design, wood technology and design and technical graphics and design in 1996, 1998, 2000 and 2001. In building technology

and design Harare girls performed better than Masvingo province girls in 1998, 2000 and 2001 while Masvingo did better in 1996 (see appendix xxix).

Provincial results replicated national performance figures and showed boys performing better than girls in all four design and technology subjects indicating some form of performance gendering. Girls, however, performed much better in academic subjects where they were found to be consistently doing better than boys in literacy subjects like English language and the traditional female subject of fashion and fabrics but fell slightly behind boys in mathematics and integrated science (see appendix xxx). Results corroborate international results showing that girls did better in literacy subjects than in numeric subjects and sciences.

Results presented in this chapter suggest that:

- Few fourth form girls enrol in technical graphics and design, building technology and design, wood technology and design and metal technology and design when compared to three academic subjects namely English language (literacy), mathematics (numeracy), integrated science (sciences) and a traditional female subject, fashion and fabrics.
- Girls who enroll in technical graphics and design, wood technology and design, building technology and design and metal technology and design achieve as well as they do in academic subjects and traditional female subjects

In the next chapter I discuss factors affecting fourth form girls' participation and achievement in design and technology subjects.

## CHAPTER SEVEN

### REASONS FOR FOURTH FORM GIRLS' CHOICE OF AND ACHIEVEMENT IN DESIGN AND TECHNOLOGY SUBJECTS

This chapter answers the two remaining sub-questions asked at the end of chapter four (p. 78) namely:

- What are the reasons for Harare and Masvingo province fourth form girls' choice of design and technology subjects for study in selected secondary schools as perceived by fourth form girls themselves and significant others?
- What are the reasons for Harare and Masvingo province fourth form girls' achievement in design and technology subjects in selected Zimbabwean secondary schools as perceived by fourth form girls and significant others?

#### 7.1 Overview of Data Analysis

Results are reported principally on integrated data deriving from student questionnaire responses, lesson observations, students', teachers', principals', education officers' and parents' interviews in eight Harare and Masvingo secondary schools designated as rural, government group B, government group A and private. Reasons for fourth form girls' choice of design and technology subjects for study and achievement or lack of achievement were captured in the responses given within each participant group, school and province.

Initial identification of themes was done manually (abductively and inductively) following Huberman and Miles' (1994) and Patton's (1990) method of finding patterns and developing conceptual themes (see table 15 on the process of identifying and naming themes). The abductive and inductive analyses are the methods that McMillan and Schumaker (1997) say pave way for the continuous discovery and identifying of tentative patterns in data. By scanning within each data type, developing conceptual models, looking at differences and similarities, gleaning out underlying and recurrent data themes, I was able to identify and give tentative names to 32 closely related themes. For example with the Mau school transcript in table 7.1, I had a close reading of the text, identified meaning and jotted down notes and conceptual themes in the emerging themes section I felt corresponded to text. This development of conceptual themes was helped by my literature review readings. For example, Eccles et al.'s (1983) model identified such

themes as cultural stereotypes, occupational characteristics, previous achievement-related experiences, socialiser's beliefs and expectations, child's perception of activity demands, self-concept of one's ability, expectation of success, child's goals, task value and cost. Woolnough (1994) identified themes such as parental advice, student experiences in and out of school, student ability and personality, school type, resources and school ethos as affecting students' engagement and success in engineering. Some of these themes were adapted in this study from the literature review as tentative themes to code the data for example subjective task value in table 7.1 (Eccles et al., 1983).

Other themes were a creation from participant responses through the researcher's synthesis of research data and meaning identification for example, curriculum continuity/discontinuity and social isolation avoidance also in table 7.1. In such cases where themes were not a direct adaptation from literature or previous studies such as Eccles et al.'s (1983) and Woolnough's (1994) analytic frameworks, data were approached with an open mind through close reading of the text and creating new themes. This was done in order not to impose an interpretation based on any pre-existing theory in the same way as advocates of grounded theory suggest that qualitative researchers should start by reading the text and try to tease out meaning from happenings (Glaser & Strauss, 1967).

Reading through the passages of text to discover theoretical concepts to stand as themes involved me asking the question: what things am I looking for that are represented in the text? Gibbs (2002, p. 64-65) suggests twelve things which I also adapted in searching for meaning and identifying themes:

1. Specific acts, behaviours - what people do or say.
2. Events - brief, one off events or things someone has done.
3. Activities - of longer duration than acts ... and in a particular setting and may have several people involved e.g. "zunde ramambo" or clan grain pooling under the chief in chapter three.
4. Strategies or tactics - activities aimed towards some goal e.g. "Unhu" philosophy in chapter three.
5. States - general conditions experienced by people or found in organisations for example, rigid time-tabling in schools constraining subject choices.
6. Meaning – what directs participants' actions e.g. concepts used to understand the social world such as norms, values and rules for example complementarity for women.
7. Participation – people's involvement and adaptation to a setting e.g. society, home and school in this study.

8. Relationships or interaction – between people for example between males and females in society and girls and boys and teachers and students in classrooms.
9. Conditions and constraints – causes and restrictions to events, actions and behaviours for example, cultural stereotypes.
10. Consequences – result or effect e.g. of going against culture.
11. Setting – context where events take place e.g. society, home and school.
12. Reflexive intervention – researcher's role to generate more data responses e.g. probes and bearing with participants suffering and concerns.

As I went through each data set, reference was made to these twelve points and passages of text and themes emerged. This way, themes were shorthand for theoretical concepts or ideas formulated as words or phrases (see table 7.1) whose meaning derived from the passages of text as raised by respondents in the meaning construction of their social reality (Gibbs, 2002, p. 57).

Table 7.1

Manual identification of emergent themes from data transcripts (see appendix xxx vii)

Extract from Mau school sample transcript (p 1)	Emerging themes
Researcher: ...What influenced you in choosing subjects for study?	
Kuda: I think it is <b>my ability to do the subject</b> whether I can pass it or not.	-Self-concept of ability (efficacy beliefs)
Researcher: What about others, what do you think?	
Jesca: I chose my subjects looking at <b>how they will help me in the future.</b>	-Subjective task value (Future value of subject)
Jane: The other thing is <b>whether the subject is available at advanced level or not.</b> I wouldn't like to take a subject that does not lead to A (advanced level) and university.	-Curriculum continuity/discontinuity (Availability of the subject at 'A' level...)
Researcher: Wonderful. Anything else that caused you to choose subjects?	
Nyenge: I may take a subject for study <b>because my friend will have chosen it</b> as well. It means we will be able to <b>help each other.</b>	-Peer pressure for conformity -Social isolation avoidance -Collaborative learning

The manual method described in table 7.1 was applied to each data set and resulted in the identification of themes from various participant groups shown in table 7.2 next page.

Table 7.2

Collated identified themes from various participant group responses (see appendices xxxviii to xlvii for themes and accompanying notes)

Students questionnaire (NP= 321)	Students taking D&T focus groups (NP= 12)	Students not taking D&T focus groups (NP= 64)	D&T teachers' focus groups (NP= 26)	Principals' in-depth interviews (NP= 5)	Education Officer's in-depth interview (NP= 1)	Parent's focus groups (NP= 28)
<ul style="list-style-type: none"> <li>• Future value of the subject</li> <li>• School organisation</li> <li>• Nature of the subject</li> <li>• Assimilated gender role schema</li> <li>• Interest in the subject</li> <li>• Paucity of information</li> <li>• Perceived cost</li> <li>• Social isolation avoidance</li> <li>• Self-concept of ability</li> <li>• Lack of home support</li> <li>• Advice of significant others</li> <li>• Domain specific subject efficacy</li> <li>• No response</li> </ul>	<ul style="list-style-type: none"> <li>• Challenging traditional opinion</li> <li>• Peer pressure</li> <li>• Self-concept of ability</li> <li>• Channeling students into subjects</li> <li>• Perception of D&amp;T subjects</li> <li>• Parents influence</li> <li>• Gender role stereotyping</li> <li>• Future value of subjects</li> <li>• Interest</li> <li>• Role models</li> <li>• Teacher influence</li> <li>• Subject background experiences</li> <li>• Guidance and counseling</li> <li>• Subject fear and anxiety</li> <li>• Negative attitudes towards subjects</li> <li>• Explore new knowledge</li> <li>• Stigma as subjects for less able students</li> </ul>	<ul style="list-style-type: none"> <li>• Efficacy</li> <li>• Future value of subject</li> <li>• Peer pressure</li> <li>• Gender role socialisation</li> <li>• Subject background</li> <li>• Parents influence</li> <li>• Role models</li> <li>• Perception of D&amp;T</li> <li>• Interest</li> <li>• Teacher influence</li> <li>• School culture</li> <li>• G&amp;C</li> <li>• Subject fear</li> <li>• Subject nature</li> <li>• Gender role stereotyping</li> <li>• Avoiding isolation</li> <li>• Lack of peer support</li> <li>• Negative attitudes</li> <li>• Media influence</li> <li>• Late subject engagement</li> <li>• Subjects for dull students</li> <li>• Unfamiliarity with subject</li> <li>• Maturation</li> <li>• Time-tabling</li> </ul>	<ul style="list-style-type: none"> <li>• Culture</li> <li>• Parents' influence</li> <li>• Future value of subject</li> <li>• Interest</li> <li>• Role models</li> <li>• Channelling students into subjects</li> <li>• Lack of resources</li> <li>• Teacher influence</li> <li>• Lack of exposure</li> <li>• Colonialism</li> <li>• Policy issues</li> <li>• Employer and media biases</li> <li>• School organisation</li> <li>• Self-efficacy</li> <li>• Subject anxiety</li> <li>• Familiarity with subject</li> <li>• Peer pressure</li> <li>• Media influences</li> <li>• Marriage and parenting</li> <li>• Family influence</li> <li>• Perception of subjects</li> </ul>	<ul style="list-style-type: none"> <li>• Culture</li> <li>• G&amp;C</li> <li>• Role models</li> <li>• Value of subject</li> <li>• Interest</li> <li>• Colonialism</li> <li>• Resources</li> <li>• Teacher influence</li> <li>• Self-efficacy beliefs</li> <li>• Subject efficacy beliefs</li> <li>• Peer pressure</li> <li>• Time-tabling constraints</li> <li>• Background experiences</li> <li>• Subjects' discontinuity</li> <li>• Lack of incentives</li> </ul>	<ul style="list-style-type: none"> <li>• Gender role stereotypes</li> <li>• Girls' perception of subjects</li> <li>• Role models</li> <li>• Future value of subject</li> <li>• Aging leadership</li> <li>• Girls' self-concept of ability</li> <li>• background skills</li> <li>• Peer pressure</li> <li>• Parents influence</li> <li>• Teacher influence</li> <li>• Ineffective G&amp;C</li> <li>• Policy enforcement</li> <li>• Inadequate resources</li> <li>• Rigid time-tabling</li> </ul>	<ul style="list-style-type: none"> <li>• Cultural stereotypes</li> <li>• Future value of subjects</li> <li>• Parents influence</li> <li>• Peer pressure</li> <li>• Interest</li> <li>• Perception of subject</li> <li>• Role models</li> <li>• Girls self-concept of ability</li> <li>• D&amp;T self-concept of ability</li> <li>• Employer biases</li> <li>• Segregated schools</li> <li>• Subject discontinuity</li> </ul>

D&T= Design and Technology, NP= Number Participating, G&C= Guidance and Counselling

Data analysis with the Nvivo QSR N6 programme was essentially the same process as the manual method but being done electronically with a more versatile and efficient coding process of using nodes. Coding with Nvivo entailed a “process of identifying and connecting the passages of text” to a theoretical concept or theme called a node related to it (Gibbs, 2002, p. 58). The process in short is called coding at the node. Node is the concept exemplifying data, its location and descriptions. Coding, on the other hand, is the process of “identifying passages of text that exemplify a certain idea or concept” and bringing them together under that identified concept or node (Gibbs, 2002, p. 58-59). This, however, is just part of the Nvivo function as it extends beyond mere attaching passages of text to nodes, to linking to other nodes, documents and memos and giving descriptions to themes or nodes (see appendix xxxvi).

Drawing on collated identified themes in table 7.2, further close reading of the passages of texts was done with the hope of finding passages of text exemplifying the theme and refining some of the themes identified manually in table 7.2. These themes were the tentative nodes on which data was coded as in figure 7.1 below.

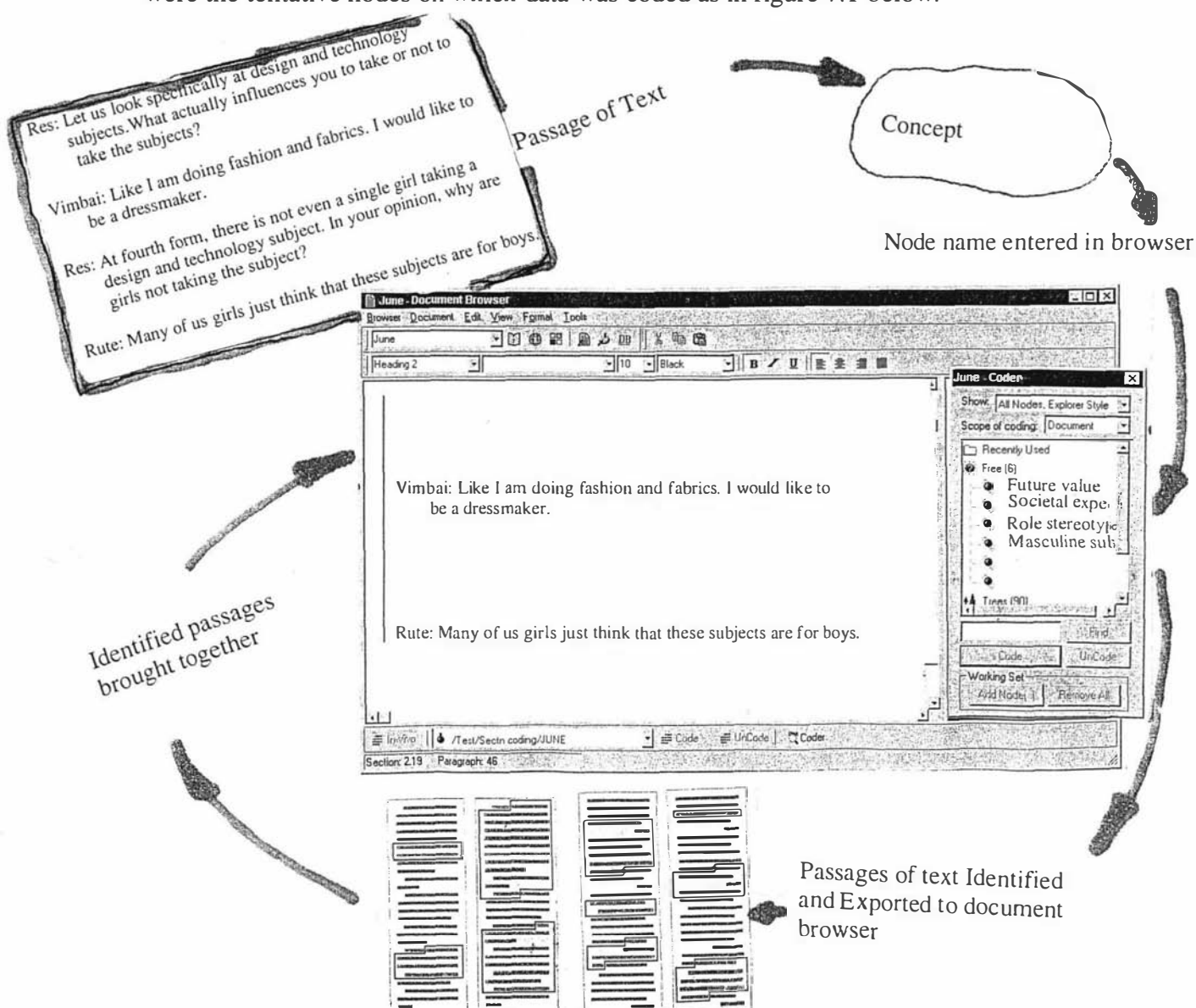


Figure 7.1. Identification of themes (nodes) and the NVivo coding process

Scanning through the tentative themes looking at similarities and differences, clustering and renaming new categories necessitated organisation of the themes into categories identified by similar meaning. This resulted in seven themes merging with others and finally ending up with a total of 25 on which the following results are presented and discussed (see table 7.3). Initially I thought I would just group the twenty-five themes into home and schooling processes like Ma (2001) did in a USA study. While this appeared sound, I realised however, that there were some cognitive processes that were the result of student input like self-concept of ability that could not be easily put under either home or schooling processes. Attitudes and perceptions were another group that needed re-organisation and classification since they also did not fit into home and schooling processes. Table 7.3 shows the tentative themes identified and refined from table 7.2.

Table 7.3

## Tentative themes identified

●●Low female education levels	●●Teacher-student interaction
●●Negative attitude toward subject	●●Perceived cost
●●Self-concept of ability	●●Type of school and location
●●School organisation and policy implementation	●●Perceived value of subject and future career aspirations
●●School organisation	●●Aging leadership in schools
●●Interest in the subject	●●Culture and ethnic background
●●Parents occupation and income	●●Employment biases and demands
●●Effects of maturity	●●Channelling of students into subjects
●●Perceptions held of subjects	●●Nature of the subject
●●Family influence	●●Family expectations and support
●●Preferred teaching and learning styles	●●Self-confidence and self-esteem
●●Prove critics wrong	●●Curriculum continuity/discontinuity
●●Assimilated gender role mindset	●●Resource allocation by Ministry
●●Peer interaction and influence	●●Teacher beliefs and expectations
●●Family traditions	●●Access to information and media effects
●●Role models	●●Subject background experiences

Arrows show themes that have merged with others

Further regrouping of the twenty-five themes, following Young, Fraser and Woolnough (1997) model encompassing effects of the school, individual and the social environment of the girl made me realise that schooling processes could be split into two

categories; school context and school climate. On the other hand, student processes could also be split into four new categories encompassing home and student background (demographic), thought, experience and the senses (cognitive), feelings and dispositions (affective) and inner motivation/volition (conative). These terms emerged from going back and forth between the data identifying similarities and differences. Further regrouping brought the six topics into only two major categories namely student and school dimensions in table 7.4.

Table 7.4

Twenty-five themes clustered into six categories and two dimensions

Dimension	Category	Theme
Student Dimensions	Demographic	• Culture and ethnic background
		• Assimilated gender role mindset
		• Parents occupation and income
		• Family expectation and support
		• Effects of maturity
		• Employment biases and demands
	Conative	• Value of subject and career aspirations
		• Perceived cost
		• Role models
		• Access to information and media effects
	Affective	• Perceptions held of subject
		• Self-confidence and self-esteem
• Negative attitudes towards subject		
• Interest in the subject		
Cognitive	• Subject background experiences	
	• Self-concept of ability	
	• Preferred teaching and learning styles	
	• Low female education levels	
School Dimensions	School	• Type of school and location
	Contextual	• School organisation and policy implementation
		• Curriculum continuity and discontinuity
		• Resource allocation by Ministry
	School	• Teacher beliefs and expectations
	Climatic	• Teacher-student interaction
		• Peer interaction and influence

The results are presented according these dimensions and categories in the next two sections: section 7.2 (student dimensions); and 7.3 (school dimensions). Direct quotes are used in most cases to support the identified factors.

## 7.2 Student Dimensions

### 7.2.1 Demographic Factors

Demographic factors in this section were concerned with the background information of the study participants, their behaviour and values that affected subject choices. Woolnough (1995) suggests that family background is a critical factor in students' decisions of subject choice. Within the family/home background category, factors such as family socio-economic status and ethnic and cultural backgrounds were investigated in this section.

*(i) Culture and ethnic background.* The study found that participants came from mainly Shona and European English speaking backgrounds, each of which had influence on the formation of students' identities as will be shown in the next sections. Differences and similarities were found in the two cultures. For example, being a girl was synonymous with submissiveness, domestic work and family caring duties while being a boy exemplified power, outdoor activities, family protection and provision of resources. Both Shona and European cultures had a low expectation of females and assigned them lighter and less difficult work compared to males who were assigned heavy and more difficult work. As one parent explained:

Culture sees man as the one with power and strength. As such, jobs requiring strength like lifting heavy metals, carrying bricks, pushing wheelbarrows, building and carpentry are ideally for men and, women cannot do them. Women have always been seen as physically weak, and that is why they do such jobs as cooking, nursing and sewing because people see these as light jobs (MP:MUSM).

Such gender-segregated roles were perceived as part of the Unhu/Ubuntu socialisation of girls and boys as theorised in chapter three. The behaviours and values children assimilated through the socialisation process became their identities through which girls and boys in the Shona culture learnt to position themselves as male or female. It was found that girls and boys had dissimilar ways of viewing the world to the extent that choices they made in life had more differences than similarities. As one design and technology education officer put it:

Over the years as Zimbabweans, we have tended to have duties that are for men and others for women. And, we tend to think that the heavier duties are for men and the lighter duties for women. This has gone on to influence the selection of subjects by pupils in our schools, where we have heavy industrial subjects that are taken mainly by boys (EO).

The response from one male European principal showed that English culture shared commonalities of domesticity for females and outdoor activities for males with Shona culture. Through a culture of difference and perceived physical strength, the principal saw males as naturally suited to do the heavier work while females perform the nurturing jobs. As he put it:

I certainly do see these two genders as having different functions in society. I think particularly of young children that mothers should be there to shape these formative years of the children when they grow up. So, the first role that I see for a woman is as a mother and I was going to say housekeeper but you can't divorce a mother's duties from house keeping duties so they go hand in hand. If we are talking in terms of manual work, I have reservations about that. I wouldn't like my wife to be wielding a pick and shovel because I think it would be demeaning for her. Well, to me manual labour for a woman is unladylike. And, you must remember that I come from a different generation where a man earned a living and the woman would be a woman of leisure, run the home and bring up the children. I was in Australia recently and it was quite surprising for me when I first went there to find women working manually in road camps, you know those pick and shovel jobs. And, I was surprised to see a woman doing that and doing it well alongside men. With my African background, I found that strange (WMP:RPSM)

While both Shona and European cultures in Zimbabwe were perceived as elevating men above women with men designating themselves as rulers and leaders and women as mere helpers, Shona culture in particular, was perceived as giving more prominence to males at the expense of females. A Shona parent illustrated this in reference to Shona family courts where young boys were regarded as leaders even in the presence of their elder sisters:

Men do not take us as their equals. I am the eldest in my family but, when it comes to family matters, my younger brother takes the role of the eldest and no family case can be heard when he is not there (FP:TUSH).

One student saw the thinking of society as implying that women were second-class citizens meant to be led by men. According to her, “traditional Shona culture has always elevated men above women. Women are considered second rate in everything. A woman cannot lead men because society expects men to lead” (Sihle:SMRSM). Societal thinking in Zimbabwe was reflected in the comment of one man representing the middle section of society who said, “do you think at family courts a woman should preside over issues? The role of the woman is primarily to help the man” (MP:GGASM). The views of this man and those of the European male principal, one of whom was from a high and one from a medium SES community, showed that views of male superiority over women were not confined to low SES groups.

These comments suggest how cultural leanings and dispositions of gender differences within Shona and European English cultures affect fourth form girls' choice decisions of subjects in schools and of design and technology subjects. Both cultures perceived girls as likely ‘natural’ takers of food and nutrition and fashion and fabrics owing to the impact of their growing up experiences with mothers. On the other hand, boys were perceived as ‘naturally’ fitting into wood technology, metal technology, building technology and technical graphics and design because of their tinkering experiences with fathers at home. As one father put it:

Our culture does not allow sons to take food and nutrition at school because that is a subject for girls. They are the ones who do the cooking at home. We teach our sons to carve hoe handles, to mix mortar and help build and thatch huts. That is what men do and any boy who chooses to take cooking is somehow abnormal (MP:MRSH).

One female principal commented from her observations of how the Shona community worked that:

Home influence does play a part in the selection of subjects. For example, girls are more likely to take fashion and fabrics and food and nutrition that are similar to their growing up experiences. On the other hand boys are likely to choose woodwork and building at this school, subjects, which are closely related to what, they perform at home with their fathers (FPr:MRSM).

Those data suggest the compelling nature of the socialisation process in girls design and technology subject choice. Though girls could make up their own minds to take some subjects for study out of individual curiosity, by and large the advice of elderly people and close family members or significant others, usually carried the day. Shona parents' attitudes and expectations for girls and boys were found to be consistent with societal expectations. In respect of a girl who would take wood technology or building

technology and design, one girl said parents would say, "Since when have you seen a girl doing wood technology or building technology?" (Tendai:SMRSM). According to Tendai, if it is a boy who would have chosen food and nutrition at school, the mother would say, "you greedy boy (makaro aro), couldn't you take male subjects like other boys do? Since when have you seen men cooking? Such men will be a problem to their wives". The compelling strength of such comments were that people in the Shona culture do not want to be labelled in the light of the opposite sex as this does not reflect well on the individual. Many children would simply conform to cultural gender role expectations in order to avoid such connotations. One student felt that females feared losing their feminine tag and being viewed negatively in societal eyes if they undertook jobs that were considered unfeminine. She pointed that:

Our society does not endorse seeing a girl taking a man's role like laying bricks and drawing building plans. You will be labeled as being possessed by a male demon. Even men would not want to marry a builder, a bricklayer, aah (Chene:SGGASM).

Cultural leanings and dispositions were less evident in some sections of Shona and English European high SES group A schools, there was a general view that children's socialised mindsets were responsible for the gendered subject choices at secondary school. Views for both Masvingo and Harare provinces were that design and technology subjects were not the province of female students. One teacher commented that, "Girls see some of these skills as meant for males because of their cultural upbringing which differentiates roles especially in Shona culture" (FBT:TRSH). One student said she saw only males employed in building, metal and wood technology and design and would find it hard to take the subjects. She said:

Just look outside, how many of builders are female? People who do metal and wood technology are male, so it is kind of hard for girls to end up saying I want to do wood technology and on top of that people may not accept you in society (Tessa:SMGBSM).

Channelling was a practice that was found to prevent girls from venturing into former male subject areas in six of the eight schools sampled. Teachers channelled students into subjects they perceived as appropriate for either girls or boys. Gemston and Riverdale in Masvingo province were the only schools allowing girls to choose subjects for study and also did not timetable them out of design and technology subjects. Denlow, Telford, Mari, Tembo, Mbizi and Mau all followed a system of channelling students into subjects. As pointed by one girl:

Here at this school we are not asked if you want to take wood technology or food and nutrition. You are just enrolled into a class and the pupils in that class are allocated the subjects they do. So, you don't choose for yourself what to do (Tairo:SDGASH).

Teachers perceived that they were in a better position to help select subjects for their students because of their assumed wide knowledge and exposure to the world of training and work. Two teachers interviewed said it was the culture of their schools to allocate subjects to students rather than let varied students' subject choices make the time-tabling job difficult. One of them said, "From many years experience in the teaching field, we know which subjects are suitable for boys and for girls. There will also be fewer problems with time-tabling subjects" (MWTT:MbRSH). The channelling of students into subjects however reflected an assimilated mindset on the part of teachers. While some girls in the eight schools perceived that the system was good in that teachers were in the best position to know what girls wanted, many believed that the system killed individual initiative. As one girl pointed out:

Our school did not allow girls to do design and technology subjects. When we came here as form ones, we were given a list of subjects to take and our teachers said boys, your subjects are metal technology and wood technology and, girls you do food and nutrition and fashion and fabrics as if we could not choose our own subjects (Dora:SMGBSM).

The cultural aspect was also mentioned as affecting female employment in traditional male areas. Girls at Mau, Mbizi, Tembo and Mari pointed that they were caught between the desire to want to venture out of female confines of culture and the need to identify with a well-cultured Shona girl preserving traditions. For example, the desire to take building as a subject at school was seen as conflicting with putting on overalls and trousers which were considered taboo for any woman to put on in the Shona culture. As one girl put it, "like when you are doing building, you can't climb up the roof in a skirt. If you decide to put on trousers, culture is against that. So, what will I do?" (Jane:MbRSH). One parent supported this by saying that women did not feel comfortable in overalls and trousers.

As women we cannot imagine ourselves in building construction, engineering or being a mechanic. We shy away from putting on overalls and trousers because that is not there in our culture. On the other hand, a woman feels that she will expose herself by putting on a dress especially when working in high places like in building ... and will not be able to take and perform tasks which conflict with tradition especially where she will expose herself (FP:TGBSH).

Culture was also found to affect fourth form girls' achievement in various subjects they took at school. Girls at both rural and urban low SES schools of Mau, Mbizi, Tembo and Mari felt alienated by both the English language learning medium and the male nature of design and technology subjects. One male principal pointed that, "Conversing in the English language is a problem that affects most of our students. Examinations are all set in English and this affects many students whose English is not very good (MP:MGBSM). The major worries for some girls at Mau school were both the language and the masculine nature of knowledge in design and technology subjects. According to them, it was difficult to relate to the subject culture easily as girls. To one girl, if the subjects were taught in their Shona mother tongue, and were more inclined to familiar knowledge of their growing up experiences, they would perform better in the subjects. She said:

Most of the time we do not fully understand what is asked in the English language and this affects the way we answer questions. The other thing is we do not understand most of the terms in design and technology subjects (Rudo:SMRSM).

The situation was made worse because the Zimbabwean curriculum developers had not incorporated any local content familiar with Zimbabweans in the curriculum, making it difficult for girls to identify with the British designed design and technology curricula first and the male specific knowledge.

*(ii) Assimilated gender role mindset.* An assimilated gender role mindset entails girls' choosing subjects for study according to their "mental constructs of how they fit into the activities" (Lee, 2002, p. 350). This is perceived to be consistent with societal and girls' own constructions of gender identity governed by "social scripts regarding proper behaviour in a variety of situations" (Eccles, 1994, p. 597).

This study found that the perpetuation of gender difference involving separate engagements in both Shona and European English cultures is fed by a rigid socialisation process of children that differentiates their roles from infancy as theorised in chapter three. One parent perceived that gender roles were passed down to the present generation. As she put it, "It is something that has been passed down through generations and parents enforce these cultural norms and values. So, we expect our children to follow these norms and values and for them to pass them on to their own children" (FP:RPSM). Consistent with Eccles et al. (1983) parents were the biggest socialisers of children. Results showed that both Shona and European English parents in both Harare and Masvingo used gendered language to play and communicate with their children and

dressed girls and boys differently. Presents bought for special occasions were different with parents favouring toy cars for boys and dolls for girls. As one parent put it:

Parents are the ones who begin this differentiation process that affects roles. They are the ones who teach children that you are a boy and you are a girl. At the time when the child begins to understand that I am a boy and, I am a girl, there are words spoken by parents that tell the child which gender group he or she belongs to. When playing with a boy they say 'baba' (dad) and 'mai' (mother) for a girl. So 'baba' will be associated with fathers and 'mai' with mothers. The child sees differences in dressing and that those labelled 'baba' put on shorts or trousers and those labelled 'mai' put on dresses. A girl comes to realise that her role is in the kitchen with mothers and the boy outdoors with fathers (MP:TGBSH).

The study found that from a young age, learning took place through observation, touching and hearing. As the child grew up, she or he participated in activities that were considered appropriate for their gender. Shona girls in particular, were socialised by mothers for their ultimate roles in marriage and according to societal expectations of femininity. With strict enforcing from parents and other adults in the society, boys grew up knowing that they were leaders in the home and society while girls took up the supportive role of mother and carer of the family according to Unhu/Ubuntu ideology. Confirming how an assimilated mindset was acquired, one mother pointed out that:

A girl will perform female roles like cooking, sweeping and cleaning the family home and washing clothes for all members of the family including brothers. Young boys grow up in the company of bigger boys and fathers. A father will call his son to help him, grooming him for his future role as father. He will help repair things, being mechanically minded, be it replacing bulbs, repair leaking taps, the things that fathers do. This is done so that he grows up knowing that he belongs to the fathers' group. If you say John can you clean the dishes, he will tell you that it is not his duty, it is for women. (FP:MGBSM).

A female student described growing up in the Shona culture:

Cooking, sweeping floors, washing clothes, ironing, hand grinding of corn and collecting of firewood is done by girls. Boys herd cattle, hunt wild animals, do gardening, cut firewood, do wood carving and till the fields. You will find girls picking used tins and using them in play cooking. At the same time you will see boys making wooden carts and pushing each other in them. This is our growing up. (Theresa:STPSH).

This description was further supported by a female teacher who said:

By virtue of being a woman, this group do all domestic chores like cooking, fetching water, collecting firewood, washing dishes and ironing clothes. When a girl grows up, she will be attached to mothers who teach her how to grow up as a girl. On the other hand, boys herd cattle, milk cows, and help fathers build houses as well as till the land (FT:MGBSM).

The significance of gender role socialisation in Zimbabwe was perceived to be the construction of different mindsets and ways of seeing the world. Girls were identified as most likely to choose fashion and fabrics and food and nutrition at school while boys were likely to choose metal technology, building technology, wood technology and technical graphics and design owing to their different upbringing. As one parent put it:

I see a relationship in all this in that the boy child will be trained in using spanners and doing gardening at home. It follows to say that when the child grows up he may choose subjects in line with this. Girls will be used to domestic, light and caring tasks and will choose fashion and fabrics and food and nutrition because at home that is what they do, sewing and cooking. (MP:GGASM).

Comments in questionnaire responses of an assimilated and stereotypic mindset concerning design and technology subject selection were evident in all the eight schools by fourth form girls not taking the subjects such as "I believe they are only done by boys" (Kuna:SMRSH), "I did not take them because they are for boys" (Future:SMRSM), "I took food and nutrition because I am a girl (Tinto:SMGBSM), "I do not know how they can help girls because they are considered to be subjects for boys only" (Varie:SDGASH), and "I was brought up believing that these are subjects for males. There is no-one who doesn't know that these are boys' subjects" (Tombi:STPSH).

In terms of achievement, an assimilated gender role mindset affected fourth form girls' subject performance in that Shona parents were perceived to give more value to boys' education at the expense of girls. This was reflected in the way parents gave boys more freedom to study while girls performed household chores. As one girl put it:

At home, I as a girl do most of the housework like cleaning the house, cooking. When it comes to studying, I will be tired already. My brother will read much more because he does not do any household chores. I think sometimes we have to blame the parents. They say he is male and he cannot wash plates or sweep floors. (Kate:SGGASM).

Another girl narrated some of her daily routines and saw role differentiation benefiting boys more in terms of study time and achieving better results at school generally. She commented:

I think boys have more time to study at home than girls. While I will be doing household chores, my brother will be busy studying. My brother is also allowed by my parents to go to the library at school in the evenings, a privilege I will not be granted as a girl. If visitors come, I have to prepare tea for them while my brother will be studying. How can I be expected to perform better than him? (Tombi:STPSH).

Consistent with the philosophy of Unhu/Ubuntu, some participant responses suggested that gender role differentiation was natural for each gender group and meant to complement efforts of each other and avoid duplication of roles. Women assuming 'male roles' were considered abnormal and unnatural while men assuming 'female roles' was said to be demeaning. A male parent commented:

I do not think that this is the kind of work (design and technology) that should be done by a woman because definitely it will strain her brains. Male skin is made by God to suit the rough terrain. Women are not made for rough work. I would want a woman to do secretarial work, teaching, fashion design, sewing in factories and catering, things that are not heavy and straining (MP:TPSH).

One student said, "Building and thatching huts is not natural and proper for a woman because the husband cannot hand the wife thatching grass on the roof while he is on the ground" (Gina:SMRSM). These results show that assimilation of gender role can have such a powerful effect on one's view of the world that activities classified as part of the other gender's role are rejected.

**(iii) Parents occupation and income.** The level of a parent's occupation and income was perceived to influence the social and economic status of that family. For example, in high SES schools like Telford and Riverdale and in medium SES schools like Gemston and Denlow, there were more parents in medium to high profile occupations such as business people (47), managers (29), doctors (5), engineers (4), accountants (13), technicians (18), lecturers/teachers (55), nurses (13) and lawyers (4). These parents earned medium to high salaries, greater than those in rural and urban low SES schools like Mau, Mbizi, Mari and Tembo where parents' occupations were mainly in the medium to low income groups. There were only a few high profile occupations in this group like accountants (3), business people (2), technicians (4), nurses (2) and teachers (16) (see appendix xxxv). Nurses and teachers are poorly remunerated and may not be classified under high-income earners.

Socio-economic status of the family was found to determine where the family lived and sent their children to school. Zimbabwe's urban schools operated a strict

zoning system where people living in certain suburbs could send their children to schools designated for those suburbs. Medium to high earners lived in low population density suburbs while the low earners lived in high population density suburbs. Schools in low population density areas where the medium to high-income earners lived pegged their fees so high that only people of high SES status could afford them. Parents interviewed in high population density and low SES suburbs said they could not afford houses and sending their children to schools in low population density areas. As one parent put it, "*Ndokwembozha uko*" "It is only the rich who live and send their children to those private and low density schools" (MP:MbRSH).

The significance of these results is that children from low socio-economic families could not access well-resourced high SES schools and their high educational standards, well-trained teachers and generally higher pass rates. The four schools in the low SES rural and government group B schools were not in a position to offer subjects like metal technology and design, wood technology and design and technical graphics and design as they were considered too expensive by the schools. Quality of teaching was also compromised in most subject areas because of low qualified teachers and lack of resources. Parents in high SES groups in the present study could afford reading materials, home workshops and electronic home learning gadgets such as televisions, computers and radios, giving their children a technological awareness edge over their lower SES counterparts.

The proportion of mothers in 'female' oriented careers (see appendix xxxv) was found to be high in rural and low SES schools of Mbizi and Mau at 93% followed by government group B at 83%, government group A at 63% and 39.6% at private high SES schools. This signified that there were more mothers in 'female' oriented careers in low SES schools than in high SES schools. The percentage of mothers in stereotypic female occupations tended to diminish with higher levels of socio-economic status of school as many mothers of girls in private schools held occupations across the gender divide. This could be attributed to a gradual erosion of traditional customs as a result of highly urbanized lives. With more mothers in gender stereotypic occupations in low SES schools, their influence over their daughters' careers was perceived to be strong since mothers were found to be the strongest socialisers for girls (see table 7.6, p. 152).

Parents' occupations and incomes were viewed by 37 girls of the 321 girls as a means to motivate them to achieve in certain subjects so that the girls themselves qualified to enter into such occupations. In the high and medium SES families, questionnaire results showed that 10 girls from Telford and Riverdale private schools and 18 from Gemston and Denlow government group A schools had thought of careers that were similar to those of their parents. In the low income brackets there were four girls

from Mari government group B, none from Tembo government group school, three from Mau rural and two from Mbizi rural schools who had thought of careers that were similar to those of their parents. In the high and medium SES bracket girls' interest in parents' careers may be attributed to the prestigious careers that most parents in the bracket occupied that their children admired and also wanted to pursue as well, compared to the low paying general labourer jobs for low socio-economic families. In the low SES bracket, girls' low preferences for careers their parents had followed may be interpreted as a desire to escape poverty by forging their own career paths that did not involve the low paying general labourer jobs their parents were involved in.

Table 7.5

Parents influence on fourth form girls' careers

School	Pursue my own chosen career	Pursue career similar to parents'	Total
Telford (Pvt)	16(80%)	4 (20%)	20
Riverdale (Pvt)	22(78.6%)	6(21.4%)	28
Gemston (Gr. A)	80(85%)	14(15%)	94
Denlow (Gr. A)	30(88.2%)	4(11.8%)	34
Mari (Gr. B)	33(89.2%)	4(10.8%)	37
Tembo (Gr. B)	23(100%)	0	23
Mau (Rural)	47(94%)	3(6%)	50
Mbizi (Rural)	33(94.2%)	2(5.7%)	35
	284(88.5%)	37(11.5%)	321

Results also showed that the majority of mothers 165(51.4%) from the four school types and SES groups were not formally employed as compared to only 96(29.9%) for fathers (see appendix xxxv). Fourteen of these (4.3%) were involved in vending goods they made in activities such as pottery, mats, crocheting and dressmaking. These women were found to have chosen these activities because they were carried out at home or close to home and therefore facilitated carrying out childcare and domestic tasks. Unemployed mothers were referred to as housewives while males were simply called unemployed signifying that the general belief in Shona society was not for a working mother. Participants especially from low SES schools perceived that the major role of the mother was to be a housewife and good mother as opposed to parents in high socio-economic situations who felt that females could have a career of their own. This revealed the ingrained thinking among Zimbabweans associating being female with domesticity and mothering.

*(iv) Family expectations and support.* One of the common questionnaire and focus interview responses given by fourth form girls concerning their taking certain subjects for study was the need to keep alive family traditions. In wanting to keep family traditions and an esteemed family name, parents in this study expected their children to take over and run family business concerns. As such they expected their children to prepare for this eventuality by taking certain subjects leading to qualifications and proficiency in the family tradition. Five girls at medium to high SES schools reported that their parents had forced them to take some subjects for them to pursue careers in the family traditions. In a focus group interview, one of the girls said:

The problem is we were born in a society where our parents look forward to have doctors in the family and stuff. So, they will always choose these other subjects and not the design and technology ones (Sarah:SRPSM).

Another girl pointed out that parents had high expectations of their children to the extent of choosing subjects for them. She commented:

Parents usually expect us to have a good job when we finish school, so they will advise us to take certain subjects in order to qualify for the jobs. Sometimes they look at who has succeeded in that area before and then they encourage or discourage you to take similar subjects (Chipo:SMbRSH).

One urban low SES parent perceived that parental expectations had a lot to do with the subjects and careers their children took, citing that,

Sometimes the reason parents force their children into certain careers is family and personal pride. We want to be counted in society such that when we say that my child is a doctor or a teacher, we feel proud. This is why we influence them to do some subjects, usually it is for our own good reasons (FP:MGBSM).

Parents were also perceived as threatening to withhold financial support in order to exert pressure on daughters who would have chosen subjects that the parents themselves did not support. One principal commented that, "Parents are the ones who pay the fees and have their own aspirations for their children which they tend to force on them. Sometimes they threaten not to pay the practical subject fees" (MP:MGBSM). This, however, could also be construed to mean that parents did not value practical subjects as much as academic subjects where they would not withhold payment. It was also found that sometimes girls made their choices about subjects to take but when they informed parents of these choices, a clash of ideas arose resulting in withdrawals from some subject areas in line with parents' wishes. Sadly, as one teacher pointed out, parents' wishes usually did not include design and technology subjects. He said:

If we go for equal numbers of boys and girls in each subject area, and students went home to tell their parents that they have been put in a non-traditional subject area, the next day parents will come here seeking transfers for their children to 'appropriate' traditional subject areas. They will say their son cannot do food and nutrition or their daughter cannot take wood technology (MWTT:DGASH).

Parental expectations for the kind of career they hoped their children to take were also seen to affect girls' decisions to take some subjects at school. A fourth form girl said parents exerted a lot of pressure on daughters looking at where opportunities for women in the workforce lay.

Sometimes they may not have seen people who have succeeded in that line of subject and business. So, they say no, leave that and do this because they will have seen people who would have benefited from taking it (Sarah:SRPSM).

Apart from self-made decisions (43%), mothers (11%) were found to have the greatest influence over their daughters' career decisions in all four school types except in private high socio-economic schools (see table 7.6).

Table 7.6

Major influences on fourth form girls' subject and career decisions

Influence on Career	Mau/ Mbizi (rural low SES)	Mari/ Tembo (urban low SES)	Denlow/ Gemston (urban middle SES)	Riverdale/ Telford (urban high SES)	Total/ Percentage
1. Self-made decisions	30(35%)	18(30%)	73(57%)	15(31%)	136(43%)
2. Mother	11(13%)	6(10%)	14(11%)	3(6%)	34(11%)
3. Both parents	10(12%)	6(10%)	10(8%)	5(10%)	31(10%)
4. Father	5(6%)	5(8%)	10(8%)	6(13%)	26(8%)
5. Sister	10(12%)	3(5%)	3(2%)	6(13%)	22(7%)
6. Brother	9(11%)	5(8%)	5(4%)	1(2%)	20(6%)
7. Friends/peers	3(4%)	1(1.5%)	3(2%)	4(8%)	11(3%)
8. Teachers	2(2%)	2(3%)	6(5%)	1(2%)	11(3%)
9. Good at subjects	-	7(12%)	-	4(8%)	11(3%)
10. No comment	3(4%)	2(3%)	-	-	5(2%)
11. Aunt	-	2(3%)	2(2%)	-	4(1.3%)
12. Uncle	1(1%)	1(1.5%)	-	2(4%)	4(1.3%)
13. Grandmother	-	-	1(1%)	1(2%)	2(1%)
14. Financial rewards	-	2(3%)	-	-	2(1%)
15. My doctor	-	-	1(1%)	-	1(0%)
16. Country's president	1(1%)	-	-	-	1(0%)
Total	85(100%)	60(100%)	128(100%)	48(100%)	321(100%)

It appeared that the mother/daughter bond extended beyond mere cultural socialisation to influences on educational and career endeavours in three school sites: rural low SES, urban low SES and urban medium SES groups. Mother influence was greatest at Mau and Mbizi rural schools (13%) perhaps because of cultural gender role shared attachments between mother and daughter in rural areas. Riverdale and Telford private school mothers with six percent were the least influential to their daughters' subject and career decisions. Both parents had a percentage total of 10 followed by fathers (8%), sisters (7%), brothers (6%), aunt and uncle each at 1.3 percent and grandmothers (2%) among family members I am focussing on in this section.

Parental expectations in Shona culture for girls to marry and be good mothers, especially in rural communities, were also found to restrict fourth form girls' decisions to take traditional male subjects and careers. Focus group interview responses of girls not taking design and technology indicated that not many would-be husbands appreciated taking a wife who would be away from home for long periods of time on, for example, engineering assignments. As one white female teacher pointed out:

In this country, there are very few men who will stand a working woman who is going to be away from home for long periods of time. So if a girl is going to become an architect, a job that is going to involve a lot of travelling, it means that she is making a decision into singledom and it's not many that will make that choice. I think it affects many women in the trades (WGCT:RPSM)

Husbands were perceived to shun wives whose orientation society considered unfeminine through taking traditional male subjects and careers. Those girls taking them were labelled loose morally and wanting to be close to men always. One mother commented that to avoid jeopardizing chances for marriage and running into conflict with cultural expectations, girls chose subjects and careers that supported their gender role identity. She said:

Girls fear taking male subjects because they say if they get married what will my husband and his relatives say if they get to know that their son married a builder? So, she may not enrol in these subjects or may not put in any effort in such subjects thinking that people may not see her in the light of a well-groomed Shona woman (FP:MbRSH).

Focus group interview responses of one male parent at Mau intimated that females lacked the mental capability to do well in the subjects. The parent undervalued female capability to successfully engage in design and technology subjects. As he put it:

Some of the subjects like technical graphics and design require a lot of thinking and most of the girls do not like such subjects where there is a lot of thinking and reasoning. They want things that are not difficult like cooking and not activities requiring, measuring, those do not interest them (MP:MRSM).

Comments such as these reflected a low expectation of women that most males in the Shona society have. On female parent at Tembo government group B school expressed that repetitive comments such as these ended up being believed by women in the community lowering their aspirations to succeed. She said:

I think some women have come to accept some of the things men say as true and therefore, unquestionable. They end up saying they cannot do this or that, simple things that men do. The thinking among men is that women cannot use their brains but truly women can do all things that men do, if not better (FP:TGBSH).

(v) *Student maturity*. Maturity affected fourth form girls' participation and achievement in design and technology subjects. In terms of participation, three fourth form girls who had chosen to take design and technology subjects at rural Mau secondary school pointed out that they could no longer afford to be seen taking traditional male subjects as this would send a wrong message to would be suitors about their sexual orientation. Many would-be Shona suitors were believed to be put off by girls who acted outside cultural expectations. Two girls who had taken building at form one and two level at Tembo school said they dropped the subject because they did not want to be seen any more in dirty overalls. One of them commented that, "Aaah! Girls, can you imagine any boy who would like to go out with a female builder or a female carpenter?" (Teri:STGBSH). A mother at another school said, "I think that husbands do not prefer wives who work in male environments as these are usually labeled "nzenza" or women of loose morals (FP:RPSM).

In terms of achievement, the present study found that across Shona, English European, rural low SES and private high SES schools, Masvingo and Harare provinces, fourth form girls perceived that they performed better than boys in most subjects before the onset of adolescence. The girls perceived that effects of puberty wore girls down more than boys because their focus tended to shift from study to social relationships as they grew older and this affected their achievement in school. One girl said that, "Sometimes we girls become interested in boyfriends to the extent of not concentrating in class" (Chipiwa:TPSH). Another girl pointed out that,

When they get to form three and four (year 10 and 11), most girls will be thinking of getting married to a rich person, to raise children and to be a housewife so much that they draw back in their school performance and start fantasizing about the future (Lina:GGASM).

Four design and technology teachers at Mbizi, Mari, Denlow and Gemston schools agreed that while boys remained focussed on their studies, girls found themselves distracted by boys seeking girlfriends. One teacher commented that, "When girls grow up and begin to discover themselves better, when boys begin to propose love to them, it affects them. They will concentrate on pleasing their boyfriends than their performance in class" (WTT:MbRSH).

At home, this study found that because girls would have matured, parents in rural and urban, low and high SES families discouraged them to attend extra evening studies when their brothers were free to do so because parents feared that their daughters would be mischievous and fall pregnant. Boys' mischief was seen as not resulting in serious consequences like falling pregnant. One girl said, "Even coming here to study in the evening, our parents will not allow us to do that as they say we will engage in bad behaviour. Boys are allowed and have more time to study than us (Tendai:SMbRSH).

*(vi) Employment and subject biases and demands.* Interview results in this section point to employer biases and demands as affecting fourth form girls' choice of subjects in schools as well as enrolment and achievement decisions in design and technology subjects. Employment biases and demands also prevented women from taking employment in former male sectors like engineering and building construction. All 24 technical subject teachers (including 18 design and technology teachers) and two guidance and counseling teachers argued that advertisements by both trainers and employers were biased against design and technology and technical subjects as a whole. Teachers were agreed that both trainers and employers demanded that a student pass five ordinary level subjects, excluding any design and technology subjects and technical subjects, for them to be enrolled in teaching, nursing and any apprenticeship training. Such demands were seen as sending a message to both girls and boys that design and technology subjects were unimportant. One teacher said:

Take for example an advertisement for nursing training; they require five ordinary level subjects excluding fashion and fabrics, food and nutrition, metal technology, building technology, technical graphics and wood technology. Straight away the message conveyed is that these subjects are not important for the job market (MTGT:GGASM).

In terms of advertisements put in national papers one principal pointed the biases therein:

I see the adverts we get about training and employment as affecting students' desire to take technology subjects as a whole. Most of the adverts mention five ordinary level subjects excluding any technical subjects. This is why the subjects are not highly regarded (MP:MGBSM).

Both teachers and fourth form girls viewed employer demands as a form of exclusion for design and technology and technical subjects' graduates. To fourth form girls, the advertisements suggested that the subjects were unimportant and hence not worthy of taking at school.

The Ministry of Education, Sport and Culture was also blamed for supporting that for any student to have a full school leaving certificate, they should have passed five ordinary level (year 11) academic subjects. Coupled with the fact that none of the design and technology subjects, with the exception of technical graphics and design, are taken at advanced and university levels, students viewed these subjects as having no future value even after achieving a string of 'A' grade passes in them at ordinary level. One teacher said:

For someone to have a full ordinary level certificate you need five subjects usually academic ones such as English language, mathematics, science, geography and history but no technical subjects. All it means is that technical subjects are not important at all (MWTT:GGBSM).

Employers were also found to favour employing males in science and engineering jobs leaving females with the feeling that taking design and technology subjects at school was only beneficial to males. Some girls perceived that their efforts in taking design and technology subjects would not be rewarded by relevant careers in a society that was largely male centred. The problem was seen as resting on male low expectation of women. As one girl put it:

You may have all these qualifications in building, may have passed very well and build well. But, when it comes to male employer and customer confidence, its like people will say, "a house built by a woman, aah, will it stand?" They look down upon you and your work and even are skeptical about your qualifications (Stembeni:SMbRSH).

Parents and students at Riverdale and Mbizi schools also perceived that girls taking traditional male subjects were likely to be frustrated as male employers tended to prefer males in place of females because of perceived cost of lost production during maternity leave if a female was employed. One parent commented:

Employers tend to prefer male employees because they do not get maternity leave at the expense of company production. Nine months means low production for the company as a woman may suffer pregnant-related illnesses. From about seven months onwards the law stipulates that a woman should take paid maternity leave. After birth the company continues to lose as the woman will still be nursing the baby (MP:MbRSH).

One rural girl saw males as stealing female employment in careers like tailoring in factories and cooking in hotels. This was perceived as a form of oppression for women who would have been groomed for such female oriented careers at home and yet men took over female oriented employment because there were rewards to be accrued. She said:

When it comes to paid employment, men oppress us and take our jobs. What boggles the mind is that society assigns roles like sewing to us women but we find adult males taking these roles in paid employment. Men are just greedy. (Jane:MRS M).

Government as the largest employer was accused of not making any effort to have design and technology and technical subjects recognised for tertiary education training. Some girls not taking design and technology subjects said the subjects were of no academic or career worth and aimed at those who only want to gain skills for self-employment. In this respect, these girls felt that the subjects led to unimportant future endeavours.

### ***7.2.2 Conative Factors***

Conative processes in this study entailed voluntary inner choice, free will or volition of the girl student to engage and achieve in a task, subject or activity. Five processes were found to affect fourth form girls' subject enrolment and achievement choices in this section. These were perceived value of studying the subject and future career aspirations, subject background experiences, role models, access to information and media effects and the desire to prove critics wrong. These are discussed in the following sections.

#### ***(i) Perceived value of studying the subject and future career aspirations.***

Questionnaire responses in three school types: rural, government group B and private, had task value as the major influence for subject choice and achievement (see appendix xxxiii). Fourth form girls tended to look at the immediate and future benefits of engaging in the subjects before taking a subject for study. Participants in these three

school types perceived that girls took subjects they perceived as leading to university and career training courses and not for their own sake. For example, some girls said they took accounts as a subject at school for careers in accounting, sciences for careers in the medical field, food and nutrition for hotel catering and fashion and fabrics for fashion design. Only 19(6%) girls perceived design and technology subjects as useful in their future career aspirations while 302(94%) thought they were of no relevance (see appendix xxxiv). One girl pointed out that:

I chose my subjects looking at how they will help me in the future. I think it is important to do subjects that have a bearing on the career I want to pursue. My future career does not have anything to do with design and technology subjects. I want to be a doctor and I don't need those subjects (Sekai:SMRSM).

Another girl who wanted an office job said:

I have seen that the world is changing and people especially students wish to work in offices when they grow up. I do not think that if I take design and technology subjects, they will be able to land me an office job (Tracy:SMGBSM).

There was a general feeling among all the 321 girls sampled that both design and technology and technical subjects were only helpful when one failed to achieve the mandatory five ordinary level subjects for a full ordinary level school certificate. In these circumstances, the subjects were perceived as becoming handy for self-employment. Comments such as, "to sew and sell clothes if I do not pass examinations" (Kazi:SMbRSH), and, "if I failed all other subjects, I will continue doing fashion and fabrics at home" (Princess:SGGASM), reveal the low status the subjects were given. Such attitudes relegated design and technology and technical subjects to the bottom of the continuum list of important subjects students took at school. One female teacher shared the same perception that the subjects were only beneficial for self-employment in the event that one failed to find formal employment. As she put it, "we do not see where these subjects lead to except to give students skills for self employment when they fail their examinations" (FBTT:MRSM).

As a result of most Zimbabweans' low perception of design and technology subjects, the subjects have tended to be looked down upon and offered mainly to B stream students who are considered more hands on and less academically able in all the eight schools studied. Comments by one girl were supportive of this assertion:

Here at school, after form one and two, teachers select and group us according to our areas of ability. They say this student is not able to do mathematics and science, so they push you to do the arts and technical subjects" (Stembeni:MbRSH).

The general push by the eight families interviewed was for their children to achieve in academic subjects. The families believed that academic subjects led to more worthwhile and prestigious occupations like medicine, law and accountancy. Subjects that only ended at ordinary level like metal technology and design, wood technology and design and building technology and design were regarded as non-beneficial to those students who aspired to go to university.

(ii) *Perceived cost.* Cost in this study entailed weighing benefits of engaging in one activity over another. Five fourth form girls at Gemston and one at Mari taking design and technology subjects pointed out that often women were in conflict of wanting to be recognized as well-groomed African Shona women and the desire to break away and venture into traditional male subjects and careers. This struggle became an internal conflict that girls and women found difficult to balance and hard choices had to be made. One girl explained:

Though women want to do various careers, they still want to keep their femininity. Now, how do you keep that intact? How do you still be a mother, be a wife, keep the traditions and still follow a career in a male field like architecture and go to work everyday? (Cheryl:SMGBSM).

Parents' focus group interviews found that women were often in conflict of taking careers in traditional male areas and the effect this would have on parenting roles expected of them by husbands as well as society. Interview results showed that balancing the two often presented problems which were resolved by ranking parenting and childcare ahead of professional endeavours. As one female parent put it:

The thing is, a girl thinks of what will become of her in the future. Suppose she takes a male career, she asks herself...if I fall pregnant surely I will have to drop out of the course unlike my male peers. And in industry, will I manage the kind of work with my pregnancy? (FP:MGBSM).

Fourth form girls not taking design and technology subjects at Denlow counted the cost of taking a completely new subject and struggling through it against taking a familiar subject in which they had some background knowledge. These girls perceived that fashion and fabrics and food and nutrition were easier subjects because they were more familiar with them than with design and technology. One of the girls said, "I took fashion and fabrics because I am familiar with the subject knowledge taught. I do not know anything about metalwork" (Peeper:SDGASH).

Girls at Gemston and Tembo said they experienced a lot of anxiety thinking that if they went against cultural expectations and something went wrong, what would

happen? They also complained about being afraid of what society would think and react like to girls who went against cultural expectations and took traditional male subjects. As one girl put it:

There is the society factor. At times you look at society, let's say I take metal technology and then maybe I fail the subject in examinations, everyone will be like, 'we told you, you were supposed to do something easy like food and nutrition. What you took is meant for men' and stuff like that' (Tsitsi:SGGASM).

The girls said that this internal struggle was usually resolved by not going through the stressful ordeal. Interview responses also indicated that girls who braved societal attitudes against women taking the subjects, often fought other external pressures and their own inner cultural convictions. For example, the fear of parents' reaction positioned one Riverdale girls to avoid taking technical graphics and design for another subject:

I was interested in taking technical graphics and design but then I also considered the consequences of taking it knowing the reaction of my father upon learning that I had chosen it, so I dropped it for accounts (Julie:SRPSM)

Pressure for girls not to take design and technology subjects was found to come not only from males but also from other female students. At all eight schools, girls reported that they were afraid of being laughed at by other girls. One girl said:

If we look generally in society, you see wood technology and carpentry being done by men. Girls will be afraid to be laughed at if they decided to take it. On the other hand, when someone asks you which technical subject you are taking and you mention metal technology or wood technology, aah, it's just hard to say to your friends (Dora:STGBSH).

Two girls at Tembo and Mari in Masvingo province said they were afraid of taking design and technology subjects because they would be labelled as loose by wanting to be near boys. Customarily, it was revealed by these fourth form girls that no one wants to be associated with looseness hence many girls succumbed to these pressures and dropped the subjects. As one girl put it, "if someone...says she wants to do technical graphics, other girls will just say that she is going there for boys' sake" (Tecla:SMGBSM).

At Gemston, some girls threatened to cut friendship ties and girls who had taken traditional male subjects had to count the cost of losing a dear friend than to just drop the subject associated with the problems. One girl confirmed this by saying, "I would rather go along with others than to lose their friendship" (Gina:SGGASM). To fourth form girls not taking design and technology subjects in all the eight schools, design and technology subjects were considered lonely subjects for any girl to take. The girls said they wanted

to be with their close friends and in the company of other girls. As a result, they sacrificed personal interest of subject choice in order to be with friends or other girls. One girl said, "Most boys take these subjects and as a girl, I wouldn't feel comfortable all alone there" (Shingai:SGGASM). Another girl said she could not take technical graphics because "There were no other girls willing to do technical graphics so I followed other girls to fashion and fabrics" (Peeper:SDGASH). One teacher confirmed girls' fear of being isolated from other girls:

There may be a girl who wants to take metal technology but does not want to be all alone in the subject. I know my daughter when she was in form one, she wanted to do wood technology but when she discovered that she was the only girl there she opted out (WFGCT:RPSM).

Girls not taking design and technology subjects in all the eight schools also weighed the idea of wanting to take the subject and the unwelcoming attitude of male teachers whom they said abused them verbally and reduced them to gatecrashers in subjects not meant for them. One girl portrayed the attitude of teachers saying:

Usually when you fail something in class, (male) teachers go like aah, 'did you think as a girl you would be able to do this subject?' They just give you this attitude that eh, 'what are you doing here, this is supposed to be for boys only and you are in the wrong place, go back to food and nutrition, just join another subject and don't bother me'. Most of the time you find that girls find it hard to perform well in the subjects (Carol:SGGASM).

*(iii) Role models.* Results indicated that fourth form girls saw and admired certain individuals and their successes in some careers and aspired to be like them. Adult women who had thriving fashion businesses, for example, inspired 25(8%) of the 321 girls to want to pursue fashion and fabrics at school in the hope of establishing their own fashion businesses in the future. The successes of these role models helped girls to attach a higher future value to the subject thus increasing their interest in it. One girl commented that, "Sometimes you see people in fashion and fabrics who sew clothes and sell their products and you say to yourself, let me take this subject as it will help me in the future" (Thoko:SMbRSH).

Close family members were perceived by all girls taking and not taking design and technology as role models to whom most girls related to more constantly. The girls said that they were able to see the immediate benefits of pursuing certain careers within the family if there were any family members holding admirable positions. For example, one girls at a government group B school said that, "I came here and I wanted to do food

and nutrition just because that is what my mother teaches...I became interested in that also." (Kate:SGGASM). Another girl said:

In my case, my grandmother was a specialist in dress and textiles. My mother is in dress and textiles and my sister is also in the same trade. So, I just followed the crowd and said like, why change the family tradition (Tsitsi:SGGASM).

A girl at Riverdale private school thought that many girls did not take some subjects because they would not have seen anyone achieving in them. She commented that, "Sometimes they think that well, they have not seen any people who have succeeded in that line of business. So they think it is not worthy your while to do the subject" (Sarah:RPSM). Another girl at another school pointed out that, "If your father is a carpenter and you are inspired by what he does, you take the subject because you want to be like him (Grace:SMRSM). A father at a Harare school said:

It is us parents who contribute a lot. Children grow up seeing us doing many things and they just emulate. I do welding at home and my sons are always with me and sometimes, though they are still young, I find them helping me hammering metal the way they see me doing (MPTGBSH).

A female teacher said she believed that someone held in high esteem like a father, mother, elder brother or sister influenced interest in girls to participate and achieve in certain subjects. As she put it:

I think most girls imitate other people they admire. If an influential figure in the family is taking a certain field of study, you find the young ones following in the same footsteps. If a girl grew up seeing older sisters taking wood technology, she is most likely to be influenced by this and may take the subject also. Like a certain girl in form two, she had a brother taking technical graphics here and she also decided to take the subject (FGCT:MGGBSM).

Three fourth form girls taking design and technology at Gemston perceived that the lack of women role models in design and technology subjects and in relevant careers did not give girls the confidence that women could successfully achieve in the area. The three girls said they had taken technical graphics and design because the subject was being taught by a female. They saw their female teacher as a role model to emulate and who encouraged them by her success in the area. One of the girls commented:

One thing is that female teachers just give us the motivation. It's like we are saying if she managed to become a technical graphics teacher, why can't we do it? So, we are really encouraged by our technical graphics teacher (Rudo:SGGASM).

Findings on the importance of role models in shaping subject choice decisions however, conflict with a study at Mau rural secondary school where the presence of a female building teacher did not readily translate to girls taking traditional building technology and design as other variables were found to be at work. There were no girls taking building technology at Mau at fourth form level. However, in technical graphics and design at Gemston medium SES school, results showed that the lady technical graphics teacher had made a significant impact as there were three girls in the fourth form she taught who had enrolled to do the subject. In the class taught by a male teacher at the same level and school, there were no girls taking the subject.

*(iv) Access to information and media effects.* Results in this section show that many fourth form girls lacked accurate information about design and technology subjects to make informed choices that outweighed the effects of gender role socialisation. One principal, two design and technology teachers and fourth form girls not taking design and technology subjects said girls did not choose design and technology subjects because of a general paucity of information on what the subjects involved and the benefits of taking them. The principal pointed out that “I certainly think that the school could do more ...to sensitise girls to take these subjects. There are girls with those talents who could be encouraged in a deliberate and planned way to take those subjects (MPr:DGGASH). One teacher conceded that teachers were not providing enough information to girls to make informed choices. She said, “It is true that schools do not give enough information about these design and technology subjects. Many students bring little or no subject background information from parents to enable them to choose the subjects wisely (FBTT:MRSM). It was also imperative from one student’s comments that schools could do more to sell these subjects to non-traditional takers in the form of subject and career guidance. As she pointed out, “I think teachers need to explain to all students the advantages and disadvantages of taking each subject. Many students do not know the value of taking some design and technology subjects (Jane:SMRSM).

Teacher guidance and counselling services were found to be active only in terms of disciplinary matters and absent in issues of subject and career advice in seven of the eight schools. Guidance and counselling, as a subject, was only found to be active at Riverdale private high SES school with the rest of the schools not providing it contrary to Ministry of Education, Sport and Culture policy calling for its inclusion in the school curricula. Students’ lack of guidance was displayed in comments at Mari and Tembo urban low SES schools where some girls said they knew nothing about design and technology subjects for them to feel comfortable taking them. One girl said, “What

would I do after passing the design and technology subjects? (Grace:SMGBSM).

Another girl at Tembo school said that, "It would not have benefited me to take subjects that I do not know where they would lead me to like technical graphics and design" (Kazi: SMbRSH).

At Denlow and Gemston government medium SES schools, it was found that the subjects were not introduced positively to girls to generate any interest in taking them. Girls not taking the subjects had misconceptions about them being too difficult. One girl pointed out that, "girls think that these subjects are difficult because they do not know what the subjects are all about" (Tatenda:SGGASM). Another girl thought that technical graphics required a lot of concentration "with all sorts of unfamiliar instruments hence many girls run away from it. I think this is actually brought about because many do not know what is involved" (Jane:SGGASM). One female teacher did not even know the benefits of taking technical graphics and design either. As her comments reveal:

Concerning technical graphics, I personally do not know the value of the subject. So, I think our girls may not understand what they will do after passing it. Girls choose those subjects which are common and which lead to courses like fashion and fabrics that help them enter 'A' level dress and textiles. As for this TG, I think there is no clear picture of what one will be doing after that. (FFT:MbRSH).

The Masvingo province design and technology Education Officer summed up the situation in schools showing clearly the need for more teacher involvement in student guidance and counseling:

My own perception is that we are not guiding them (students) into what we want them to do. You would be shocked at how little information they have got about their own lives. So, I would like to say that in most of our schools, we are not exposing our students to what the future is holding for them. Most of them are in total darkness. In other words, we are not giving them career guidance that is needed by them when they leave school. So, we would definitely say... most of the teachers besides teaching their own subjects and talking about the subject knowledge, there is nothing else they are giving to the students before they leave school.

On being asked where fourth form girls got their information on subjects and careers, girls taking design and technology at Riverdale said it came from close family members, friends and the media. Parents' information was, however, said to be limited to careers the parents themselves knew and held in high esteem like teaching and nursing, although these are poorly paid, and accounting and medicine. As one girl explained, "Parents have a vague view of careers and that is the only view you may be getting, so

narrowed to only what they want you to be. So, we do not have a large information base” (Cheryl:WGRPSM).

Media as a reflection of society was seen by Riverdale girls taking design and technology as biased towards males and ignored highlighting female achievements. For example, national television was blamed for airing programmes where male achievements were highlighted only. As one girl put it:

When I watch TV, I ... don't see many women in the technical fields. We are never shown work done by women that we can marvel and say whaa, 'look at what this woman has done, look at this nice building that she planned,' we never are shown that. We are only shown what men do (Cheryl:WGRPSM).

The lack of accurate information about design and technology subjects and their future value was perceived as the reason why many girls never considered them for study among many other factors discussed in this research. Media messages were perceived to be assimilated by girls and made them believe that what was shown on television represented reality.

### ***7.1.3 Affective Factors***

Affective factors in this study were seen as subjective feelings and dispositions held about an activity. These encompass emotions, perceptions and attitudes about a phenomenon. Shen (2002) argues that these are not inborn but have roots in environmentally induced favourable and unfavourable experiences or variables. This section looks at the perceptions and attitudes held about design and technology that have led to girls' disengagement with the subjects. These perceptions and attitudes bring out the nature of the subjects as well.

***(i) Perceptions held of design and technology subjects.*** Results show that 77 out of 321 fourth form girls or 23% say they would have taken a design and technology subject if free choice of subjects prevailed in schools and if all the subjects students wanted to take were offered (see appendix xlv). The majority, that is 77%, said they still would not have taken the subjects for various reasons presented in this section. Most of the girls in the 77% bracket perceived that the subjects espoused male values that did not support their gender identity as girls. Consistent with Wigfield and Eccles (2000), the fourth form girls looked at their self-image regarding female roles and how this self-image fitted with design and technology activities. To most of these girls, design and technology subjects were “heavy work”, “heavy subjects”, “physical work”, “dirty”, “filthy”, “greasy”, “dirty practical work”, “man's thing”, “boys' thing” for girls to take.

Most girls in the eight schools shared these views. This could also mean that girls saw themselves as weaker than boys physically. As one girl put it:

Many of us girls just think that these subjects are for boys. It is too heavy work for us to do, imagine moulding and laying bricks. It is the heaviness of the work that, I think would suit boys who have more strength (Vimbai:SMRSM).

Another girl hated the dirty work involved and pointed out that her girl identity conflicted with putting on 'male' clothes. She commented:

My brother who is doing an apprenticeship in motor mechanics looks filthy. I mean the idea of getting grease under my nails just freaks me. I just don't like the idea of getting so dirty and, I can't picture any of us girls in overalls getting all greasy and I got long hair, can you picture my hair in oil? I just can't see that happening (Cheryl:WGRPSM).

The views of these girls were compared with those of adults in the community to see if other people shared similar views. One teacher stereotypically supported Cheryl's view that there was a lot of dirty work that girls would not want to handle. She pointed out that, "Girls are selective and smart in their nature. They wouldn't want to get dirty mixing mortar for building. What they prefer is a clean environment like home, doing their sewing and cooking" (FFFT:TGBSH). The female building and technology teacher at Mau however, viewed the subjects differently saying that, "Actually these days girls are not worried about doing men's jobs. If you look at this school, they are doing subjects like agriculture. I don't see them as worried about dirt" (FBAT:MRSM). One female parent however shared the 'heaviness' and 'dirty subjects' views pointing that:

Take building for example, this is a job that requires strength in pushing wheelbarrows and laying bricks. Some girls will resent this kind of dirty and heavy work in the same way they would not like dirt in metal technology and wood technology and design (FP:RPSM).

The heaviness of the work involved also received support from one education officer who intimated 'normalcy' in girls and boys' separate subjects saying:

They are assumed to be heavy subjects. They are not lighter like what I would term the normal girls' subjects like sewing, cooking and so on. In most cases girls simply feel that perhaps they are not physically fit enough to handle those heavy subjects as they term them (EO).

The attitude of one female principal was no different in saying:

The mere mention of wood technology is associated with heavy logs and planks which girls may find too difficult to handle. Even when I go to observe lessons in wood technology, I have always questioned myself whether I would have been interested in doing the subject myself. Patience and skill in executing dovetail joints and all the grooving, I do not think I would have managed that (FPr:MbRSH).

Of the 309 girls who filled in the questionnaire and were not taking any design and technology subjects, most of them perceived the subjects as difficult. The subjects were associated with mathematics and science that the girls said were difficult subjects. As one girl put it, "I think it is a difficult area since it involves a lot of science and mathematics" (Tatenda:MGBSM). This mere association with mathematics had the effect of putting girls off the subject. Many of the fourth form girls said they associated difficult subjects with male participants and easier subjects with female participants. This reflected a low self-concept of ability on the part of girls. As comments by one girl and a teacher reflected:

They are difficult and are only suitable for boys (Vas:SMRSM).

Yes, boys take subjects like technical graphics that are difficult. Boys also take wood technology while girls take simple subjects like fashion and fabrics (FFFT:MRSM).

Girls not taking design and technology perceived that all the design and technology subjects were difficult. Girls taking technical graphics felt that it was only metal technology and design, wood technology and design and building technology and design that were difficult while technical graphics and design was manageable but challenging. One girl said that, "I wouldn't consider taking them because they are all difficult" (Theresa:TPSH). Another girl said that, "Technical graphics is challenging but we are doing it but I think metal, wood and building technology and design are more difficult. Perhaps it is because we have never done them" (Rudo:SGGASM).

Two Gemston girls perceived design and technology subjects as helping those taking them in other subjects like mathematics, physics and technical graphics because the subjects and their concept bases were related in such areas as calculations and geometry. As comments of one of the girls reflected:

You find that the subject helps you in your mathematical geometry because they share common themes. In mathematics there are geometrical constructions and you find that students taking technical graphics are very good at construction geometry (Rudo:SGGASM).

For the 12 girls who were taking technical graphics and design at Mari, Gemston and Riverdale, design and technology were not different from other subjects that anyone could take and achieve in. One of these girls felt that many other girls were simply not keen on venturing into what they saw as unfamiliar territory. She commented that, "many girls just say they can't draw but they have never tried. They just surrender and say they can't do it" (Rumbie:SMGBSM).

All 321 fourth form girls perceived that one factor that prevented many fourth form girls from taking design and technology subjects was mere numbers. Fourth form girls saw more boys and male teachers in school workshops than girls and female teachers. Similarly, the girls saw more girls and female teachers outnumbering boys and virtually no male teachers in home economics subjects. This made girls perceive that the two subject areas were not only different but synonymous with someone's gender orientation. In terms of design and technology subjects, one teacher said that, "The subjects are still considered very much a boys' thing. You don't see women doing metal technology, wood technology or construction jobs. It's very much a man's thing (WFFNT:RPSM).

Female teachers and fourth form girls taking and not taking design and technology subjects perceived that design and technology textbooks were male-biased with male specific language and illustrations to match and no mention of girls' participation and achievement. They also perceived that the absence of literature in design and technology subjects written by women did not help the situation as males wrote using male-specific examples. The following excerpt from an interview with a teacher represents views of biases in literature:

Most examples in the textbooks are male in nature. They talk about men doing that...writers have always been male...and all the older books have males illustrated because the subjects have been male dominated. Most probably girls see the pictures and think that the subjects are for men (MTGT:RPSM).

Fourth form girls not taking any design and technology subjects at Gemston and Riverdale high SES schools pointed to the nature of design and technology knowledge as not the everyday language and kind of knowledge that girls were accustomed to in their growing up experiences. One girl who had dropped wood technology and design was critical of the workshop atmosphere. She said, "You enter a workshop and you see so many unfamiliar tools and machinery. Sometimes you don't even understand what the teacher will be saying because he talks about things you have no idea about" (Clara:SRPSM). According to this girl, this made girls feel isolated, lonely and sometimes unwanted in the classroom.

Both design and technology and technical subjects teachers in all the eight schools perceived that design and technology subjects had a stigma of subjects for the non-academic stream in Zimbabwe was another factor believed to prevent girls from taking the subjects. The teachers mentioned that colonialism brought the system of streaming students on ability grounds. Students who were not academically capable were considered to be hands on and skills oriented instead of minds on. The academically capable students were assigned to academic subjects and low stream students to skills or technical subjects. This result corroborates Fleer and Jane (1999, p. 82), who argue that the problem rests in “culture that sees technology as being a second class intellectual pursuit or activity, which can be traced back to things like technical schools before the restructuring. If you went to a technical school, you went because you weren't very academic”. One principal confirmed this:

These are important subjects because we do not have all students who are academically inclined. Some are good at using their hands and should be allowed to pursue them. Sadly this seems to be the general thinking that the subjects are for the less able students and us teachers tend to use these criteria often when allocating subjects (MPR:MGBSM).

One design and technology teacher perceived that academic subject teachers looked down upon technical students as well as their teachers. Sadly, with everyday reality in Zimbabwe showing that academic subjects led to more worthwhile career and life endeavours, many students avoided design and technology and technical subjects. As the teacher put it:

Academic subject teachers usually call our students derogatory names and girls tend to see these subjects as meant not only for boys but also, for those who are dull and avoid them (TGT:DGASH).

Ministry of Education, Sport and Culture was also perceived by both design and technology and technical teachers as having had no insight in establishing design and technology as a special component of traditional male subjects such as metal technology, wood technology, technical graphics and building technology and design while suspiciously leaving out home economics subjects like food and nutrition and fashion and fabrics. This oversight assumed all pupils including girls would be interested in taking male design and technology subjects and made people believe that design was not part of knowledge that females should have. One teacher commented that, “I do not know why the design component is the approach for teaching traditional male subjects and not home economics. It appears like Ministry is saying girls cannot do it or that it is irrelevant to their subjects” (FBAT:MRSM). Teachers in all eight schools and students

perceived that design should have been made a core component of every technical subject including home economics subjects and not design and technology subjects only.

(ii) *Self-confidence and self-esteem.* The twelve girls taking technical graphics and design at Mari, Gemston and Riverdale perceived themselves as able to succeed in the subject. The girls saw the subject as a stepping-stone to the careers they desired to pursue and said that this increased their self-confidence in the subject. One of the girls said that, "I feel confident to achieve in technical graphics as I am in any other subject. I hope to use the knowledge gained to pursue a career in architecture" (Clara:SRPSM). Five girls taking technical graphics and design from Gemston and one from Riverdale schools perceived that their self-confidence was raised high when they took the subject out of determination to prove critics wrong that they could achieve in them. A student at Riverdale said, "Part of me says I want to prove that I can do it, just for the sake of proving that I can do it. (Clara:SRPSM). This was also echoed by another girl who said, "I wanted to show my parents and friends that I could do technical graphics and pass it because I got the talent to do it like any other person (Tendai:SGGASM).

The performance of fourth form girls in technical graphics classes I observed at Gemston and Riverdale proved that there was no basis for saying girls could not take and do well in traditional male subjects. As I went through students' work, their drawing folios and the teacher's mark book at the two schools, I noticed that there was no noticeable difference between the quality of girls' work and achievement levels with that of boys. All the six girls were above average in their performance and one of the girls at Gemston was doing extremely well to be in the top five positions in the class. Her teacher said, "It all depends on how comfortable the girls feel in the subject. The more they are at home, the more they will enjoy it and will be able to achieve in it" (FTGT:GGASM).

Feelings of self-confidence and self-esteem were however, found to be low in girls whose previous subject experiences were negative. One questionnaire response on what was girls' reasons for taking and not taking design and technology subjects said that, "I realised that my marks were beginning to fall so I dropped technical graphics and design for fashion and fabrics" (Princess:SGGASM). For this girl, her self-confidence and sense of belonging to design and technology subjects was lowered by the falling marks and this added feelings of withdrawal. Design and technology teachers at both Harare and Masvingo rural schools perceived that girls tended to lower their performance in design and technology because of their self-belief that they could not perform to the same level as boys. The teachers saw this as an attitude problem brought about by cultural norms. As one teacher commented:

It is just an attitude problem. Girls have been brought up to believe that they cannot beat boys in anything. In the Shona culture women cannot be above men in any way. This means that even the most able girls tend to lower their performance levels in order to let boys take pole position. They think that boys and men should be leaders (FBAT:MRSM).

A parent at Riverdale private school perceived that apart from cultural practices, girls did not achieve in design and technology subjects because they learnt the subject skills quite late in life at secondary school level when boys would have been engaged in such skills from a very young age. She perceived that it would be quite difficult at this late stage to cultivate enough interest in girls and raise enough confidence in them to achieve. She also perceived that if girls were to start taking these subjects at the same time as boys, they would be able to perform at the same level. As she put it:

I believe that these are subjects that girls usually begin to do at secondary school. To cultivate their interest in the subjects at this late stage is sometimes difficult. Girls begin to learn the skills for the first time and yet boys would have been doing the work and this will not give girls an advantage over boys. Many of the technical subjects' skills are things that boys are familiar with. So, learning these things at school will be like perfecting skills acquired earlier on in life (FP:RPSM).

One teacher perceived that girls began the subjects with a fear of the unknown but later discovered that they were equally capable. He said:

Many may not have the confidence to take the subjects but, once they have enrolled, the fear disappears and they begin to enjoy themselves and do well in the subjects. The problem is breaking the ice. (WTT:DGASH).

*(iii) Negative attitudes towards subject.* Results in this section focussed on fourth form girls' attitudes to the institution of the subject, subject based careers and subject instruction. Girls not taking design and technology subjects at all eight schools had negative attitudes towards the subjects based on perceptions that taking the subjects would not fulfil their self-image of 'girlness' built by years of differential socialisation. A girl at Riverdale confirmed this by saying, "I can't picture any of us girls in overalls getting all greasy and I got long hair, can you picture my hair with oil? I just can't see that happening" (WG:RPSM). This girl did not like the subjects because of the dirt associated with them which did not fit her perceived identity of a girl.

Rural fourth form girls at Mau and Mbizi schools appeared resigned to social pressures to conform to their gender socialisation roles. None of these rural girls saw

design and technology in the light of subjects that could be taken and studied successfully by girls. One of them commented that, "We were brought up to believe that these are subjects for boys. We girls have our own subjects" (Rose:SMbRSH). This girl went on to say that girls should take "female occupations like nursing, teaching and dressmaking".

Girls not taking design and technology had negative attitudes toward the subjects that were based on the perceived nature of the work as heavy and unsuitable for females. One girl said, "I do not like the subjects especially the way they are done. It is heavy work there with heavy metals to be lifted up" (Rumbie:SMGBSM). A parent who did not like the workshop conditions said, "There is a lot of noise and women do not favour working in such an environment" (FP:MbRSH). Other negative attitudes were perceived as caused by participants having no sufficient background knowledge about the subject. The following excerpts from interviews with a student and a teacher represent this point:

I discovered that such subjects were difficult and needed a lot of labour so I withdrew (Laura:SMGBSM).

I just have a negative attitude. I think for metal technology and design, it will be worse because I hardly know anything there (FPr:MbRSH).

Girls in mostly rural schools of Mau and Mbizi did not believe in their own ability to do design and technology subjects. This was perceived as causing many of them to take familiar home economics subjects. One teacher at one of the two schools said, "Girls haven't believed that they can succeed in these areas (MBTT:MbRSH). Girls in rural schools in particular, were found to perceive themselves as incapable of performing better than boys in some subjects. One of the girls said, "I think girls do not match boys in measuring and calculations required in such subjects as technical graphics and design. Boys are just too good and no matter how we try, they will always beat us (Shumi:SMRSM). The twelve fourth form girls taking design and technology were found to have negative attitudes towards practical work because they perceived themselves as not possessing the polished skills that boys had to enable them to make good design products. This negative attitude toward practical work resulted in these girls doing very well in theory but not in practical work. One girl who had dropped wood technology and design for technical graphics commented that, "I used to do well in theory work but practical work was always a problem for me and this caused me to drop the subject" (Rura:SGGASM).

The three girls taking design and technology at Riverdale high SES school felt that their male teacher harboured negative attitudes towards female students. The teacher

was perceived as conducting lessons as if girls were absent in the lesson. Furthermore, the girls alleged that the male teacher did not like many girls in his subject area because he thought the girls lacked the domain specific knowledge and skills of the subject. As one girl put it:

Our technical graphics and design teacher does not like many girls in the subject area because he says they know nothing and will pull down the subject pass rate. He says we slow down the lesson with our many questions resulting in him not being able to complete the syllabus (Clara:SRPSM).

*(iv) Interest in a subject.* A total of 39(12%) fourth form girls out of the 321 who filled in the questionnaire expressed that it was interest in a subject that made them select it for study (see appendix xxxiii). Interest in a subject in this study was found to be linked to past positive experiences of the student in an activity and to future career aspirations. For example, in choosing any subject, fourth form girls pointed that they evaluated task demands against their self-concept of ability and future value. Where the task was valued and girls perceived themselves as competent to do well in the activity, this translated into interest to pursue the task. One girl said, "I will just have an interest in the subject usually driven by what I want to do in the future. The more you are interested, the more you want to do in the subject" (Laura:SMGBSM). The girls perceived that where one's future aspirations did not match subjects being taken; there was aversion of interest to take only those subjects in line with the aspired career. One girl dropped technical graphics and design because she, "found it uninteresting and boring. I was not interested because I am a business minded person" (Randy:SRPSM). One girl who perceived herself as a fashion designer in the future was found to have an interest in fashion and fabrics at school. She said, "I took fashion and fabrics because I want to pursue a degree in clothing technology and start my own fashion business" (Tsubvu:SGGASM). Another girl said she "took technical graphics because of interest in design work as an architect but, focussing on material design" (Clara:SRPSM).

Interest in a subject area was also found to be linked to past positive experiences and those girls who had taken certain subjects at lower levels of learning were motivated to take them to higher levels (see appendix xxxi). One girl linked taking her present fashion and fabrics to her growing up "sewing and liked it more than anything else" (Maru: SMbRSH). An analysis of whether the present design and technology and technical subjects that the 321 girls in the eight schools were taking were actually the subjects they had intended to enrol in and were interested in revealed that girls took subjects they had some background experience in (see appendix xxxi). Responses highlighted the question of choice and curriculum adequacy. Girls were asked to write

down the design and technology or technical subject they would have taken had it been offered at their school (appendix xxxii). Results show that the present intake of subjects by the fourth form girls leaned more to traditional female subjects like fashion and fabrics and food and nutrition. If student subject choice was considered in schools and all the desired subjects offered, more girls would take wood technology, metal technology, building technology and technical graphics and design than at the present moment where only twelve girls took technical graphics and design only.

Table 7.7

Fourth form girls' current and desired design and technology and technical subjects

Subject	Agr	Co/ Ty	F/F	F/N	W/T	M/T	T/G	Buil	Art	Phot	Mus	Nil	Total
Current Subject	37	16	115	34	0	0	12	0	15	0	3	89	321
%	11.5	5	35.8	10.6	0	0	3.7	0	4.7	0	0.9	27.7	100%
Desired subject	23	20	32	81	12	14	34	17	11	2	4	71	321
%	7.2	6.2	10	25.2	3.7	4.4	10.6	5.3	3.4	0.6	1.2	22.1	100%

Agr= Agriculture; Co/Ty= Computers/Typing; F/F= Fashion and Fabrics; F/N= Food and nutrition; W/T = Wood Technology; M/T = Metal Technology; T/G = Technical Graphics; Buil = Building; Phot= Photography, Mus= Music;

The majority of girls 81(25.2%) however, would still have opted to take a female oriented subject signifying more assimilated gender role schema than mere interest (see table 7.7). This percentage was followed by 71(22.1%) girls who did not want to take any technical subjects. Technical graphics received the most interest among girls coming second after fashion and fabrics. This percentage of girls interested in the subject came from urban low to high socio-economic schools with none of the rural girls choosing the subject (see appendix xxxii). This signified the conservative nature of Shona culture to let girls take traditional male subjects. The high percentages of girls currently not taking design and technology subjects 89(27.7%) and those who desired not to have taken any design and technology subjects 71(22%) may signify employer and training institutions demands for academic subject passes instead of technical or design and technology ones.

One girl perceived that girls failed design and technology subjects because of simply following their friends into subjects. She said:

It could be just a matter of some girls following their friends to the subject without a genuine interest in the subject; hence such girls may not apply themselves fully to pass the subject. Imagine just following your friend to do metal technology when your mind is not there, you will just fail the subject (Theresa:STPSH).

Parents were perceived by fourth form girls as forcing their children to take subjects they did not like resulting in less effort being put in the subject and failure by the child. As one girl said, "Sometimes you are just forced into a subject that you are not particularly interested in and you won't be motivated to perform well" (Chara:SRPSM). A parent at another school commented that:

We as parents force our children to take certain subjects when they are not interested in them and you find that the child will not perform well. If a person takes an activity of his or her own interest, they tend to perform better and usually produce good results (FP:MGBSM).

Findings of this section indicated that developed competencies and interests which emerge through earlier school years' participation in some subjects were critical in any future decisions a student made concerning related subjects and careers.

#### **7.2.4 Cognitive Factors**

Cognitive factors included the construction of knowledge through thought, experience and the senses. Subject background experiences, self-concept of ability, preferred learning styles and low female education levels were the four thematic topics which were found to impact on fourth form girls' participation and achievement in design and technology subjects in this section.

*(i) Subject background experiences.* Subject background experiences were found to be both conative and cognitive. Conative in the sense that favourable and unfavourable previous experiences motivated girls to pursue or not pursue a subject. It was also found to be cognitive in that knowledge gained became cultural capital and building blocks upon which further knowledge was to be built on (Hill, 2001).

In terms of participation fourth form girls' interview responses in all the eight schools were in agreement that the subjects girls chose at school were a reflection of their familiarity with subject matter, accomplishments and experiences whether favourable or unfavourable. One girl perceived that it was better to take subjects that she was used to and which she could relate to than begin new ones completely. She pointed that, "With me, what will cause me to take a subject is my previous experience. If I did a subject say at form one level, by the time I come to form three, I would want to continue doing it rather than begin a new subject altogether" (Rudo:STPSH). A girl at another school commented that, "The thing is if you do not know something, you are unlikely to select it. You do something you already are familiar with, for example, fashion and fabrics" (Chara:STPSM).

Questionnaire responses traced through girls' schooling years from primary school level showed that of the 35 girls who took agriculture at forms one and two levels at Mau and Mbizi rural schools, they continued taking the subjects at third and fourth form levels with only one girl dropping out. For Fashion and fabrics, all 47 girls who took the subject at form one and two levels went on to take the subjects to fourth form level. At Mari and Tembo urban low SES schools, of the 27 girls who took sewing at primary school level only two had dropped the subject by the time they reached ordinary level (year 11). Eleven girls who took food and nutrition at form one and two levels continued to take the subject to ordinary level with only one girl dropping out.

At Denlow and Gemston urban medium SES schools, ten girls who took typing at form one and two levels had interest in the same subject at third and fourth form level and continued taking the subject. Twenty-five girls took sewing at primary school and all took fashion and fabrics (as sewing is called at secondary school level) at form one and two level with the number growing to 26 by the time the girls reached fourth form. All ten girls who took food and nutrition at primary school took the subject at secondary school with the number growing to 23 as other girls also became interested in the subject. Technical graphics and design, art and music started with ten, nine and six participants at form one and two level but lost some to remain with five, seven and three participants respectively at fourth form. However, all these girls had taken the subjects at form one and two level.

At Telford and Riverdale four girls took agriculture at form one and two levels and three of them went on to take the same subject to fourth form. Fifteen girls took sewing at primary school level and went on to take the same subject to fourth form with the number growing to 23 at form one and two level and dropping to 17 by fourth form. Technical graphics and design and art which had seven and 20 girls initially at form one and two level ended up with three and eight girls respectively by fourth form.

Contrary to Ministry of Education, Sport and Culture policy, three girls did not take any technical subjects at form one and two level with the number growing to four (five percent) at fourth form level. At Mari and Tembo, twenty-four girls did not take any technical subjects at primary school level with the number growing to 25(42%) by the time they reached fourth form. It was also found that all 48 girls (38%) who were not taking any technical subject at fourth form level at Denlow and Gemston had not taken any technical subject at primary and lower secondary school level. The number of girls opting out of technical subjects at Telford and Riverdale rose from six at primary school to sixteen (33%) by fourth form.

All interview participant groups perceived that gender role socialisation was the foundation of subject choice decisions later in school. This was reflected in one girl's comments on how gender role socialisation affected subject choices:

These roles have a lot to do with our selection of subjects because ... at home if my clothes are torn, my mother will say get a needle and sew them up. However, if my brother's clothes are torn, she does not ask him to sew them but will still instruct me to do it. So, I will be used to sewing such that even at school, I will not choose building which will be new to me but I will take fashion and fabrics. My brother will take those design and technology subjects because that is what he usually does at home helping our father to build houses and to do carpentry. (Thoko:SMbRSH).

One principal said:

Girls tend to select food and nutrition and fashion and fabrics reflecting their background experiences in domestic roles. Boys on the other hand, take metal technology, wood technology, building technology and technical graphics and design because they already possess much of the skills found there through their experiences in growing up (FPr:MRSM).

One girl compared the benefits of taking a familiar traditional girls' subject against an unfamiliar one:

Like fashion and fabrics and food and nutrition, we already know most of the skills because that is what we do at home. The subject becomes easier to relate to at school unlike metal technology. As for me, I do not know anything about the subject (Tsitsi:SMGBSM).

Two girls offered reasons why some students did not take design and technology subjects:

Technical graphics to us is something that is foreign. I think the reason why fashion and fabrics is easier for girls is because...we have always done it (Chara:STPSM).

Many girls run away from boys' subjects because they are not used to them (Thoko:SMbRSH).

In terms of achievement, twelve fourth form girls taking technical graphics and design in this study perceived that the issue of familiarity was critical for girls' performance in a subject area. The girls felt that their performance in technical graphics and design was lower than that of boys because of their different background experiences. One of the girls said that, "girls were equally intelligent but boys' past

experiences oriented them for design and technology subjects while girls' experiences were more into home economics" (Clara:SRPSM). One teacher perceived that boys' early engagement in technology related subject areas cultivated their skills and interest in design and technology subjects and gave them general foundational knowledge necessary for them to pursue and achieve in the area. He commented that, "If the father makes window frames, the boy may come to school already with welding skills. If the father is a carpenter, the son will bring those skills and knowledge to the school workshop" (MBAT:TPSH). School design and technology subjects; in this case, was like an extension of what boys did helping fathers in home workshops. One parent perceived that, "if their backgrounds were the same, girls would perform just as well as boys in these subjects" (FP:RPSM). Because of a past that did not involve tinkering experiences one girl found some aspects of technical graphics and design difficult. She commented:

It is the engineering drawing that is too much into the mechanics of things, the bolts and nuts. Most of the things I started knowing them only when I came to ordinary level. For those people especially boys who have done metal technology before, they find it so much easier to do technical graphics because they already know how to draw these features and how the engine looks like. I am told this is an engine and it's just a couple of lines, curves, some straight and I just have to figure out what this all means (Clara:SRPSM).

This section has shown that taking familiar subjects for most of the girls in this study was both consistent with and enhanced their growing up experiences. As such, they found building on familiar learning material enhanced their learning and achievement.

(ii) *Self concept of ability.* Questionnaire results indicated that 43 or 13.3 percent of the 321 fourth form girls said they evaluated their current skills and knowledge levels in respect of a particular subject, task or activity and weighed whether they would be able to achieve in it (see appendix xxxiii under domain specific subject efficacy). Where the demands of the activity were considered greater than the personal skills to achieve it, there was a tendency by the girls to refrain from participation. One girl commented that: "sometimes you look at what you personally are able to do. It may be in wood technology and design and you say, will I be able to do this subject?" (Tendai:SMbRSH). Another girl pointed out that, "I think it is my ability to do the subject, whether I can pass it or not. It is best to choose a subject that I will be able to do" (Kuda:SMRSM). One principal also gave similar comments when she said that, "the question of achievement is important in our examination driven system. Girls are likely

to weigh their chances of success in a subject with their present knowledge to see if they are likely to pass (FPr:MbRSH).

One male principal perceived more girls preferring subjects like English language, Shona language and home economics than science, mathematics and technology subjects. He perceived that stories doing the rounds among female students that science, mathematics and technology subjects are difficult were responsible for many girls' low preferences for science, mathematics and technology subjects. He commented that, "These subjects are considered by many girls as very difficult and suitable for men. I think it has historically been believed among girls that they are male subjects and girls tend to avoid them" (MPr:MGBSM).

Results showed that girls' self-concept of ability was related to an attitude that drew them behind in terms of achievement in design and technology subjects. A tendency was noticed where girls undervalued their capabilities and potential to the extent of believing that boys were born with better capabilities. Comments by one fourth form girl confirm the low self-concept of ability girls usually have of themselves. She commented that, "There is a belief in us girls that we cannot do men's work. We just feel that we are not able to match their skills. Sometimes we just say we cannot beat boys in their own subject areas" (Jane:SMbRSH).

Perceptions of the twelve girls taking design and technology subjects were found to be more positive than those not taking the subjects. One girl taking technical graphics and design commented that, "I have come to like the subject a lot and I have been doing well for the past four years. It is just like any other subject" (Chene:SGGASM) and, "Now I think technical graphics is an interesting subject though I found it challenging at first. I think my success at form one and two level has given me more confidence to achieve in the subject" (Chiedza:SGGASM). For girls who were not taking any design and technology subjects, there was a tendency to perceive the subjects in a negative way as difficult and heavy. As some girls in this group said, "They are hard subjects suitable for boys. I do not understand them (Tina:SMbRSH), "They are too hard and difficult for me. I just cannot do them (Ocean:MbRSH) and, "I don't think that I am good at technical graphics, it is difficult for me as a girl and may lower my overall pass rate (Mclo:SDGASH).

One girl not taking design and technology subjects blamed society's low expectation of women for girls' lowered expectation of ability and felt that they sometimes let boys achieve better in line with societal expectations. She commented that, "Society has always looked down upon women and we have tended to limit ourselves to the level of societal expectation. I think girls feel low esteemed and that way pull themselves down" (Rudo:STGBSH). Girls' low self-concept of ability was summed up in

one response from one male technical graphics teacher who said, "Girls haven't believed that they can succeed in these areas" (MTGT:MGBSM).

Results in this section show that fourth form girls' participation in a subject was usually a sign that the weighted positives outweighed negatives. Results also show that students who had positive self-ability beliefs in a subject tended to have positive expectations of success.

*(iii) Preferred teaching and learning styles.* This section fell under both cognitive and school climatic factors. Two lesson observations carried out in mixed gender classrooms at Gemston urban medium SES and Riverdale private high SES schools revealed both the male and female teachers' preferences for teacher-centred modes of teaching involving group instruction, problem solving, recall skills and application of facts. Both teachers introduced their lessons on construction of triangles and the design process and kept tight control of all proceedings. There was more teacher talk and chalk and directing of questions and responses to and from pupils. However, while the female teacher allowed more flexibility in terms of student interaction, the male teacher preferred no noise in the class resulting in little interaction between students except through him.

Fourth form girls in both classroom situations preferred more interactive and collaborative and non-competitive ways of learning where free flow of ideas was encouraged in contrast to boys' preferences of individual and competitive ways. Observations on how the two groups approached their work showed these differences clearly. At Gemston (group A) school, I observed that the five girls in the technical graphics and design lesson sat and worked together in their own gender group near the female teacher's table (see figure 7.2). They were observed to be in constant consultation with each other and with the female teacher. They seemed more relaxed in the presence of the female teacher and participated more freely in lesson proceedings.

The arrows in figure 7.2 show the consultative interaction processes taking place while students were working on constructing triangles over a period of 70 minutes. There was more consultation between the girls themselves and their female teacher as the girls were drawing. A good number of boys rarely consulted the teacher and each other and worked as if they were competing against each other. On the rare occasions boys consulted, it was to the nearest boy to them. Only one boy was found to consult others extensively while working. While three girls at the front were often seen consulting the teacher, only one boy did so for the entire 70 minutes.



consultation with the teacher while the rest worked either alone or in consultation with the next boy.

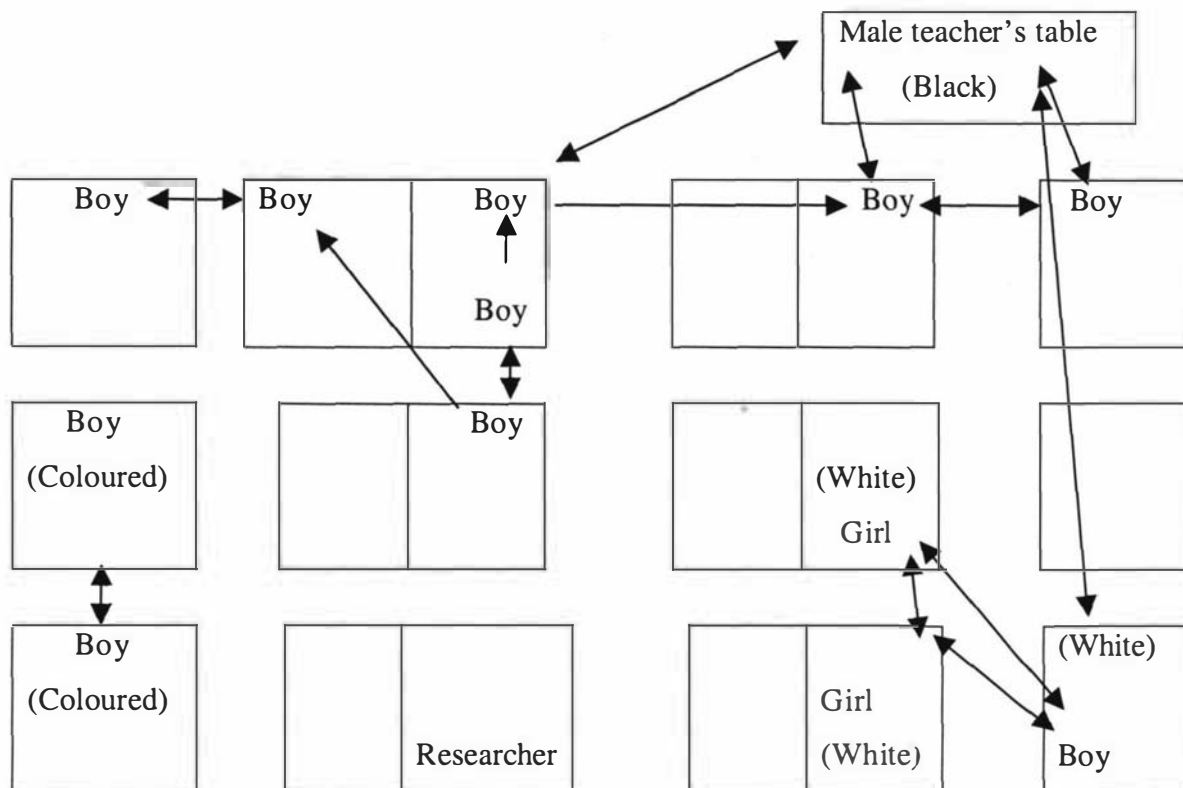


Figure 7.3. Lesson interaction processes at Riverdale private school

The two white girls sat close to each other and formed their own consultation group with the European boy while the coloured boys did the same in their own group further away from the teacher's table. There was also more teacher consultation for the group nearer the teacher's table and rarely from those further away. It was also seen that students close to the teacher's table benefited more from consultations with the teacher than those further away. The two European girls in particular, did not seem to be benefiting from the consultations taking place in this gender and race segregated set-up except within their own group.

The five girls at Gemston and three at Riverdale taking technical graphics and design said they preferred more exploratory theory and drawing centred approaches to learning than practical work involving model making. All of them pointed out that they did not have the skills to make good models. One girl commented that, "I enjoy creative designing and drawing where I am even better than most boys but find model making difficult (Cløe:SGGASM). The girl confirmed experiencing anxiety each time the class embarked on model making which she did not like.

Both the female and the male teachers observed teaching in this study preferred using book examples in explaining situations. Most of the classroom talks and lesson examples did not have close relationships with experiences of girls in real life. Five girls

taught by the female teacher said though they sometimes found the examples difficult to follow, they consulted the teacher more for meaning clarification. They however, said that this would be difficult with the male teacher who would feel bothered by continuous consultation especially by girls with little background knowledge of the subject. As one girl put it:

Lady teachers' understand us better than male teachers. They attend to our complaints faster than males. Male teachers tend to ignore complaints from us no matter how genuine we may be. However, they rush to attend to boys at the slightest opportunity (Tsitsi:SMGBSM).

Another girl said that, "With male teachers we are a bit scared to ask questions. It is actually easy to interact with a female teacher" (Jane:SGGASM). All the eight girls at the two schools taking design and technology subjects intimated that male teachers more than females, through stereotypic beliefs and social messages, supported a competitive environment where they encouraged boys not to allow themselves to be beaten by girls because they were "boys". One girl said that, "You find that when male teachers teach the subject, they expect boys to do better than girls. They actually say that boys cannot be beaten by girls" (Tatenda:SGGASM).

*(iv) Low female education levels.* Males in the Shona society were perceived by female parents, teachers and fourth form girls to be more traditional and unwilling to change, preferring females to remain doing domestic chores and care jobs. This was seen as a power game being played in society with males exerting their dominance over women by taking all high paying jobs while pushing women to low paying jobs like teaching and nursing. A mother pointed that "Men push women to areas that are not well remunerated while they learn skills that lead to well paying jobs" (FP:TPSH).

Rural parents in particular, were perceived to have little interest in the education of girls. All the 321 girls in this study perceived that girls were the likely dropout candidates whenever fees problems arose in a family while boys continued with their education. One rural girl who said that, "I am not even certain to finish my 'O' levels because if my parents cannot afford next term's fees, it is I who drops out of school and not my brother. That is not fair at all" (Ocean:SMbRSH).

Girls not taking design and technology subjects at Telford perceived that most problems associated with girls' low education were found to be related to issues of marriage. One of the girls said, "Usually it is us girls who suffer because our parents think that we will be married anyway" (Chipso:STPSH). A Parent at Mbizi rural school pointed out that, "Girls will be married irrespective of their education. It is different with a boy because he pays the lobola (bride price) and has to support the family. So while

girls may be educated, it is better to educate a boy" (MP:MbRSH). A teacher at a rural school also said:

Rural parents do not seem interested in the education of girls. We have been seeing more of girls than boys leaving school because of unpaid fees. Parents say girls will get married and so they need not be educated much. Many boys go on to university and take well paying jobs and the circle of domination of men over women continues (FFNT:MRSM).

One girl at Mbizi rural school perceived that because society and family expected a girl to be married whether educated or not, most girls tended not to work hard at school thinking that even if they failed, their future husbands would look after them. She commented:

Sometimes girls have this perception that whatever happens I will get married and become so and so's wife. So, they usually don't put as much effort in their work as boys do. And, so this hinders them from achieving better than boys.

(Rose:SMbRSH).

A girl at Denlow urban medium SES school who perceived that she was more focused on brighter career prospects with marriage in the distant background did however not support this argument. She asserted that, "Of course I will get married one day but for now that will have to wait. I want to go to university and complete my accountancy degree and establish myself in practice (Kiri:SDGASH).

Results in this section show that societal beliefs and preferences by parents for the boy child to be more educated than the girl-child in the Shona culture, was a form of bias that led to girls dropping out from school and from subjects that were considered to lead to more profitable career endeavours.

### **7.3 School Dimensions**

School dimensions were placed into two categories: school contextual and school climatic factors and included type of school and location, school organisation and policy implementation, curriculum, sex composition, teacher influences, peer influences and counselling and guidance (Ma, 2001; Young, Fraser, and Woolnough, 1997).

#### **7.3.1 School Contextual Factors**

Pannizzon and Levin (1997) point that since the greater part of a child's day is spent at school, it is reasonable to assume that students' perceptions, values, beliefs and attitudes may be shaped by the school system to a greater extent than normally realised. School contextual factors found in this study to affect fourth form girls' participation and

achievement in design and technology subjects included school type and location, school organisation and policy implementation, curriculum effects and resource allocation. These are discussed in the following sections.

*(i) Type of school and location.* Due to strict zoning of residential areas and schools in Zimbabwe, high SES parents send their children to private high SES and government group A medium SES schools located in the low population density areas of Harare and Masvingo towns. On the other hand low SES parents had their children in rural and high population density urban government group B schools. Socio-economic differences between the types of schools and families were found to affect resource allocation to learners. For example, Riverdale and Telford high SES private schools and Denlow and Gemston government group A medium SES schools were found to have highly qualified staff, well equipped workshops, libraries and classrooms. This contrasted sharply with Mari and Tembo urban low SES and Mau and Mbizi rural low SES schools which had to make do with temporary, unqualified and lowly qualified teachers in poorly resourced workshops, libraries and classrooms. Mau and Mbizi rural schools were not electrified and students used hand sewing machines in fashion and fabrics and basic hand tools for wood technology and design while Telford, Riverdale Gemston and Denlow high and medium SES schools had modern electric equipment and offered a wider technical curriculum (see table 7.8).

Subjects like music, typing, computers, metal technology and design, technical graphics and design, art and food and nutrition which were offered at medium and high SES schools could not be offered at Mau and Mbizi as well as at Mari and Tembo because of lack of funding, thus affecting all students who might have wanted to take them. Only two design and technology (wood technology and building technology and design) and two technical subjects (agriculture and fashion and fabrics) were offered at the two rural schools (see table 7.8). At Mau, Mbizi, Mari and Tembo rural and urban low SES schools, study participants reported serious problems of materials and equipment shortages that were crippling the day-to-day running of their design and technology and technical departments. Ministry of Education, Sport and Culture were blamed for inadequate allocation of equipment and material grants to all schools. As one teacher put it:

We don't see Ministry as concerned about the welfare of poor schools at all especially their technical departments. If they cared, they would have reviewed the allocation they give each subject, as the present allocation is simply not enough (MMTT:MGBSM).

Table 7.8

Technical and design and technology subjects offered at eight schools sampled

Technical subject	School							
	Mau	Mbizi	Mari	Tembo	Denlow	Gemston	Telford	Riverdale
F/nutrit			√	√	√	√	√	√
T/graph			√	√	√	√	√	√
Comput					√	√	√	√
Art					√	√	√	√
W/techn	√	√	√	√	√	√		
M/techn					√	√		
Agric	√	√		√		√	√	√
F/fabrics	√	√	√	√	√	√	√	√
Music						√	√	√
Typing						√		
Building	√	√	√	√	√		√	
Bakery							√	

W/techn= Wood technology and design, M/techn= Metal technology and design, Agric= Agriculture, F/ fabrics= Fashion and fabrics, F/ nutrit= Food and nutrition, T/graph= Technical graphics and design, Comput= Computers,

Design and technology teachers pointed that much as they would like to enrol more girls, there were limited by controlled numbers that could be enrolled each year in each of the subjects because of limited resources. One teacher said:

The lack of facilities and controlled numbers in design and technology subjects deters many students from taking these subjects. Take for example, a subject like wood technology and design which may accommodate only 20 students per session and yet there could be as much as 100 students who want to do it.

Teachers in this case tend to choose the best 20 students who are likely to be boys, so girls will be left out (MTGT:MGBSM).

Faced with such a situation, design and technology teachers said they enrolled boys whom they considered as having the background knowledge of the subjects at the expense of girls.

School type differences were also noticed on fourth form girls' choices of careers. There were four fourth form girls in rural schools who wanted to pursue a career in farming compared to only one from urban schools. This was perhaps because farming was the main pre-occupation in rural environments. None of the urban girls wanted a career in farming preferring more scientific and technological ones (see appendix xxxii).

These results tend to explain the effect of market demands of the rural and urban environments.

*(ii) School organisation and policy implementation.* In all the eight schools sampled in both Masvingo and Harare provinces, male parents and three male design and technology teachers were inherently not supportive of girls' participation and achievement in design and technology subjects. The twelve girls not taking the subject encountered subtle overtones in schools not supporting design and technology subjects for girls. For example, only Gemston allowed its students to enroll in technical and design and technology subjects of their own choices. In the other seven schools, girls and boys were simply directed to traditional gender specific subjects without any questions raised. Girls were channeled to take food and nutrition and fashion and fabrics while boys took metal technology, wood technology, building technology and technical graphics and design. Contrary to this, Ministry of Education, Sport and Culture Girls in these schools said they ended up taking subjects they did not like because they were just pushed to do them by their respective schools. At Mau one girl said:

It's like when we began form one, teachers selected the subjects for us all. Girls were told to go and do food and nutrition and fashion and fabrics while boys were told to go and do building and technical graphics. (Rute:SMRSM).

A teacher at Tembo school spoke of how the school organised its pupils:

We have a system of allocating classes to subjects first and boys and girls to their respective subjects. Girls do fashion and fabrics and food and nutrition while boys take technical graphics and design, metal technology and wood technology (WTT:TGBSH).

One Education Officer was of the view that separating girls and boys' activities and channelling them into gender stereotypic subject areas happened because there was an aging leadership in most secondary schools whose views were conservatively non-generational. He perceived that many school principals had overstayed in their schools to the extent of not accommodating any new and innovative views, preferring to hold on to old ideas and gender stereotypic thinking. The Education Officer pointed out that where progressive voices said gender should no longer be an issue in the selection of students for design and technology subjects, these old principals believed in separate engagement for males and females and stood in the way of any autonomous voices calling for student choice decisions. He commented:

In our schools we have got older leaders who themselves when they went to school, knew these subjects as boys' subjects and others as girls' subjects. So, in

most of the schools, pupils are simply channelled into subjects and of course they will never put girls into boys' subject areas, and that is a fact (EO).

Most fourth form girls supported this view and perceived that teachers did not want to change from the system they themselves went through during their schooldays. As one of the girls put it:

The problem with our teachers is that when they went to school, they were told which subjects to take by their teachers so they don't see anything wrong with that. It never crosses their minds that we have got interests of our own.

(Laura:SMGBSM).

My observation of how school timetables at all the eight schools revealed that the way most school curricula were structured did not allow girls to enrol in some subjects though they would have liked to do so. For example, girls who wanted to study metal technology and design at Denlow and Gemston medium SES schools could not do so as the subject was time-tabled at the same time with food and nutrition which they had been forced to enrol into by the school. As one girl pointed out that, "I think the time-table should be more flexible to allow us to do the subjects we want. At the moment if you are scheduled to do food and nutrition, you cannot do technical graphics and design because they are scheduled at the same time" (Tina:SDGASH).

One teacher at Gemston raised that most of the design and technology and technical subjects were timetabled for afternoon sessions for two and a half hours or more. This deterred most girls because afternoons in Zimbabwe were usually hot and many girls found standing for long periods of time doing practical work most daunting. The subjects themselves extended into the afternoon way after other students had finished school and gone home. This did not appeal to many students. As he put it:

If you look at our timetable, you will notice that our subjects are done in blocks of two or four periods stretch. Considering that our country is hot, some girls may find doing a technical subject for four periods stretch while standing in the afternoon difficult. School normally finishes at 3.15pm but when we have four periods in the afternoon our subjects extent to as late as 3.45pm when all other students would have left for home. Not many students would want to stay another period when others have closed for the day (MWTT:GGASM).

My observation in schools revealed that Ministry of Education, Sport and Culture gender policy on technical education had had little or no effect in influencing greater enrolment and achievement by fourth form girls in design and technology subjects. For one, not many female design and technology teachers had been trained to make any

significant impact as role models in Harare and Masvingo schools. In the eight schools sampled in this study, only three female teachers out of 25 technical teachers were found to be teaching a design and technology subject. It was pointed out by the Education Officer and the five principals in the study that many female teachers who trained to teach design and technology subjects diverted to go and teach academic subjects for one reason or another. The move by Belvedere and Chinhoyi Teachers' Colleges (two colleges training design and technology and technical teachers) to train female design and technology teachers was seen as a waste of resources when the trainees ended up teaching academic subjects only instead of technology-related subjects, thus robbing girls of visible role models. The two colleges trained teachers in double majors, an academic and a technical or design and technology-related subject. One teacher commented:

I think that the Ministry of Education, Sport and Culture should make sure that teachers who are trained in double major subjects do not end up teaching the academic subject only as is the case at the present moment. Many women from Belvedere Teachers' College are trained in these double majors but end up teaching the academic subject only (MWTT:MbRSH).

Both male and female technical and design and technology teachers interviewed perceived that female teachers had little confidence teaching the technology subject which they only began taking at college and thus preferred to teach the academic subject whose background they had a sound grounding in. One female teacher had this to say:

I think lady teachers who have double major subjects and end up teaching the academic subject only are not to blame. They just studied the subject for two or three years at college and are not adequately trained and prepared to teach the technology subject. Most of the time they won't have any interest, background knowledge and confidence to teach it. If these ladies had started the technology subject at primary and secondary school levels like their male counterparts, their skills and knowledge in the subject would also be deep. In most cases, boys in her class may challenge the teacher's knowledge of the subject and even correct her to her embarrassment. (FFFT:MbRSH).

On another organisational matter, the Education Officer did not see free choice of subjects as the answer to girls taking traditional male subjects. He perceived that free choice had in the past led to gendered enrolments and this would continue in the future if deliberate and purposive ways were not followed to actively engage girls. He advocated for controlled and purposeful guidance where, in the end, every child knew subjects and future career directions. He commented:

We are loosely saying each child should be exposed to some technology or vocational education and in particular, we are saying the child can choose any of the many subjects we have got. We just leave it loose like that and in a manner we are leaving it to the boys to take design and technology subjects and follow related careers. We need more guidance to be given to these girls so that they know exactly where they are heading. In most cases we are making assumptions to say that they will take up the subjects, but without us giving adequate support and information to them (EO).

One female teacher in Masvingo also perceived that Ministry policy on technical education left it too open for students to choose any subjects they wanted to take. She commented that for many students, free choice of subjects did not translate to promoting girls in non-traditional areas. As she put it, "I see nothing wrong with the Ministry because at the moment, the policy is that every girl child can take any subject they want and the problem is that girls don't see any reason motivating them to take technology subjects" (FFFT:MRSM). The teacher proposed affirmative action in the recruitment of girls for design and technology subjects or a girls only technology college to improve numbers of girls in traditional male areas saying, "the Ministry, apart from policy decisions, should put in place incentives for girls like scholarships to boost the number of girls in the subjects". Another design and technology teacher perceived that if Ministry of Education, Sport and Culture made it policy that for the five subjects required for a full ordinary level certificate pass, four be academic subjects and one a design and technology or technical subject, most students would find taking the subjects appealing.

The education officer also felt that while teachers were aware of the gender policy on technical education, there was little being done in schools to actively engage girls in design and technology subjects. He perceived that there lacked enforcement at both school and Ministry level. As he put it:

About two years ago, a really good policy was made where they were saying each child was supposed to leave school after ordinary level having done at least two technical or vocational subjects at form one and two level and only one of these subjects at form three and four level. But as of now, it is not being enforced on all students in schools (EO).

All 27 technical and design and technology teachers in the eight schools perceived that there should be research by Ministry on ways to encourage girls' participation since there was no willing participation. In this respect, teachers called for Ministry films, TV documentaries, charts, careers' symposiums, workshops and even

bringing resource persons in the school to make both teachers and students aware of technology opportunities available. The technical graphics and design teacher at Mau rural low SES school in Masvingo commented:

I think schools and Ministry should find all means to market every career that involves technology because some of these things you try to explain to the kids that there is engineering by just talking from a textbook or a magazine without the students seeing it, it is very difficult for them to understand it (MTGT:MRSM).

Fourth form girls not taking design and technology subjects at Riverdale, Telford and Mbizi however, perceived that the subjects came too late for most girls. They suggested that design and technology subjects be done at primary school level so that when children finally came to secondary school, it would not be such a shock for them to meet these subjects. The girls said that if every student was taught design and technology subjects from as early as grade one, stereotypes emanating from home would quickly be eroded. One of the girls commented that, "They should introduce a system that makes it compulsory for all students to do design and technology subjects in primary school" (Chipo:STPSH). One female principal perceived that Ministry of Education, Sport and Culture should make gender issues part of the national school curricula so that everyone is sensitised on equality issues. She commented:

I think the best that can be done is sensitisation so that children know. If gender issues are brought in as part of the school curriculum, girls will be made aware that IQ wise, they are just the same with boys, if not better (FPr:MRSM).

One rural parent was not in agreement with Ministry of Education, Sport and Culture intentions on gender policy on technical education. He saw such a move as encouraging disunity in Shona family circles where he believed separate roles were complementary and not intrusive of each other's tasks. He pointed out that, "This will confuse our customs and cause women to rebel against their husbands. It will cause confusion in the villages where our lives complemented each other instead of competition between men and women" (MP:MRSM). However, one urban parent thought that while the policy initiatives were good, there lacked a willingness to make them work in schools. She offered the following suggestions:

Ministry should make it a must that subjects are not done on sexual grounds. There must be equal numbers in all subjects. In fashion and fabrics, there must be boys as well; the same with building technology, technical graphics and metal technology, there must be girls in equal numbers to boys. This will help us to have a growing economy with women as equal partners alongside men (FP:MGBSM).

One girl also perceived that, "the school should send equal numbers of boys and girls to each subject area. If they put 20 boys for metal technology and design, they must also have 20 girls in the same class" (Chipo:SMbRSH).

(iii) *Curriculum continuity and discontinuity.* Eight families and 321 fourth form girls in this study perceived Zimbabwe to be an examination-oriented country that esteemed tertiary qualifications highly. High qualifications were perceived to lead to prestigious careers and both parents and students were found to value subjects at school that led to such qualifications and careers. As one parent said:

I wouldn't like my children to be in the situation that I am in of being a general labourer. If I can find enough money to send them to school, I would like them to go to university and get better paying jobs (MP:TGBSH).

Subjects that ended at ordinary level such as metal technology and design, wood technology and design and building technology and design were not considered as of extreme importance since they did not lead to desired educational ends for them. One girl said that, "my aspiration is for me to get a university education. Subjects such as wood technology only end at ordinary level in Zimbabwe and that is not enough for me" (Clara:SRPSM). Another girl at Mau rural low SES school pointed that it was not enough to just take subjects for their sake, as she wanted subjects that led to higher levels of learning. She commented that "the thing is whether the subject is available at advanced level or not. I wouldn't like to take a subject that does not lead to 'A' level and university" (Jane:SMRSH). Following these arguments and the fact that metal technology and design, wood technology and design and building technology and design only ended up at ordinary level in Zimbabwe, it was unlikely for these girls and others like her to take these subjects.

Among the design and technology subjects, only technical graphics and design was taken at advanced level and this subject was a pre-requisite for some engineering courses at university level. One girl said that she had taken technical graphics and design because "it is one of the subjects leading to the engineering course I want to take at university" (Clara:SRPSM). For 309 girls' not taking design and technology subjects, home economics subjects such as fashion and fabrics and food and nutrition were perceived as better because they were taken at advanced level and were pre-requisites for family and home studies at university. As one girl not taking design and technology put it, "At least with fashion and fabrics I can take dress and textiles technology at

polytechnic or university. Where would building technology take me to?"

(Jane:SGGASM).

The principal of Telford high school perceived that in order to entice more girls to take design and technology subjects, Ministry of Education, Sport and culture should make the subjects pre-requisites for university entrance. He commented:

These subjects should be offered to advanced and university levels as well. In the present set-up, subjects like metal technology, wood technology and building technology and design only end up at form four level. Technical graphics and design, where more girls are beginning to take it, is the only subject that is offered at advanced level. Parents and students generally would like a university education as it opens many doors of opportunity (MPr:TPSH).

These results show that Zimbabwean society and students attached esteemed and prestigious values to some subjects and careers and this attracted student wishing for higher social class attainment.

*(iv) Resource allocation by Ministry of Education, Sport and Culture.* All 27 teachers, five principals and one Education Officer in this study perceived that efforts to provide design and technology education to all students, let alone girls, was being frustrated by the Ministry of Education, Sport and Culture's indifference towards the subjects. One female principal for example said:

While Ministry professes to be behind a massive drive to vocationalise the curriculum, policy is not being matched by enough resource allocation. Design and technology departments are crippled by lack of materials and equipment to the extent that teachers are abandoning subject practical work and doing theory only (FPr:MbRSH).

The Ministry of Education, Sport and Culture was perceived as not serious enough in its quest to change the traditional technical curriculum in line with the British model Zimbabwe seems to be following. A male principal commented that, "What use is it to say we are providing design and technology to all students when we do not have even material and equipment for the few boys who are there?" (MP:MGBSM). A teacher at Gemston pointed out that Government technology departmental allocations set a decade ago were still being disbursed to schools without changes. Findings at all the eight schools studied pointed to them struggling to purchase equipment and perishables for technical and design and technology departments due to rising costs. At Mbizi school the female principal said:

Much as we would want to introduce subjects like technical graphics and design, we see that it would be too expensive to ask a child to buy instruments for drawing. So right now I have got a technical graphics and wood technology teacher but for us to introduce the subjects, it would be difficult as many parents cannot afford it (FPr:MbRSH).

The principal saw Ministry of Education, Sport and Culture as meddling in unfruitful politics and non-productive issues such as a national dress code for all citizens and same uniform for all students in schools at the expense of quality education for the nation.

With Zimbabwe presently in the midst of a crippling economic crisis characterised by sharp price increases, all the eight schools said they were struggling to buy subject materials since parents were struggling to pay industrial subject fees required for their daughters to take the subjects. Apart from Riverdale and Telford private schools, the other six schools had resorted to asking students to provide their own subject materials with little success. The move was found to be benefiting only few girls with resources. As one girl put it:

I may say yes, I want to do fashion and fabrics ...but where will I get the money for material requirements. If I tell my father that this is what is required at school, he will tell me to drop the subject (Tecla:STGBSH).

The six schools argued that if they were failing to cater for boys only who were presently enrolled in these subjects, they would not be able to cope with both boys and girls taking the subjects as this needed extra classrooms, equipment and running costs for perishables and equipment maintenance.

### **7.3.2 School Climate**

According to Martin, Howard and Colia (2004), school climate is more of a psychological than a social construct involving the shared but often diverse perceptions and reactions of school or community members to the values, attitudes, beliefs, and norms of a given culture. Results in this section identified four school climatic factors as affecting fourth form girls' enrolment and achievement in design and technology subjects. These are teacher expectations, teacher student interaction including instructional management, student interaction and influence and access to information. The four factors are discussed in the next sections.

**(i) Teacher beliefs and expectations.** The fifteen male design and technology teachers in the present study did not see girls' participation in design and technology subjects as supporting their gender role identity. They argued instead that girls should

take traditional female subjects like food and nutrition and fashion and fabrics. They perceived girls to be too physically weak to carry out such tasks as metal filing and hand planing of wood. They also perceived design and technology subjects as difficult for girls whom they accused of being poorly equipped for practical work and slowing down lessons' progress to the point of teachers being unable to complete syllabi. One teacher commented:

Girls may do quite well in theory work but when it comes to practical work, you may have set goals as a teacher that by this time I should have completed a stool with the students, but you will find a girl still mortising the frame or making errors. Sometimes you just lose your patience to deal with girls who slow down syllabus progress (MWTT:MbRSH).

The response showed that generally apart from the teacher believing that girls were not capable, he also lacked the patience to work with new girls in his subject area. Ten of the teachers said they did not feel comfortable enrolling female students whom they said lacked the relevant subject knowledge. These teachers viewed boys as the ideal people to take and achieve in design and technology subjects citing societal expectations and boys' background tinkering experiences. One teacher said that he would not feel comfortable if his own daughter took a traditional male subject at school. As he put it, "I do not think that I would be too happy if it is my daughter. I will just tell her that this is not for her. She just doesn't have the background knowledge of the subject" (MBAT:TGBSH).

In terms of achievement, one-fourth form girl pointed out that male teachers did not expect boys to be beaten by girls in class. She said that teachers made no secret of this in class by announcing it to boys in the presence of girls. She said, "when male teachers teach design and technology subjects, they expect boys to do better than girls. They actually say that boys cannot be beaten by a girl" (Tatenda:SGGASM). This was perceived as giving more motivation to boys to succeed at the expense of girls. Girls picked up the negative social messages from teachers in their day-to-day workshop activities. According to Rosser (1993), the expectations and prejudices of the teacher can bias teaching to the extent that pupils do not perceive data correctly. Jones and Wheatley (1988) posit that the idea of teachers having different expectations for students based on their sex can influence student motivations and self-perceptions and may be influential in decisions girls make to continue or opt out of a subject.

In all the eight schools studied, I observed that there was streaming of students according to their ability. Students whom teachers perceived as intellectually gifted were expected to take academic subjects and the less gifted were called the non-academic stream and expected to take technical and design and technology subjects. One student perceived that it was a result of teacher beliefs and expectations that girls were not

intellectually capable to do design and technology subjects just because they were girls. As she put it, "I think male teachers think that girls are not capable of doing well in design and technology subjects, that is why they push us to do home economics" (Thoko:SMbRSH). The education officer commented that,

Teachers' as socialisers tackled issues from the patriarchal view of society as a result of many years of exposure to Shona and Ndebele culture. This influenced their handling of classroom issues (EO).

*(ii) Teacher-student interaction.* Lesson observations at Riverdale and Gemston schools showed that boys received more attention and also demanded more of it from teachers than did girls. Question distribution from a male teacher to a mixed gender and race group at Riverdale showed that the male teacher favoured boys as twelve questions were asked in thirty-five minutes and girls answered only three. However, the ratio of boys (ten) to girls (two) could have played a part in more boys being selected to answer questions. It was however, observed that the male teacher continued to give more assistance to boys whose attitude was tantamount to keeping the teacher to themselves.

At Gemston group A school where a lesson on the construction of triangles was being taught by a female teacher, five questions were posed to boys and four to girls. The female teacher had the opportunity to call both girls and boys to the board to demonstrate some stages in triangle construction. The female teacher's distribution of questions and board demonstrations was perceived to be fair to both girls and boys and did not appear to show any favouritism. Language used was non-sexist and the teacher called students by their names to answer questions posed. It was, however, noticed that while girls were orderly in the way they waited to be called to answer questions, boys shouted out a number of responses without being called to respond. Furthermore, while girls sat attentively at the front, boys had to be restrained to avoid making too much noise at the back right side of the classroom.

Two fourth form girls at Mbizi and Mari schools perceived that male teachers were reluctant to give girls the attention they needed to support their learning. One of the girls pointed out that girls usually felt unable to pursue questions with male teachers and sometimes let some issues ride for fear of being told off for slowing down the lesson. However, male teachers were found to be putting more effort on boys and leaving girls feeling less valued. She commented that:

Once the teacher has explained something and if the majority of the students who are boys signalled that they understood the lesson, a girl would not dare continue ask any more questions because the teacher and the boys would say you are drawing us back. In the end you just keep quiet (Kiri:SMGBSM).

One Mbizi girl said male teachers were unfriendly, hostile toward girls and unsupportive of their efforts. She also perceived that male teachers were unhelpful especially when girls got stranded in practical work because they considered girls as helpless and destined 'to fail anyway'. As she put it:

Male teachers usually give a lot of attention to boys. I may ask a genuine question and he may just brush it aside as trivial but if a boy asks a question, the teacher responds in detail with supporting illustrations. If a girl continues to ask questions, the male teacher will say that it is best that you drop the subject because you don't know anything (Thoko:SMbRSH).

The education officer pointed out that in most schools he supervised, girls lacked proper academic support from male teachers who seemed biased in favour of boys consciously or unconsciously. He pointed out that teachers assumed a lot that they were dealing with a homogenous group of students when teaching mixed classes ignoring the varied experiences students brought into learning. As he put it:

I want to believe that teachers ... might not be giving the needed attention to these girls. In most cases, teachers believe that students at this level should be feeling confident and perhaps independent when doing most of the activities, not aware that some of these girls may need some additional support for them to do better. I want to believe that if teachers were fair with girls from the word go and assisted them equally, then we would find a situation where these girls would be performing just as good as the boys (EO).

Girls' own fear, as well as parental fear that male teachers would abuse girls if they had extra lessons with them was mentioned by four fourth form girls as a possible reason why girls did not do well in traditional male subjects. To these girls, it would be helpful if more lady design and technology teachers were trained as girls would be able to approach them without any fears or social connotations. As one of the girls put it:

You wouldn't ask a male teacher for private lessons if you are a slow learner and yet this is easier to say to a lady teacher. Lady teachers have patience with us who may not be familiar with the stuff being taught (Tracy:SMGBSM).

**(iii) Peer interaction and influence.** The twelve fourth form girls taking technical graphics and design perceived that mixed girls' and boys' environments were often tension and anxiety filled, with boys harassing and belittling girls at every opportunity. According to two girls at Mau and Riverdale, boys often jeered girls who got wrong answers to questions asked by the teacher. This was said to affect girls'

continued participation in the subject as well as their performance in classroom tasks.

One of the girls said:

Boys always seem to have something to laugh about me in class that I do not know of. They laugh at me when I get wrong answers and the next time the teacher asks a question I will be afraid to raise up my hand to answer any more questions. Boys also discuss alone and you just feel unwanted. Sometimes you just feel left out especially when they laugh, and you feel they are laughing at you or something (Clara:SRPSM).

Clara also pointed out the “power over girls by most boys” that in some instances, girls’ responses to questions asked by the teacher were stopped in mid-air as boys took over without the intervention of especially male teachers. My observation confirmed this in a technical graphics lesson taught by a male teacher at Riverdale private high SES school. When Clara tried to speak, often a boy would intervene and complete the sentence for her. At one point she angrily said to one boy who had stopped her finishing her sentence, “I have a mouth...let me finish what I wanted to say because it is not exactly the way you have put it across” (Clara:SRPSM).

Another girl who had dropped out of wood technology and design classes saw boys as the biggest perpetrators of girls’ harassment and exercising a lot of power in resource sharing of tools and workshop materials to the extent that girls ended up taking left-overs every time they had a design and technology practical lesson. She pointed out that the unfortunate part was that male teachers rarely intervened as if they were giving consent to the power dynamics at play. She said that she was powerless to challenge the dominance of boys in the absence of the teacher’s intervention and responded by keeping quiet, withdrawing classroom participation or leaving the subject altogether. She commented that, “Usually girls do not get the best tools in the workshop because boys take them and share among themselves. Girls always take the leftovers and you won’t have the power to challenge them (Tecla:STGBSH).

The Masvingo Education Officer also perceived that interaction processes taking place in the classroom hampered girls’ performance in design and technology subjects. He perceived that girls were harassed by boys to the point where it affected their self-confidence as individuals and performance in the subjects with little teacher intervention. As he put it:

Girls tend to be dominated by these young males. You find that where resources are scarce, girls tend not to get what they should get for them to be able to learn with confidence and in a happy atmosphere. In some cases these boys take whatever is there for them before girls can get a chance. This is where it is

unfortunate. Girls are not getting the support which they want first and foremost from the classmates and also back home; they would not get the support of some people (mother and father) on hearing that they are doing that subject which is normally done by males (EO).

One rural girl perceived that lack of support from boys was to blame for the poor performance of girls. She saw boys as uncooperative to work with preferring to work alone or in competition with girls. She commented:

Boys do not want to cooperate with us in discussions even though we may have some important points to contribute. I think they are afraid that we may beat them in class. Sometimes even an important point raised by a girl, they will laugh at it just to demoralise her. I think this affects our performance in class (Chipo:SMbRSH).

Results also showed that harassment of girls and negative influence for participation did not only come from boys but from other girls who chose not to take design and technology subjects. One of the girls said:

Yes, girls usually laugh at each other. Many will say look at this adventurer. My friends laughed at me and called me names like 'Tom-girl' when I joined wood technology. I went home and told my parents that I wasn't going to do the subject any more (Phoebe:STGBSH).

Discouragements from other females were perceived as deterring girls more from participating than those coming from boys. Three girls from Tembo, Telford and Gemston said some girls used negative comments, derogatory remarks and sometimes threatened the cutting of existing relationship and friendship ties in order to win their friends back from taking 'male' design and technology subjects. One girl said, "My friends started behaving very unfriendly and shunned me when I took wood technology and design and so I dropped the subject" (Tatenda:SGGASM).

Shyness and social isolation avoidance were two factors found imbedded in student interaction processes. In terms of shyness, one girl taking technical graphics and design said, "Sometimes you are unable to say what you want because of the many eyes that will be looking at you in class (Linda:SGGASM). Almost all 321 girls sampled said they wanted to belong to their girl groups and tended to avoid being alone especially by straying into a traditional male subject area. According to these fourth form girls, decisions for subject enrolment were usually made as a girls' group with intentions to preserve friendships and help each other in schoolwork. As one of the girls said:

I may take a subject for study because my friend will have chosen the subject. It means that we will be able to help each other. Sometimes you choose the same subject as that of your friend because she is quite good in it and you will be able to get help from her as well (Shumi:SMRSM).

One male principal also said that, "I think the constraint it may appear, is peer pressure. Girls tend to group together along traditional subject areas and we don't have that shift where more girls cross over to design and technology subjects (MPr:DGASH). He also said that girls did not achieve in design and technology subjects because, "Many times girls simply form friendship groups that are not work oriented, groups that negatively influence each other's decisions even to study".

## **7.4 Summary and Re-Modelling Participation and Achievement Perspectives**

This study set out to explore the case of fourth form girls' participation and achievement in design and technology subjects in selected Zimbabwean secondary schools with an overarching aim to find factors affecting fourth form girls' enrolment and achievement in design and technology subjects. Twenty-five complex but closely interrelated factors were implicated and presented in this chapter emanating from questionnaire results, lesson observations, content analysis and interviews involving 321 fourth form girls, their 27 design and technology and guidance and counseling teachers, five principals, an education officer and eight families in eight different schools. Data were analysed using the manual coding and categorisation method as well as the electronic NUDIST QSR N6 programme giving corroboration to results obtained.

Results were indicative of a multiplicity of sociological, psychological and feminist variables working to shape fourth form girls' internal belief systems affecting decisions of choice and achievement. This highlighted the problems of girls and design and technology in the African context, a dimension that has been largely missing from mainstream debates on the subject. Student and schools dimensions were derived from an analysis of 25 themes organized under six categories: demographic, conative, affective, cognitive, and school contextual and school climatic. This organization of factors is presented in the model of girls' participation and achievement below (see figure 7.4).

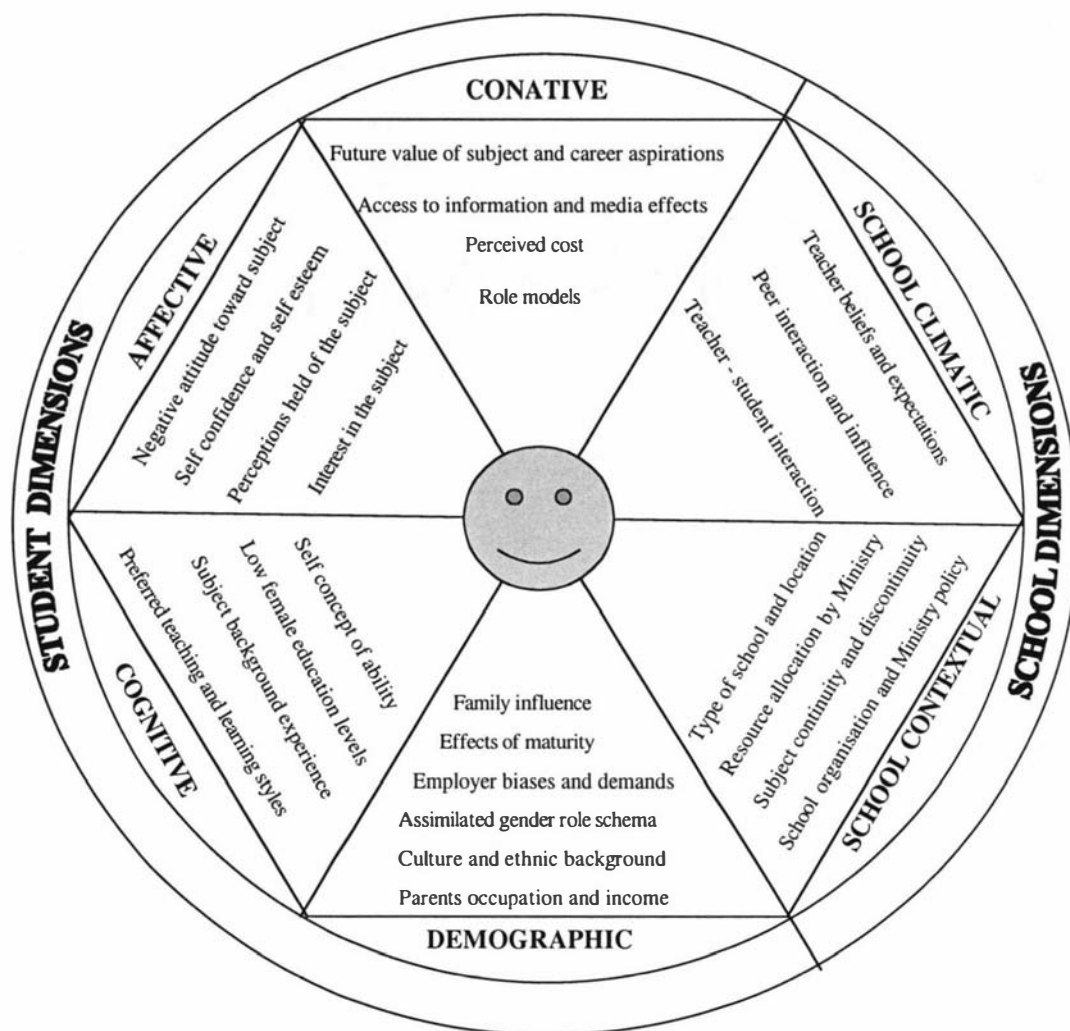


Figure 7.4. The student and school dimension model of girls' participation and achievement in design and technology subjects.

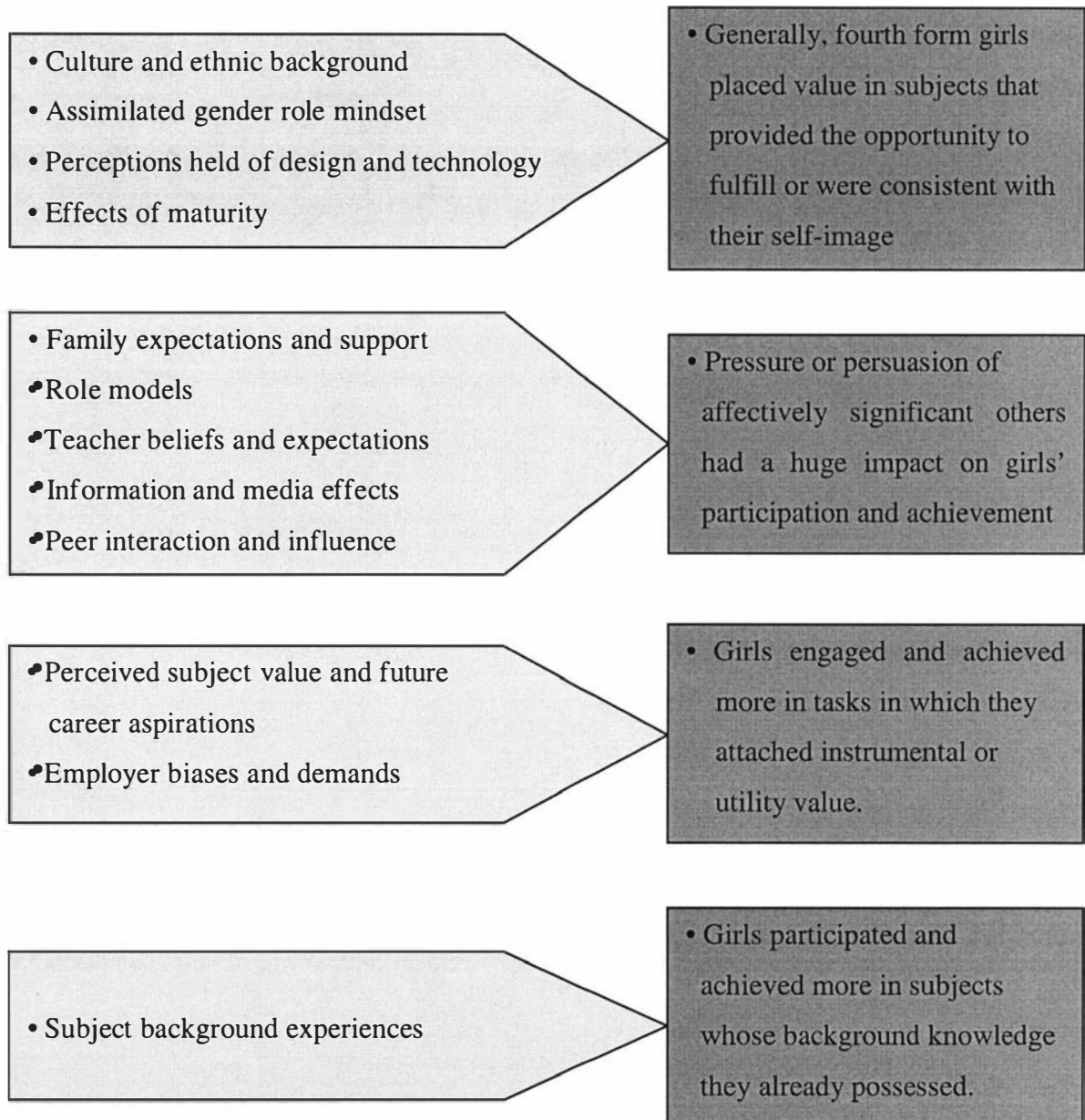
As presented in the results, demographic, conative, affective and cognitive factors are grouped under student dimensions which were conceived as including sociological, psychological and gender variables emanating from personal factors such as age, gender, personality type, cognitive style, level of trait and state anxiety, cultural background, motives for studying and prior knowledge. School contextual and school climatic factors are grouped under school dimensions as they bring together factors associated directly with schooling processes affecting the student. However, the complexity and interrelatedness of the 25 factors means that some of the factors can be placed under both student dimensions as well as under school dimensions.

A closer meaning analysis and working "back and forth between the data and the classification system to verify meaningfulness" (Patton 1990, p. 403), I was able to do another thematic re-organisation of the 25 variables presented in this chapter into nine

derived meanings. This process of abductive and inductive analysis enabled me to further discover and identify more meaning from the data by grouping together those categories that had a converging theme as shown in figure 14 (Huberman & Miles, 1984). For example, data presented under four categories: culture and ethnicity, assimilated gender role mindset, perceptions held of design and technology subjects and effects of maturity shared one theme intimating that girls placed value in subjects that provided the opportunity to fulfil or were consistent with their self-image as girls (Eccles et al., 1983). Culture socialised girls in perceived roles for females to the extent of forming rigid mindsets that rejected activities thought to belong to the other gender. Maturity was included because socialisation takes place as people mature to acquire those traits and identities consistent with their gender (see figure 7.5).

Related category of factors (N=26)

Derived meaning or finding (N=9)



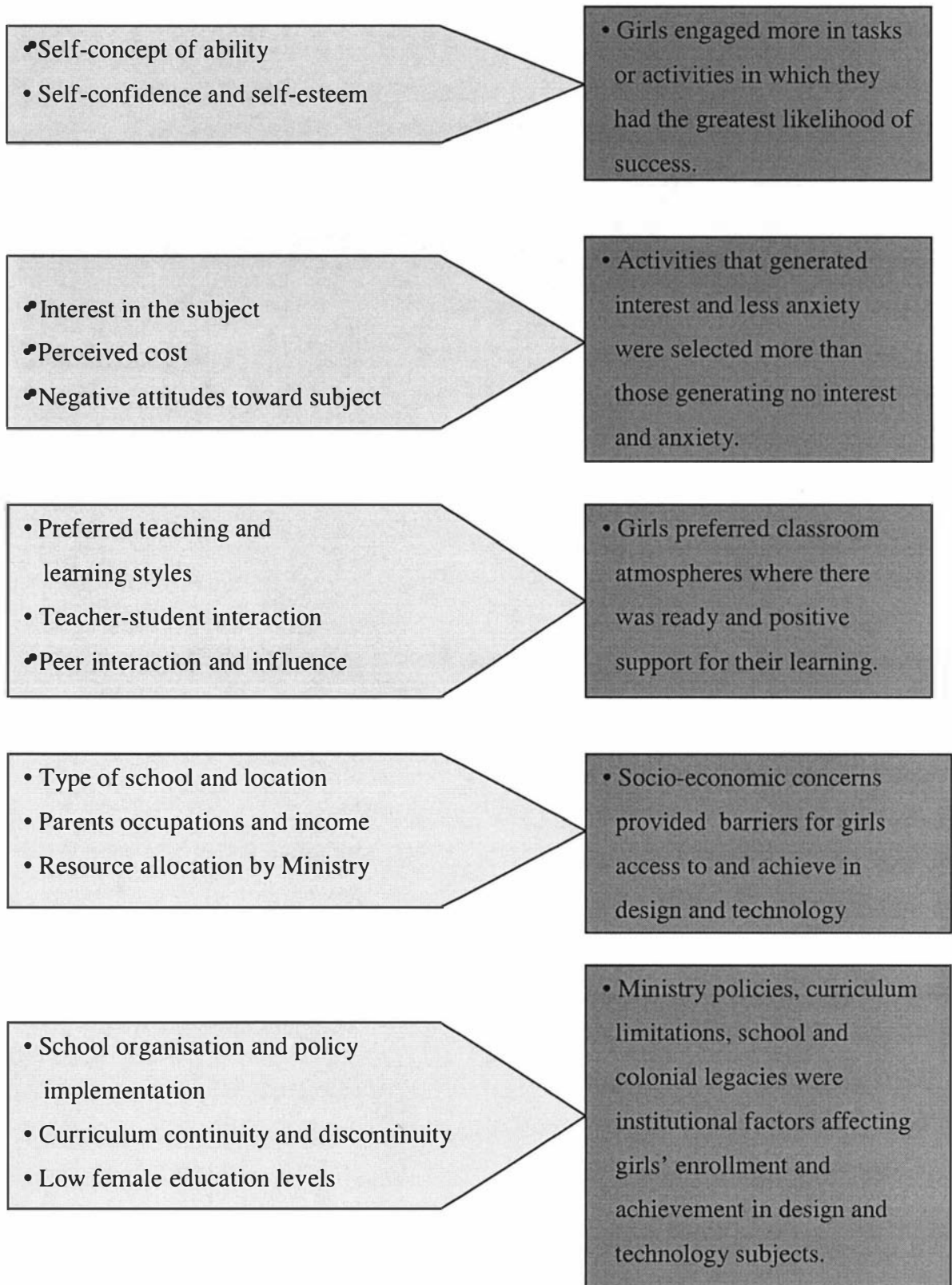


Figure 7.5. Derived meanings from category of factors

The second derived meaning, pressure or of effectively significant others came from four related categories all of which intimate that girls' participation and achievement in design and technology subjects was a result of expectations, support and interactional processes with significant others. These significant others were perceived as

exerting overt and covert pressure for girls to comply. Fourth form girls' decision processes were thus seen as acting as compelled by the external pressure or persuasion. Family, role models, teachers, peers and the media all fell into the compelling category.

The third derived meaning from the results was that fourth form girls favoured engaging in activities to which they attached instrumental value rather than those taken for the sake of taking them. This meaning was drawn from two categories: perceived subject value and future career aspirations and employer biases and demands. Both categories focussed on fourth form girls, parents and employers who favoured mainly academic subjects that were perceived to lead to tertiary qualifications and high profile occupations like medicine, engineering, law and accountancy. Subjects that did not proceed beyond ordinary level (year 11) like metal technology, wood technology and building technology and design were thus perceived as unable to meet this demand and suitable for the less able academically.

There was only one category representing the fourth finding that fourth form girls participated and achieved more in subjects whose background knowledge they already possessed. The girls were found taking mainly those technical subjects they had taken at primary and lower secondary school levels instead of new ones they did not have any experience in. Girls background experience in domestic work tended to align them for home economics subjects while tinkering experiences for boys aligned them for design and technology subjects like metal technology, wood technology, building technology and technical graphics and design.

The fifth finding was built up by categories expressing how the girl perceived herself as able to fit and achieve in design and technology subjects. This finding was built up from literature reviewed in chapter four that a person's perceived ability in an area has critical motivational consequences towards enrolment decisions as well as success there (Wigfield & Eccles, 2000). The category was built up by two themes namely self-concept of ability and self-confidence and self-esteem.

The sixth finding had three categories dealing with interest in the subject, attitude toward subject and perceived cost of selecting one subject over another. Results from the three categories show that those activities that generated more interest and less anxiety were more likely to be selected than those generating no interest and more anxiety. The seventh finding focussed on classroom interactional processes affecting girls' participation and achievement in design and technology subjects. Three categories formed this group and these were preferred teaching and learning styles, teacher student interaction and peer interaction and influence. All three supported that fourth form girls were ready to enrol and achieve in educational environments where there was ready and positive support for their learning.

The eighth finding was made up of categories dealing with socio-economic concerns affecting girls' subject enrolment and achievement. Type of school and location, parents' occupations and incomes and, resource allocation to schools by Ministry of Education, Sport and Culture were put in this group. All three corroborated that socio-economic status of both the family and the school provided barriers for girls' participation and achievement in design and technology subjects. Last but not least, the last finding came from three categories dealing with curriculum and policy issues. These were school organisation and policy implementation, curriculum continuity and discontinuity and low female education levels. Policy and curriculum issues were found to affect fourth form girls' enrolment and success in design and technology subjects.

Analysis was informed by Eccles et al. (1983) expectancy value model of achievement motivation and occupational choice and Woolnough's (1994) model of student choice of science and engineering as well as Weiner's (1985) attributional theory of achievement motivation. The models posit that students choose subjects for their utility value, supporting their self-image and where their expectations for success were high as enhanced by subject background experiences providing a sense of belonging. However, findings in this study brought out unique processes particular to Zimbabwe that could not be located in other countries especially the cultural aspects. Nine findings from this chapter and two from chapter six provided the nucleus of the study upon which the discussion and interpretation in the next two chapters are premised.

## CHAPTER EIGHT

### DISCUSSION OF FINDINGS

This study set out to examine the case of apparently few fourth form girls' enrolling and achieving in design and technology subjects in selected Zimbabwean secondary schools in two provinces: Harare and Masvingo. Subjects named design and technology under scrutiny were metal technology and design, wood technology and design, building technology and design and technical graphics and design. This chapter discusses the eleven major findings of the study (see section 9.1 on pages 242-243 and figure 7.5 on pages 193-194) whose meanings have been drawn from the 25 themes in relation to the major question of the study: "Why do few fourth form girls participate and achieve in design and technology subjects in selected Zimbabwean secondary schools?" To answer this question, three research sub-questions provided the basis for data needed and these are:

1. How are fourth form girls represented and performing in design and technology subjects in Zimbabwean secondary schools and in the two provinces of Harare and Masvingo?
2. What are the reasons for Harare and Masvingo province fourth form girls' choice of design and technology subjects for study in selected secondary schools as perceived by fourth form girls themselves and significant others?
3. What are the reasons for Harare and Masvingo province fourth form girls' achievement in design and technology subjects in selected Zimbabwean secondary schools as perceived by fourth form girls and significant others?

This discussion first focuses on the extent of fourth form girls' participation and achievement answering sub-question 1.

#### **8.1 Extent of Fourth Form Girls' Participation and Achievement in Design and Technology Subjects**

Results presented in chapter six answering sub-question one on the extent of fourth form girls' participation and achievement provided the basis of discussion in this section. The results suggest that:

- Few fourth form girls enrol in technical graphics and design, building technology and design, wood technology and design and metal technology and

design when compared to three academic subjects namely English language (literacy), mathematics (numeracy), integrated science (sciences) and a traditional female subject, fashion and fabrics.

- Girls who enroll in technical graphics and design, wood technology and design, building technology and design and metal technology and design achieve as well as they do in academic subjects and traditional female subjects

Despite the Zimbabwean government's efforts to make education and school curriculum ungendered, findings revealed that design and technology subjects are still gendered in their enrolment. Girls were found to have persistently low enrolments in the four design and technology subjects (technical graphics and design, building technology and design, wood technology and design and metal technology and design) when compared to three academic subjects namely English language (literacy), mathematics (numeracy) and integrated science (sciences) and a traditional female subject, fashion and fabrics. It would seem that Government being signatory to major regional and international conventions on equality of opportunity and the elimination of discrimination against women (see section 1.2, p. 3), has done little or had little success in efforts to change gendered enrolment patterns associated with certain subjects. The fact that more girls were enrolled in academic subjects and fashion and fabrics (see the higher percentages given in appendix xxviii) and yet were represented in extremely low percentages in design and technology subjects (as seen in appendix xxvii), suggests open and subtle obstacles hampering their active participation. On the other hand, design and technology subjects could be functioning in ways that prevent girls from full involvement. Findings also point to the school system's failure to support Government's equality of opportunity policy and to motivate girls to take non-traditional subjects.

While Zimbabwean schools are compelled to accord equal treatment and equal access to both girls and boys in respect of the curriculum, findings give a strong hint that the design and technology curriculum is not benefitting girls as much as it does to boys. This confirms fears by Jasaat and Mwalo (1985) that girls' absence from certain subjects at school is, in reality, preparation for different career paths and a way to prevent them from competing against boys. This may hold true considering that while women constitute 52% of Zimbabwe's 12.5 million people, only seven percent of the workforce in the non agricultural sector are women (Ministry of Health, 1994). In the same way in this study, if between 0.02 percent and 0.7 percent of girls among the population of school leaving pupils are the ones taking design and technology subjects, and yet these subjects are considered pre-requisites for apprenticeships and other engineering courses, then girls are being shortchanged. The fact that between 43.4 percent to 100 percent of

girls participate in academic subjects suggests that design and technology subjects act in ways that prevent girls from full participation. On the other hand, boys' enrolment in design and technology (traditional boys' subjects) during the same period ranged between two and 10 percent. When this is compared with girls' 0.02 to 0.7 percent participation, this suggests gendering in the way design and technology subjects are taken. Similarly, girls' high enrolment in fashion and fabrics (a traditional female subject area) ranging from 17 to 29 percent compared to boys participation of between 0.2 and 0.5 percent confirms enrolment gendering in that subject as well.

Among the design and technology subjects, technical graphics and design and building technology and design, with 0.5 percent enrolment each, had the highest number of girl takers followed by wood technology and design (0.2 percent) and metal technology and design (0.1 percent). Since technical graphics is offered beyond ordinary (school certificate) level, this may be a factor encouraging girls to take it as Zimbabwean society tend to value subjects that lead to a university qualification. The other three design and technology subjects end at ordinary level and this suggests why many who may want a university education do not pursue them. The content of technical graphics and design is focussed on theory, drawing and design, areas girls may find more appealing than practical work, which predominates in building technology and design, wood technology and design and metal technology and design, and is considered strenuous by girls.

Girls' taking of building technology and design, though ending at ordinary level, may suggest school practices of channeling girls into subjects they do not choose themselves. The fact that fewest girls took metal technology and design of all design and technology subjects suggests they may have been affected by the subject's close association with (mechanical) engineering, which Woolnough (1994) found British girls did not favour. Boys were enrolled more in building technology and design (6.9 percent) followed by wood technology and design (5.3 percent), metal technology and design (3.2 percent) and technical graphics and design (2.4 percent). Why boys did not enrol more in technical graphics and design, a design and technology subject chosen more by girls, is a factor that needs further investigation.

Girls' and boys' high participation in academic subjects more than in design and technology subjects suggests demands placed on a full ordinary level (school leaving) certificate that must have five subjects passed at grade C or better. It seems probable that students' participation in academic subjects more than in design and technology subjects is only to the extent that this helps them to achieve the compulsory five academic subjects required for one to have a full ordinary level school leaving certificate. Design and technology subjects, being optional, offer little incentive for girls to take them serve

only for those who may want a technology or engineering career, a rarity with Zimbabwean girls. Employer demands for academic subjects only, the low status design and technology subjects command and the fact that they are optional subjects on the certificate, does little to encourage girls to take them. Design and technology subjects' long association with boys' traditional technical subjects (see chapter two) has only helped them to be seen in the same light as lacking appeal, that is, hands on and the conditioning of learners in certain rituals (Kemmis and Stake, 1995).

Writing about Zimbabwe, Palmer and Birch (1992) argue that subjects taken at school tend to direct girls and boys to different routes in training and employment. Girls' absence from school design and technology subjects in this study seems to confirm their absence also in engineering and technology careers. My earlier observations in chapter one that most apprenticeships are taken by boys is to be expected when few girls enroll in school design and technology subjects. It would seem that girls' congregation in home economics subjects misaligns them from pursuing engineering and technology careers and only leads to condemn them further to the private sphere of domestic roles. There were no significant enrolment differences between girls in Harare and Masvingo provinces to warrant any explanation.

Apart from a low girls' achievement in building technology and design in 1990 and 1992 (see table 6.6 on page 125), there were no marked differences in terms of fourth form girls' design and technology subjects achievements compared to academic subjects and fashion and fabrics. The fact that design and technology subjects achievement ranged between 8% and 56% and academic subjects ranged between 11% and 48%, shows that girls' achievements in both areas were almost similar. Contrary to belief among girls themselves and Zimbabweans society as a whole that girls could not perform well in design and technology subjects, findings show that girls do as well in these subjects as they do in academic subjects. Comparisons between girls' and boys' achievement suggest that girls perform slightly lower than boys in design and technology subjects (traditional boys' subjects) where their achievement ranged from 14% to 40% compared to boys' 41% to 59% in technical graphics and design, eight percent to 17% compared to boys' 31% to 44% in building technology and design, 11% to 56% compared to boys' 35% to 76% in wood technology and design and zero percent to 48% compared to boys' 26% to 61% in metal technology and design.

It was interesting to note that boys' achievement of 26% to 44% was lower than girls' achievement of 30% to 48% in fashion and fabrics. Girls performing better than boys in fashion and fabrics and boys performing better than girls in design and technology subjects suggest that familiarity motivates and breeds success in a subject area (Lewis, 1995). In this case, girls' extensive socialisation in sewing and needlework

and boys' tinkering with fathers at home and with teachers in primary school suggests working to their advantage in the respective subjects at secondary school level.

While the results showed that Masvingo girls performed better in design and technology subjects than Harare girls (see appendix xxix), the low enrolment figures make it rather difficult to give a conclusive argument. A larger study involving more participants could reveal more on this.

## **8.2 Factors Affecting Fourth Form Girls' Design and Technology Subjects Participation and Achievement**

This section discusses factors affecting fourth form girls' participation and achievement in design and technology and technical subjects in relation to findings in figure 7.5 to answer sub-questions 2 and 3. While the focus remains on design and technology subjects, factors affecting enrolment and achievement in some academic and technical subjects are also discussed.

### ***8.2.1 Self-image***

Results of this study suggest that fourth form girls chose design and technology and technical subjects that provided the opportunity to fulfil or were consistent with their self-image (Eccles, 1994) of femaleness as conceived by the wider spectrum of Zimbabwean culture whether African or European. The study has shown that the Zimbabwean Shona and Ndebele groups' ways of life are embodied in the philosophy of African humanism (Unhu/Ubuntu) standing for the groups' expected way of life. As discussed in chapter 3, 'Unhu/Ubuntu' is premised on essentialist notions of gender difference, positing that since men and women are created biologically different, they should occupy separate but complementary roles in society each with its own sphere of activity and power. Individuals operate within the bounds of communally prescribed group expectations and behavioural norms (unhu or tsika) based on gender, rank and precedence. Every person has a place and each place has clearly defined rights and duties (Adeyemi and Adeyinka, 2003; Fairbairn-Dunlop, 1991). From this assertion, it is apparent that role theory is actually embedded within Unhu/Ubuntu, a pedagogy of difference that is used to rationalise the continued disadvantage of women and girls in the Shona and Ndebele cultures.

'Unhu' in this study was found to be a way of building an identity not only for the whole Shona, Ndebele or European community, but also for shaping individual self-images of whom each person was in the group's way of life. This entailed the teaching of difference which began early in a child's life and was internalised by participation in

daily life as well as in various rituals and practices that moulded each person's understanding of her or his place in the social structure. Girls' and boys' education formally and informally was thus tailored differently in response to the immutable gender differences resulting in gendered growing up experiences that Bourdieu (1990) calls habitus. Bourdieu perceived habitus as individual dispositions connected to everyday practices that influence a person's social actions. In this study, habitus is taught by imperceptible apprenticeship and inculcated by experience, teaching and observation resulting in identifiable "appearance, speech, behaviour, manners and tastes" (Tomanovic, 2004, p. 343). Both the home and the school were found to be sites where habitus was inculcated into the lives of girls and boys. These two sites created and supported the gendered nature of habitus. Reinforcements from birth by adults at home were seen as building up an image of what it meant to be a boy or a girl. In the Shona and Ndebele societies, while boys were taught blacksmithing, building, thatching huts, wood carving of artefacts and tools such as hoe and axe handles, ox yokes and cooking sticks by their fathers, girls were taught by mothers how to clean the home, cook and serve food, wash dishes, wash and iron clothes: the things that a 'good' mother was expected to do. For boys, this fiddling with gadgets at home, gave them greater inclination to science and technology activities.

At school, self-image was seen as embedded in gender role stereotyping of subjects. Teachers set up rigid school structures that allocated home economics subjects to girls and design and technology subjects to boys. Because teachers are also shaped by the same culture supporting difference, they felt it normal to channel girls into home economics subjects. Boys' selection and teachers' channelling of boys into metal technology, wood technology, building technology and technical graphics and design was also considered normal as this also supported conceptions of the male image. Owing to assimilated perceptions of their self-image, girls in this study considered it natural to select fashion and fabrics and food and nutrition for study because the subjects' culture supported their self-image of being female shaped by the socialisation process into domestic work.

The self image of 'girlness' that fourth form girls in this study had of themselves tended to affect their sense of belonging to design and technology subjects. The girls were found to have developed mental constructs of how they did not fit into the culture and nature of design and technology subjects. To these girls, design and technology subjects were espoused by male ethos and values that supported male dispositions of masculinity. They pointed to masculine language used in textbooks, illustrations depicting males as actors and invisibility of female participants as clear indications that it was a male domain. Secondly, the way the subjects were taught, highlighting only

exploits of prominent males and use of equipment alien to girls' socialization, did not make girls feel that they could fit and achieve in the subjects. In terms of mere numbers, design and technology subjects reflected male domination with male students and teachers outnumbering by far both female students and female teachers as seen in chapter five and chapter six. All these factors combined to establish that design and technology subjects were unsupportive of girls' self-image, carried the masculine tag that alienated female engagement and therefore, were the domain of males.

Findings indicated that as girls matured and boys started proposing love to them, they became more self-conscious of who they were as females and no longer wanted to be associated with dirty, messy and heavy work associated with design and technology subjects because it was considered 'unladylike'. Girls' self-image also meant not going against cultural taboos of putting on male clothes like trousers and overalls, as these are associated with maleness. While these may be standard gear for industry, the powerful effect of cultural socialisation meant that girls rejected these as alien to their socialisation. This point supports Eccles' (1994) view that, "assimilation of the culturally defined gender roles can have such a powerful effect on one's view of the world that activities classified as part of the other gender's role are rejected" (p. 590).

It seemed plausible that in order to encourage and increase girls' participation and achievement, those contexts consistent with girls' self-image and identity be part of national curriculum planning for design and technology subjects. For example the inclusion of home economics subjects as part of the design and technology curriculum is perceived to bring more familiar contexts that girls can relate to. Burns (1988) recommends changing the subject. The present setup where low SES Zimbabwean Shona girls with a strong culturally assimilated gender role schema and non-tinkering backgrounds were required to fit into 'male' structured design and technology curriculum and knowledge worked to further alienate girls (Burns, 1997). Radical feminists like Spender (1982) and Daly (1978) see this as unacceptable presentation of masculinity as universal and the ideal to which women must strive to be.

Though the study found a slight shift of attitudes and perceptions in some sections of society, such as the high economic groups and Europeans, the general perception was that of different genders occupying different but complementary positions in life for harmony and avoidance of duplication of roles. However, the fact that it is men who control avenues where beliefs about difference are actioned (Unhu/Ubuntu ideology) and expressed in Zimbabwean society (practices), gender self-identity achieved through socialisation of roles, becomes a power game assigning males the public sphere of life while condemning women to perpetual domesticity. The complementary role this assigns women means that they can never rise above men.

The sidelining of females early in the socialisation process at home and in school subject selection may mean that they are left out of educational routes to key employment areas and power. Work by Marxist theorists also highlighted that by separating male and female domains, this may mean that women as a class are not taken as equals to men. Work on sex-role theory also point out that socialising women in 'their roles', tends to mask the intentions of men to be in a perpetual maintenance of their hegemony by holding onto key subject areas, knowledge and employment areas (Connell, 1987).

In terms of achievement, the present study found that fourth form girls' decisions for both design and technology subject participation and achievement were influenced by the image the girls saw themselves as able first of all, to fit into the culture of design and technology subjects and second, to tackle the male knowledge and skills. Those perceived as possessing the culture and knowledge of design and technology subjects especially boys, were thought to have an advantage over girls who were alienated early through the socialisation process and the late subject engagement at school. Boys were perceived to have grown up in the culture, knowledge and skills of these design and technology subjects through tinkering experiences at home with fathers (Woolnough, 1994).

Having, or not having, the requisite background knowledge and skills (*habitus*) thus played a big part in girls seeing themselves as fitting in the knowledge and culture of design and technology subjects and achieving there. Consistent with Mickelson (2003), decisions for fourth form girls in this study to invest in design and technology subjects "depended on their expectations of whether people like themselves could and should be academically successful" in the subjects (p. 375). The 209 girls not taking design and technology subjects did not perceive themselves as having the *habitus* likely to reward them with success in the subjects believing instead that the subjects were not the domain of women. This finding is consistent with Wigfield and Eccles (2000) who point that students who believe that they belonged to an institution (in this case design and technology subjects) were likely to do better academically there.

### ***8.2.2 Socialisers' Influence***

Findings in this study point to pressure and persuasion of affectively significant others as having a huge impact on girls' participation and achievement in design and technology subjects. This pressure and persuasion came as a result of family beliefs and expectations, role models, teacher beliefs and expectations, peer interaction and influence and, information and media effects. The eight parents sampled had high expectations of their children especially for them to take subjects leading to a university education and a

well paying job in the end. In advising their daughters, parents did so looking at where opportunities lay for women in the workforce as has been observed by others in developed countries (Kelly, 1987; Day, 1992). Findings indicated that not only did parents put pressure on the child to do well in school and train for a top job that would give the child a better life, but also for the parents' own personal and family pride so that they would be counted in society. This finding supports Talton and Simpson (1986) who argue that parents' attitudes towards the learning of technology and science can be passed on to their children by the way these subjects are represented, perceived and supported at home. Where parents regarded these subjects as instrumental for technology careers and impressed this on their children, as was done by high SES parents in this study, this was reflected in girls' aspirations for a technology-related career.

Pressure and persuasion from family members especially parents, brothers and sisters was more influential than any other factor. Differences were found between the perceptions of mainly low SES families in rural areas and those of high SES families in urban private schools. Parents of the predominantly rural low SES communities of Masvingo (Mau) and Harare (Mbizi) felt that their daughters should adhere to cultural expectation of role, while private high SES school parents at Telford and Riverdale were more open minded and allowed their daughters freedom to choose own subjects and varied careers including those considered male oriented like architecture. Parents in the middle section in government group B and group A schools tended to support the more cultural adherence route. This finding showed a steady erosion of some cultural beliefs among urban high SES groups that influenced their daughters' thinking about subject selection.

The study found that parents' expectations were usually influenced by their own assimilated gender role mindsets. As people living in a community with its own values and expectations for its members, parents were bound by the community spirit to conform to its expectations. Girls were thus expected to take subjects considered as leading to worthwhile occupations like mathematics, science and English language and those considered appropriate for females like food and nutrition and fashion and fabrics. For those girls who defied parental authority and went on to take design and technology subjects, parents were likely to withdraw both financial and moral support to force them into subjects they supported.

Pressure to marry also forced many girls to consider 'appropriate' subjects to take at school consistent with their perceived roles in the future home. A good mother in Shona and Ndebele custom is one who cooks well, takes care of the husband and children and whose role is complementary rather than in competition with the husband. Thus, many girls considered taking food and nutrition and fashion and fabrics that supported

their perceived roles as mothers. There was also pressure of what society would say on learning that so and so's daughter was a builder, as this brought shame and questions about her gender orientation. To avoid all this, the study found that girls opted for subjects (usually home economics) that supported their future roles and were not confrontational with cultural expectations as well as academic subjects.

Pressure for girls not to take design and technology subjects also came from male teachers who believed that being a girl was not consistent with taking the subjects. These beliefs and expectations were perceived to be a result of teachers' own assimilated gender role mindsets. Through perceiving that girls were physically weaker, slow in executing skills tasks, and not capable mentally to handle the rigorous skills processes, male teachers did not perceive girls to be the ideal candidates to take design and technology subjects, rather seeing it normal for boys to do so. This was seen in the channelling of girls to home economics and boys to design and technology subjects in all schools sampled. However, findings of this study in which girls taking technical graphics and design were excelling, challenge male beliefs and expectations of boys as the ideal candidates to excel in these subjects.

Much pressure was felt by girls in this study not to take subjects they had little or no information about. The majority of girls' not taking design and technology subjects in this study could not consider options in design and technology subjects because they and some of their teachers were not aware about what career options the subjects led to. Findings support Reid, Barnett and Rosenberg (1974), who found that making a decision on subject choice by students is often a conflict process due to a general lack of information on subjects offered and their implications on the job market. For teachers who were not in the know, this meant that they could not advise students on careers involving design and technology subjects. Serious guidance and counselling is called for in this study in all schools to highlight more advantages that could be accrued from taking design and technology subjects. Rennie and Parker (1993) pointed out that the success of student participation in subjects depended on the capacity of schools and teachers to provide considerable accurate information to students. They pointed out that the lack of early advice or encouragement from teachers tended to induce students to choose non-science subjects perceived by especially girls to be easier than science subjects. In New Zealand, a study by Selby (1995) of female participation in tertiary information technology education showed that the attrition of girls was a result of a lack of knowledge about career prospects using information technology.

Design and technology as a new programme in Zimbabwe's curricula, needs a lot of publicity on its educational importance and career value otherwise it will be viewed as another Western packaged commodity with no local relevance. Its links to important

tertiary courses and career opportunities need to be clearly spelt out to give more weight to its inclusion in the school curriculum. Further, its capacity to develop intellectual curiosity should be seen to outweigh mere conditioning, skills acquisition and memorisation of facts. The previous technical subjects approach emphasising traditional specialist training as seen in chapter two, could be responsible for the general labelling of these subjects including design and technology as subjects for the less academic classes. This has only helped to push more candidates away from taking them. There remains a need to extricate design and technology subjects from the narrow focus of being a skills-based subject moulded in the transmission mode of learning, to constructivist approaches. Such knowledge need not only end at ordinary level as is the situation presently in Zimbabwe, but must be linked to prestigious tertiary courses and careers for girls to see their value.

Findings also pointed out that the invisibility of female role models tended to make girls believe that design and technology was a domain for males. The importance of female role models to persuade more girls to take design and technology subjects and related careers, however, was rendered ineffectual by the case at Mau rural secondary school where there was a female building and agriculture teacher but no girls were found taking building technology, a subject she was teaching. Being a rural school in a predominantly rural province like Masvingo, the absence of girls in this subject taught by another female could be explained by strong cultural expectations of role prohibiting females into building, perception of the subject as dirty, the limited material and equipment resources, timetabling girls out, controlled numbers in the subject and lessons that went beyond normal school time. The presence of a female design and technology teacher at Gemston medium SES school had however a significant positive effect on the attitudes of girls towards taking the subject. Five girls were taking the subject in her class as opposed to none in the other fourth form class taught by a male. To girls in the female teacher's class, the success of their female teacher helped them to believe that females could also succeed in the area. Furthermore, the fact that a female taught technical graphics and design, girls found it easier to approach and discuss their work without any cultural and social interaction implications as would happen with male teachers. Technical graphics was also considered as a cleaner office type subject and this tended to appeal more to girls than building technology and design.

Pressure and persuasion through peer interaction and influence was a dimension that showed the impact of power relations between girls and boys on classroom processes as noted by Pannizzon and Levin (1997). Findings show that girls enrolled or avoided enrolling in subjects for study because of peer pressure to be together as a girls' group and avoid social isolation. Decisions for subject selection were made in consultation with

friends and other girls. Many decisions were made to preserve friendships than for the sake of pursuing a subject. Discouragements for girls' participation in design and technology subjects came from both boys and girls. Boys' discouragement took the form of direct harassment, derogatory remarks and name calling, lack of support, ganging together and laughing at a lone girl's contribution in class resulting in withdrawal from lesson participation and sometimes from the subject. To put pressure on friends who would have deserted them to take design and technology subjects, girls used negative comments, name-calling, derogatory remarks and sometimes threatened the cutting of existing friendship ties.

In terms of achievement findings show that the general low male expectation of females in Shona and Ndebele societies did put pressure on girls not to perform to their best, as they would confound cultural expectations of females' complementary role under males by achieving better results than boys. Many girls taking design and technology subjects, owing to cultural expectations for boys to lead, undervalued their capabilities to the extent of believing that boys were born with better capabilities to achieve in the subjects.

Lack of peer support from especially boys may also be blamed for difficulties girls said they faced in order to achieve in technical graphics and design. Boys were perceived to be uncooperative to work with, preferring to work alone or in competition with girls (Pannizon and Levin, 1997). Evidence put forward in this research show that boys harassed girls in tools and workshop materials sharing to the extent that girls took left-overs every time they had a design and technology practical lesson. The unfortunate part was that male teachers rarely intervened as if they were giving consent to the power dynamics at play. Girls felt powerless to challenge the dominance of boys without teacher intervention and responded by withdrawing classroom participation or leaving the subject altogether. These findings on peer processes add a missing dimension in Eccles et al. (1983) expectancy value model of achievement motivation and occupational choice.

### ***8.2.3 Instrumental or Utility Value***

Findings indicate that girls engaged and achieved more in tasks to which they attached instrumental or utility value. Findings in this section were consistent with Eccles et al. (1983) expectancy value model of achievement motivation and occupational choice's utility value. Utility value is described as the degree to which a task relates to a child's current and future goals. English language, mathematics, science and any other academic subjects are considered core certificate subjects in Zimbabwe while technical and design and technology subjects are considered optional. The subjective worth of

these subjects from this standpoint becomes different with academic subjects being given the higher status knowledge tag. Parents, students and their teachers all placed more value in academic subjects which they perceived as leading to more worthwhile career opportunities like medicine, law and accountancy than any technical subjects could offer. These findings were consistent with MacKenzie's (1992) assertion in New Zealand, that academic studies accredited by the universities and tradition were of the greatest vocational worth, and that "realistic and practical subjects were suitable only for short-stay pupils aiming to enter trades and low skilled commercial work and, those good with their hands" (p. 33). Furthermore, he concludes that, "...the technical stream leads later to low status and reward, whilst the academic stream leads to high status and desirable social roles" (p. 187). This devaluation of technical education as of little significant worth meant a greater demand for academic subjects in Zimbabwe. McKenzie (1992) concludes that "technical education can have no privilege unless it is seen to lead to worthwhile career opportunities and, consumers are most likely to choose what they see as being successful" (p. 38). Where parents and pupils feel that the present curriculum has little relevance to their needs, their level of motivation to recommend and take the subject will be low.

Technical graphics was found to have an extended life beyond ordinary school certificate level (year 11) to advanced and university level where it was a prerequisite subject to some university engineering courses giving it an edge over the other three design technology subjects which ended at ordinary level. Many girls were motivated to pursue and achieve in technical graphics and design through perceiving that anticipated career returns in architecture and engineering would outweigh costs associated with taking it. For those girls whose future value of the subject was not well defined, there was low performance, subject aversion and sometimes withdrawal for those who would have taken it. Metal technology and design, wood technology and design and building technology and design were not seen as leading to worthwhile careers but as subjects ideal only for self-employment skills when one failed to achieve the mandatory five ordinary level subjects for a full school leaving certificate. Twelve fourth form girls taking technical graphics and design attached greater likelihood for success in the subject than in metal, wood and building technology and design owing to its shared geometric knowledge with mathematics and science.

Findings also showed that trainers and employers in Zimbabwe do not presently recognise design and technology subjects or any technical subjects as requisite subjects contributing to a full ordinary level school leaving certificate. This does not seem to be helping Government endeavours to promote these subjects in schools, let alone to girls.

Trainers' and employers' preferences for academic subjects meant that technical and design and technology subjects are relegated to the 'other' subjects.

These results are consistent with Martin (2002) who found that "when students see the utility and importance of what they are taught, they tend to be more engaged in these subjects and achieve at a higher level" (p. 38). Also supporting these results and speaking of the British design and technology KS3 and KS4 situation, Murphy (2003) argued that knowledge is often valued for its instrumental purposes rather than for mere knowledge sake. As such their subject choices reflected a focus on future career areas they considered as yielding better opportunities for girls' success. Results also replicate those by Watson, McEwen and Dawson (1994) and Speering and Rennie (1996) writing about Australia, who found that students often looked at perceived usefulness of studies to intended occupation and where a correlation was not found, this resulted in decreased interest, aversion and sometimes withdrawal from the subject. For Anderman (2003), Shashaani and Khalili (2001) and Zhang and Espinoza (1998) students who view some subjects as irrelevant to their future concerns were likely to feel a low sense of belonging to the subject as did many fourth form girls not taking design and technology subjects in the present study and who had their sights set for careers not involving technology.

#### ***8.2.4 Subject Background Experiences***

Findings in this section showed that girls participated and achieved more in subjects whose background knowledge they already possessed. Decisions by fourth form girls taking or not taking design and technology subjects was perceived as a reflection of their past favourable or unfavourable experiences. Girls' selection of home economics subjects at school in this study for example, was consistent with Woolnough's (1994) finding that students who engaged in various scientific and engineering activities in their spare time assimilated in themselves a scientific and engineering identity and were likely to engage in science and technology courses at school. The 12 girls had taken the subject at lower secondary school level, enjoyed it and wanted to take it to higher levels of learning. For the rest of the girls not taking the subjects, it was unfamiliarity with subject knowledge and difficulties experienced in the area that contributed to their lack of participation. With respect to academic subjects such as English language, mathematics and science, girls had taken these from primary school and as subjects that were pre-requisites for a full ordinary level certificate, they had no option but to take them.

This finding was supportive of Lewis (1995) who argues in her Australian study on the importance of prior experience in a learning situation that males often have "significant informal experience outside their schooling that gives them language and mechanical concepts" as well as "provide them with both knowledge and motivation to

choose engineering” (p. 205). In a study of forty students, Lewis found that 85% of male students had “informal tinkering experience, had built houses with their families, had pulled cars and tractors apart, ... or had been tinkerers and builders with their fathers” (Lewis, 1995, p. 205). Ainley and Daly (1997) in their investigation of a wide range of variables influencing participation in advanced mathematics across Australian schools concluded that improving levels of prior mathematics achievement, enhances students sense of competence in the area. These findings may mean that the battle to have more girls taking design and technology subjects in Zimbabwe should begin early in girls lives by offering them similar growing up experiences to boys. Ainley and Daly argue that this could be one of the most effective ways of raising levels of participation.

The study also found that a good number of fourth form girls had experiences that had frightened them away from further participation in subjects such as design and technology subjects, science and mathematics. While many girls had found mathematics and science difficult, they did find subjects like design and technology as remote having knowledge they could not relate to. Many girls had avoided taking any technical subjects from primary school, through to ordinary level for reasons varying from lack of interest to the subjects not supporting their future career aspirations. In many cases it was lack of policy implementation by schools to ensure that all students took a technical or design and technology subject. Most girls in this study took familiar traditional female fashion and fabrics and food and nutrition because they perceived them to be less alienating, less stressful and that they enhanced their assimilated identity.

In terms of achievement, most of the fourth form girls did not consider themselves less intelligent than boys. They felt however, that performance disparities existed because boys already possessed a lot of relevant design and technology and science background knowledge and skills from home through tinkering and helping their fathers in home garages. Girls argued that they could not match boys in these subjects as their background experiences lay in home economics subjects. When they came to schools, boys’ participation in design and technology subjects was perceived as perfecting skills from home. For girls who had taken a design and technology subject at lower levels of learning, they found that they could relate more to the subject knowledge and felt a sense of belonging. Subject knowledge became less frightening and less anxiety causing to them and this tended to build girls’ self-confidence and self-esteem, considered necessary motivators to achievement.

Though girls in this study were doing quite well in technical graphics and design, I perceived that they could have been doing even better had they undergone the same socialisation processes as boys in their growing up, giving them the same subject cultural capital (Bourdieu, 1973; Hill, 2001). The present study corroborates Weymer’s (2002)

findings in a USA study of Modular Technology Education (MTE), who found that there was a significant relationship between students' prior knowledge and student achievement in technological activities. Using multiple regression analysis and data from the National Assessment of Educational Progress (NAEP), the study indicated that females at ages 9, 13 and 17 had significantly less science experiences than boys of comparable ages. The study found a disparity between boys and girls in the use of scientific equipment (scales, telescopes, thermometers and compasses) and work with experimental materials (magnets, electricity and plants), which was said to be partially due to sex-role stereotyping of toys and extra-mural activities for boys and girls in growing up. Rosser (1993) further corroborates this study by saying that girls and young women who lack hands-on experience with science and technology laboratory equipment and instruments are apt to feel apprehensive about using it in learning situations and this affect their performance in these subjects. These findings may mean that to win more girls to design and technology subjects, early engagement by all students irrespective of gender will cultivate familiarity, identity and sense of belonging that removes anxiety associated with learning new material.

### ***8.2.5 Expectation for Success***

Findings showed that students were likely to enrol in courses they thought they could master. As an example, there were more girls who enrolled in English and Shona languages than in any other subject because they considered themselves likely to succeed in these literacy subjects. The percentages of girls enrolling in mathematics and science were lower than those for languages because fewer girls felt that they could achieve in them.

Social messages from socialisers (mainly parents, teachers and peers) about how difficult subjects like mathematics, science and design and technology were and how girls' skills were 'insufficient' to achieve in the subjects were heard daily and assimilated by girls, altering their life courses not to take the subjects. Parents at home spoke of a university education for their daughters and encouraged them to take academic subjects while discouraging them from engaging in traditional male subjects they considered difficult for girls. Male teachers openly said girls lacked the practical skills to achieve in design and technology subjects. Coupled with girls' own assimilated behaviours, they evaluated their current skills and knowledge levels in respect of design and technology subjects, weighing whether they were able to take and achieve in them or not. Where personal skills and knowledge weighted lower than the perceived demands of the activity, there was a tendency to avoid taking the activity. Girls' avoidance of taking design and technology subjects was a sign of their lowered expectation and confidence to

engage and succeed in the subjects. This point is also supported by Martin (2002) who argues that the interaction of children's expectation for success and "their valuing of a given task predict their motivation on it such that those with high expectations and who also value the task are most motivated to do it" (p. 38).

Fourth form girls' self-concept of ability in this study was found to be related to previous achievement in related tasks. Girls who had achieved in previous related technical and design and technology subjects were found to view themselves as able to perform and likely to pursue the same subject even to higher levels. Prior achievement at form one and two level tended to build a feeling of control and expectation for further success which contributed to twelve out of 321 fourth form girls wanting to pursue technical graphics and design to higher levels. Even the perceptions the twelve girls taking technical graphics and design had about the subject were more positive than those not taking any of the design and technology subjects.

In terms of achievement, while girls taking technical graphics and design had greater expectation for success in the subject and perceived themselves as able to do well, girls who were not taking any design and technology subjects perceived the subjects in a negative way as difficult and heavy. Most of these girls had a very low self-concept of their design and technology ability and the group tended to have a lot of subject anxiety. This group of girls also reported strong gender stereotyping of design and technology subjects than girls taking design and technology subjects. These findings support existing motivation and self-efficacy theories (Bandura, 1977, 1997; Wigfield and Eccles, 2000; Eccles and Wigfield, 2002; Martin, 2002) that students who have self-ability beliefs in a subject tended to have positive expectations for success.

Among the four design and technology subjects, technical graphics had the highest number of girls expecting to pass it. It was also the subject which had received the highest percentage of takers (12). Building, wood and metal technology and design had no female takers and girls considered metal technology and design as the most difficult and the least design and technology subjects they were likely to take. Its direct association with various engineering careers in which girls did not identify with could explain this.

Findings revealed that one of the problems affecting girls' achievement in design and technology subjects was looking down upon themselves and believing that they could not perform to the same level as boys. Girls tended to lack that self belief that they were as capable as boys and often undervalued their capabilities and potential, looking down upon themselves to the extent of believing that boys were born with better capabilities (Oswald and Harvey, 2003). Many of these girls only relied on stories from among female students that design and technology subjects were difficult without having

experienced it themselves. Results in this section corroborate Shen and Padulla (2000), Shen (2002) and Ma and Xu (2004) who argue that many girls tended to pull themselves down in terms of their school performance because of their inferior complex beliefs.

Findings also support Wigfield, Eccles and Pintrich (1996) in a study of children's self-concepts of ability and values in relation to their performance and subject choice that found that self-concept of ability and expectancies for success were the strongest predictors of subsequent grades in mathematics. Pannizon and Levin (1997) study in four countries Britain, USA, Australia and Sweden also found that students' expectation for success in a subject actually aided their effort and likelihood of success. These findings also call for early design and technology subject engagement for girls for them not to be alienated to subject culture and to build their prior ability and self-confidence which are associated with self-ability and expectation of success (Pannizon and Levin, 1997).

### ***8.2.6 Subject Interest and Anxiety***

The study found that activities that generated interest and less anxiety were selected and achieved in more than those generating no interest and anxiety. Interest in this study was perceived as the intrinsic pleasure derived from engaging in an activity. Fourth form girls in this study were found to have varied interests touching on hobbies, subjects and careers which were influenced by several factors such as past positive experiences, utility value, future aspirations, self-image, cost of taking the activity, activity demands, attitude toward activity, interactional processes, self-concept of ability and expectancy for success unisonally or individually. For example, girls who had taken particular hobbies and subjects that had interested them at form one and two levels were motivated to take them at form three and four levels as a way of continuing to build upon previous skills (see appendix xxx).

Girls also found taking subjects like mathematics and science which they considered difficult, less burdensome because they were used to taking them from primary school than design and technology subjects which they started taking only at secondary school level. These findings corroborate Ainley (1993) in a Western Australian study and Evening (1998) in a Fiji study who found that developed competencies and interests which emerge through earlier school years participation in some subjects were critical in any future decisions a student made concerning related subjects and careers.

Girls' not taking design and technology subjects were found to have less interest and less favourable attitudes to design and technology subjects. Most of the negative attitudes were found to emanate from the way the subjects were perceived as less useful

for girls, more stressful, anxiety filled, less enjoyable, dirty and heavy. Anxiety included experiencing worry or uneasiness over an activity. These findings support Akpan's (1986) research in Nigeria in which he found that students with favourable attitudes to technology-based subjects, instruction and careers were more inclined to choose to study related subjects. Students whose attitudes were less favourable to the subjects were likely to decline offers to take the subjects for study.

Girls who were not taking design and technology subjects were likely not to engage in subjects that did not support their gender identity and in which they did not have the relevant background experiences. This was weighed against the familiar home economics subjects. Findings revealed that girls did not generate any interest in taking a completely new subject like design and technology and struggling through it or failing it against taking a familiar one in which they had some background knowledge like fashion and fabrics. To make matters worse, there was fear of losing time engaging in the wrong activity only to find that their interest lay elsewhere.

The anxiety of studying a subject as a lone girl did not appeal to many girls. Design and technology subjects were considered lonely subjects for any girl to take since many girls were not keen on taking them. Findings revealed that many girls sacrificed personal interest of subject choice as some who had chosen design and technology subjects dropped them in order to be with fellow girls. Most fourth form girls' responses across all school sites concurred with the desire for companionships of the same gender. Unfavorable interaction between teachers and students was perceived as also causing anxiety in girls continued taking of design and technology subjects. Both girls taking and not taking design and technology subjects across all school sites were found to weigh the idea of wanting to take the subject against the unwelcoming attitude of both male teachers and boys who abused them verbally and did not support their learning. Such fear and anxiety was found to be consistent with conceptions of cost of taking one activity over another.

In terms of achievement, findings support that interest in a subject is important for achievement in a subject. Fourth form girls were perceived to fail design and technology subjects because of simply following their friends without any interest in the subjects themselves. Without a genuine interest in the subjects findings show that girls may not apply themselves fully to pass the subject. At times it was parents who forced their children to take subjects they did not like resulting in less effort being put in the subject by the child and subsequent failure. The general perception was that if a person took an activity of his or her own interest, they tended to perform better and usually produced better results.

Fourth form Shona girls in this study were found to suffer the conflict of wanting to be feminine and to behave nicely as well groomed girls who respect culture and the personal need to achieve. Some girls tended to enrol in design and technology subjects with a resigned attitude that it was a male area and boys were the most likely candidates to achieve there. Coupled with cultural expectations that uplifted boys above girls, girls tended to pull back a little when things got tough and allowed boys to surpass their level of achievement. This finding supports Eccles (1994) who found that “girls felt caught between doing their best and either appearing feminine or doing the caring thing” (p. 603).

Fourth form girls taking design and technology were found to favour theory work more than practical work because they perceived themselves as not possessing the ‘polished’ skills that boys had to enable them to make good artefacts. This negative attitude toward practical work resulted in most girls doing well in theory than in practical work. This may give an indication why 12 girls in this study preferred technical graphics and design, a more theoretical subject than metal, wood and building technology and design. Findings also showed that many fourth form girls did not have interest in taking design and technology subjects for fear of confirming negative cultural stereotypes that girls were not able to achieve in the subjects. Findings support Spencer, Steele and Quinn (1999) who referred to this fear as stereotype threat or the fear of confirming a negative stereotype about one’s own group. According to Oswald and Harvey (2003, p.134), stereotype threat posits that when a woman, for example, fails to achieve in a culturally designated ‘male area’, she risks confirming women’s culturally held low abilities compared to males in the area concerned. Oswald and Harvey (2003) argue that as long as it is present, stereotype threat leads to misidentification with the negatively stereotyped domain and may result in women opting for traditional female areas to avoid the anxiety associated with stereotype threat.

These findings call for positive early engagement in a subject to create familiarity with subject culture and generate interest for similar future endeavours. It also calls for educators to create a positive learning environment where every student is valued for the unique attributes they bring into the learning environment and their contribution while avoiding those that generate anxiety and disinterest.

### ***8.2.7 Ready and Positive Support for Learning***

The study found that girls preferred a classroom atmosphere where there was ready and positive support for their learning. Findings revealed that much disinterest for girls in taking design and technology subjects as well as general subjects in the curriculum was experienced through unsupportive attitudes and actions by both male

teachers and male students. Findings revealed that male teachers' tended to approach classroom activities from the biased eye of society and an assimilated gender role mindset believing that only boys should take design and technology subjects.

In the classroom, the low expectations for girls' success by male teachers translated into a lack of proper academic support with noticeable conscious or unconscious biases. Many of the male teachers considered girls as helpless and destined to fail in design and technology, mathematics and science anyway hence their uncaring attitudes, discouraging and plain hostile attitudes toward them. For example, results show in section 7.3 (i) and 7.3.2 (ii), that while male teachers felt that girls were physically weak to carry out heavy metal filing and wood planing processes in practical work, they still gave more help to boys than girls who really needed it. These made many girls feel unwanted and less interested in pursuing the subject.

Many of the male teachers were perceived as conducting design and technology lessons as if girls were absent in the lesson. Fourth form girls taking design and technology subjects felt that male teachers gave more assistance to boys whose behaviour was tantamount to keeping the teacher to them. More teacher time was spent with boys than girls with more questions being posed to boys than to girls. Teachers also yielded more to boys' demands for attention and forgot that they had girls in class. Girls also felt unable to pursue questions with male teachers and sometimes let some issues ride for fear of being told off for slowing down the lesson. This left girls feeling unwanted, less valued and with negative results for their continued participation. Though few male teachers would admit to their unfavourable treatment of female students in the present study, it was perhaps these unconscious, subtle and sometimes unintentional acts that tended to have a great effect on girls' achievement and progression in design and technology subjects. It appeared that teachers', as socialisers, tackled issues from the eye of society and the patriarchal view from many years of exposure to the pedagogy of difference in both the formal and informal education settings. This influenced the content of their handling of classroom issues. This argument supports, Jones and Wheatley (1988) and Herzig (2004) who argue that since teachers are a reflection of society themselves, it seems inevitable that they would perpetuate sex-stereotypes in their workshops and classrooms which may come in the form of unintentional biases in teacher behaviour such as different achievement expectations of students based on gender.

Girls' preferences in the present study were for a good learning environment in which every student received the support they needed and where every member was valued for their contribution. Considering these studies, girls' benefits were anticipated to be less in the Zimbabwean classroom where more male teachers taught design and

technology subjects. Results corroborate Barret (2001, p. 351) who argues that students who feel a sense of satisfaction with “school and the features that it offers, are less likely to drop out and more likely to perform well academically”. She further argues that, “negative school experiences often lead students to become alienated and disengaged from school” (p. 357). Hiron (2001) however, points out that while boys take up a disproportionate amount of teacher time in the classroom, this can be a possible factor in their lack of success these days in many developed countries as much of the classroom attention focuses on behavioural matters for boys rather than learning. McKinnon, Nolan and Soler (1989) cautions teachers to resist boys’ insatiable demands for attention and allow girls’ talents to flourish and be nurtured.

Findings also revealed that apart from male teachers believing that girls were not capable of doing well in design and technology subjects, they also lacked the patience to work with new girls with no subject background experiences. Male teachers expected boys to do better than girls in every subject and made no secret of it during lessons. Girls picked up these negative social messages in their day-to-day lessons and this did not enhance their quest for achievement. All fifteen male design and technology teachers accused girls of slowing down the progress of their lessons and did not feel comfortable enrolling female students whom they saw as misfits. The three female design and technology teachers in this study were said to be more patient with girls than the male teachers. The general perception of the 321 girls in the study was for more female design and technology teachers to be trained. Generally fourth form girls in this study did not feel that there was ready and positive support for their design and technology subjects learning.

Findings in 7.2.2 (iii) also gave testimony of power struggles of society being played in the classroom between girls and boys. Boys’ dominance in class discussions, activities and access to the teacher was perceived as enactment and implementation of the wider views of Zimbabwean society which reinforce their control, use, subjugation and oppression of females as was theorised in chapter three. Boys were found to exert power over girls with little male teacher intervention. Fourth form girls perceived this lack of teacher intervention as silent consent by the teachers for boys continued power over them. With boys being perceived by girls as uncollaborative in classroom activities, this tended to leave the few girls in design and technology without access to peer help. Boys were perceived to be uncooperative to work with, preferring to work alone or in competition with girls. This did not enhance girls’ preferences for a more collaborative and relational discourses where there was order in conversations, sharing of ideas, cooperation and mutual assistance which interaction with peers allowed than where there was competition with each other (Boaler, 1997; Hoyles, 1988; Kahle and Lakes, 1983;

Sutton, 1991). This had the effect of alienating girls from classroom proceedings and making them feel insecure, less confident and not worthy the effort to pursue the subject.

Consistent with this Zimbabwean finding, MacNaughton (1997) found that girls disliked working in a classroom atmosphere where male exercised dominance over them preferring instead to create their own alternative female space with dominant female ways of being. Findings also support Mahoney (1998) and Measor and Sykes (1992) who, in studies of students' classroom interaction patterns, argue that males dominate females in the classrooms and concentrate a lot of their time on the control of girls. They contend that classroom oppression is one of the major constraints impacting on the girl child's education and boys have power to reduce girls' chances of participation and success at school.

In terms of achievement and consistent with Barret (2001), the present study found that it was difficult for girls to act and behave out of role and at the same time cope with the design and technology learning tasks. Findings show that it would be more appropriate for teachers to accommodate the varying learning styles girls and boys prefer in the learning situation so that students have a choice in the mode with which they access the material to be learnt. Findings in the present study showed that male teachers assumed a lot that they were dealing with a homogenous group of students when teaching mixed design and technology classes ignoring methods of learning that appealed more to girls. The teachers also forgot the varied background experiences girls and boys brought into learning. As a result, special methods that supported girls' learning were ignored and the learning field was never levelled, with negative effects to girls' successes. All 18 design and technology teachers (both male and female) in the study were found using the individual skills acquisition and problem solving approach that tended to appeal more to boys who were used to competition than girls who tend to favour collaborative learning. Robertson and Hill (2000, p. 82) suggest that, "teachers need to be aware that pupils bring to school different experiences, interests and strengths which will influence the way in which they learn".

The present study found that design and technology subject material in Zimbabwe's curriculum had not been contextualised to include female experiences. Teachers tended to present the subject material wrapped with male specific examples. To the twelve girls taking design and technology in this study, the knowledge was male specific and they had a lot of difficulty identifying with it. Design and technology classes were perceived as anxiety filled because girls struggled to grasp the meaning of the unfamiliar material and this caused them not to achieve in these subjects. Rosser (1993) implores teachers to incorporate and validate personal experiences females are likely to have had as part of the class proceedings to ameliorate anxiety associated with unfamiliar

learning materials. She points that most learners regardless of their learning style are interested in phenomena and situations with which they have had personal experience. Her research also found that beginning the course or individual lesson with examples and equipment with which girls are more likely to be familiar with, might reduce anxiety for girls.

Findings also revealed that the mere large numbers of males in the design and technology class had the effect of silencing girls and make them feel like they were in the wrong subject. Observations carried out at Riverdale where girls were enrolled in a technical graphics and design class taught by a male teacher revealed that the girls did not appear free to participate in the lesson. The three girls in the class said they were shy because of the pressure of so many eyes from the opposite gender looking at them. This pressure caused a lot of anxiety that affected girls' achievement. Findings were consistent with Gwaunza and Nzira (1997) who, in a study of four Zimbabwean boys in a female single sex school where they had been admitted because their parents worked for the school, found that these boys exhibited the same negative characteristics exhibited by girls in previous studies in co-educational schools. The four boys were observed to take a "back seat role and felt intimidated by girls" (p. 22). The performance of the four boys in mathematics and science was also found to be severely undermined. Similarly, Barrett (2001, p. 352) found that "high school students who perceived the learning environment, to be comfortable and friendly were more satisfied with their educational experience". Findings in this section explore a dimension that is missing from Eccles (1983) model or that they assumed was included under socialiser's beliefs without elaboration. Woolnough (1994) only dealt peripherally with classroom processes affecting subject choices and achievement under school factors.

### **8.2.8 Socio-economic Issues**

Findings in this study showed that socio-economic concerns provided barriers to fourth form girls access to education and success in design and technology subjects. Socio-economic concerns were found to provide mechanisms of cultural reproduction in schools in the form of class and educational apartheid which stratified Zimbabwean schools into low, middle and upper classes with unequal benefits to members (Bourdieu (1974; 1977). For example, high SES parents in Harare and Masvingo provinces of Zimbabwe lived in expensive low population density suburbs and sent their children to similarly expensive and more prestigious private high SES and government group A medium SES schools zoned for their suburbs. These schools were found to have a wider technical curriculum (see table 7.8, p. 186), better teaching and learning facilities and more qualified staff because the schools could afford to pay for them. On the other hand,

low SES parents could only afford the poorly resourced rural and high population density urban government group B schools with a restricted curriculum, poor resources and less qualified staff due to financial constraints. Findings corroborate Ainley (1993) study on Australian students' decision of subject choice looked at classification of schools and their location in a capital city, provincial city or country and revealed that systemic factors such as school type were related to subject choices. Covering six states namely Victoria, Western Australia, New South Wales, Tasmania, Southern Australia and Queensland with respect to science and technology, Ainley found that there was a tendency for participation in science and technology courses to be slightly lower in government (with fewer resources) than in private schools.

Differences in the statuses of schools not only provided different experiences to students but these differences also provided an unfair advantage to children of high and medium SES schools of better resources and examinations whose concepts they could identify with. Examinations were set by their learned parents and the same parents could afford extra books and equipment demanded at school to support their children's learning while poor parents only relied on what their poor schools provided. Subjects like music, typing, computers, metal technology and design, technical graphics and design, art and food and nutrition which were offered at medium and high SES schools like Riverdale, Telford, Gemston and Denlow could not be offered at Mau and Mbizi as well as at Mari and Tembo because of lack of funding. This affected students who might have wanted to take these subjects at these four schools. Consistent with Bourdieu (1977) socio-economic differences between school types and families were in reality barriers to some girls in low SES families who could not be enrolled at high SES schools to take the subjects.

Findings also revealed that with some subjects like metal technology and design, wood technology and design and technical graphics and design demanding a lot of materials for practical work, at rural schools like Mau and Mbizi and at urban low SES schools like Mari and Tembo, most girls could not enroll in them for fear of not meeting the material demands. Where some schools offered these subjects, this was only to boys whom teachers considered ideal for taking them. Teachers themselves argued that if they could not cater for the material resources of few boys there, what more with increased numbers of girls. Ministry of Education, Sport and Culture itself was blamed for not equipping schools enough to offer the subjects. It was felt that Ministry left the burden squarely in the hands of poor schools that could no longer afford the expensive equipment and material costs associated with these subjects. Findings revealed that if Ministry of Education was serious about sound policy implementation, they should

provide adequate resources in schools for all students to take technical and design and technology subjects and supervision structures to make sure that policy was adhered to.

School type differences were also noticed on fourth form girls' choices of careers with rural fourth form girls mentioning more farming occupations than their urban counterparts because farming was the main pre-occupation in rural environments. None of the urban girls wanted a career in farming preferring more scientific and technological ones (see appendix xxxiv). Findings explain the effect of market demands of the rural and urban environments and corroborate Ato and Wilkinson's (1983) Nigerian study that compared subject preferences of urban and rural students and found that urban students took science courses more than their rural counterparts in response to technological demands of science careers in urban areas.

Socio-economic issues affected girls' education in general as poor parents in rural areas were found to prefer sending boys to school whenever financial problems arose in the family. Consistent with Unhu/Ubuntu philosophy, findings showed that parents believed that girls would be married irrespective of their educational qualifications and that it did not matter much if a girl was not educated than a boy. This confirmed the low levels of female education in Zimbabwe.

The proportion of parents in stereotypic female oriented careers was found to diminish with higher levels of socio-economic status of school as many mothers of girls in high SES private schools held occupations across the gender divide (see appendix xxxv). This tended to have an effect on their children's subject and career choices that were found to be diverse as well and across the gender divide. This could be attributed to the prestigious careers that most parents in the high socio-economic bracket occupied that their children admired and wanted to take as well compared to the low paying general labourer jobs for low socio-economic families. This finding supports the view that strong role models from home often have positive influences on choices children made in life (Mordi, 1991; Woolnough, 1995).

In terms of achievement, findings of the present study revealed that none of the rural schools were electrified and students had to make do with basic science equipment, hand sewing machines in fashion and fabrics and basic hand tools for wood technology and design. On the other hand, high and medium SES schools had modern electric equipment. This affected the quality of practical artefacts rural schools produced and the time spent on each project by students and teachers. This was anticipated to result in visible student results differences between low and high SES schools. Findings corroborate Gillborn and Gipps (1996) and Gillborn and Mirza, (2000) whose studies found that pupils who lived in the most economically deprived areas participated less and did less well in public examinations than those from well-off areas. Findings call for

urgent measures to uplift standards in low SES community schools to match those in high SES schools if educational equality is to be achieved across all curricula subjects.

### ***8.2.9 Colonial, Ministry and School Policies and Practices.***

In this section, the study found that colonial legacies, Ministry and school policies were institutional factors affecting girls' participation and achievement in design and technology subjects. I theorised in chapter three that Western constructs of female role could have found similar ideological bases in African Shona and Ndebele societies with the effect of reinforcing pre-existing patterns of social organisation. The study found that the colonial legacy of male migrant labour and dominant gender ideology (man as breadwinner, woman as housewife), combine to diminish opportunities for women in the formal sector. The two were seen as responsible for the many women not in formal employment. For example, the percentage of women not employed was found to be severe in rural areas presumably because of assimilated gender role beliefs. A total of 71(84%) women at Mbizi and Mau rural schools were housewives waiting on migrant worker husbands to provide for them compared to 36(60%) for urban low SES schools of Mari and Tembo (see appendix xlvii). The housewife percentages were much lower at Denlow and Gemston medium SES schools with 41(32%) and at Telford and Riverdale high SES private schools with 7(14.6%).

Colonial legacies of gender-differentiated careers were also high in rural and urban low SES schools compared to medium and high SES schools. Mothers in 'female' occupations were 79(93%) in rural schools of Mau and Mbizi, 50(83%) in urban low SES schools of Mari and Tembo, 63(49%) in medium SES schools of Denlow and Gemston and 19(39.6%) for high SES private schools of Telford and Riverdale (see appendix xlvii). The significance of these statistics is that since mothers' advice and influence on girls rates high among all significant others (see table 7.6, p. 152), given such a significant percentage of mothers in traditional female occupations and as mere housewives, the effect of this on fourth form girls' future aspirations was likely to be significant as well. More of these girls would see more mothers in traditional female occupations and as mere housewives and not aim higher than their mothers. The likelihood of many of these fourth form girls taking 'male' occupations would be low.

Findings revealed that 14(4.3%) of unemployed mothers were involved in vending to augment their low income earning migrant labour husbands' incomes. Activities they undertook such as knitting, crocheting, pottery and mat making were carried out close to home and as an extension of domestic tasks. Since girls are socialised by mothers in Zimbabwe, such skills were passed on to them. However, the skills were only of benefit to the primary school child as craft was part of the curriculum. At

secondary school level these skills were relevant only in food and nutrition and fashion and fabrics as technical and design and technology subjects' curricula did not include them. Inclusion of such traditional technologies for girls in the secondary school curricula could harness some of their background skills for development. As it is, there is discontinuity in traditional technologies that girls learnt at home with technologies offered at school. This discontinuity aligns girls to familiar home economics subjects and not to design and technology subjects.

The colonial system followed at all the eight schools sampled where girls were channelled to home economics subjects was supportive of extending domestic roles of girls into the school. This differentiation was bolstered by the European and African male belief that a woman's given role is in the home kitchen. This argument provided the basis for giving females a technical education that would not bring them in competition with males. However, this practice tends to endorse the somewhat taken for granted position that women in Zimbabwe should have their own sphere of influence not in competition to men. From these colonial vestiges, school thus reinforced home roles for girls and presented boys' and girls' education as separate. This may be a form of domestication of women as it deprives women of public sphere experiences outside the home.

Findings also revealed that schools were reluctant to implement Ministry policy as; many students who were supposed to be taking technical subjects were not doing so (see appendix xxxi). The irony of it all was that there was no Government effort to correct the situation by enforcing policy nor were schools determined to make this work. While policy allows for students to take two technical subjects at form one and two level and only one subject at form three and four level, slightly over 25% fourth form girls completed compulsory schooling without having taken any technical subject, with the largest population affected being in government group A (Gemston and Denlow) and B schools (Mari and Tembo). If Ministry is serious about the success of policy implementation, then it should put in place self-check measures to ensure adherence by schools.

Findings also showed that Ministry policy left it too open for students to take any subject they wanted without proper guidance. As a result, many subject enrolment decisions in both academic and technical and design and technology subjects continued to be gendered. Perhaps, as several participants in this study intimated, Ministry policy should emphasise equal numbers of girls and boys in each subject. The present open system ended up defeating the intended purpose of non-gendered subjects with girls continuing to choose home economics and boys taking design and technology subjects. In academic subjects, girls were found to choose more literacy subjects than science and mathematics setting the stage for different career routes. Findings support affirmative

action and putting in place of bursaries and other financial inducements so that the taking of design and technology subjects becomes attractive to girls who might not be motivated under normal circumstances to take the subjects. Woolnough (1994) and Ainley (1993) found that incentives such as scholarships and bursaries awarded by higher education institutions and ease of entry of students from schools into higher education courses were factors that influenced students' higher enrolment into higher education engineering courses.

It was also clear from fourth form girls' responses in this study that career programmes and symposiums held at various schools were coming too late for girls who may have wanted to take them. While the career symposiums were perceived as good and an eye opener to most girls concerning employment opportunities available, the fact that they were held when the students were in fourth form did not make them useful as students would be completing their secondary education. This finding demands that for these programmes to be of any help, they should be held at form one level to help students in choosing subjects wisely. Better still, if design and technology subjects could start at primary school grade one level as compulsory subjects, this would offer the wider school population with the chance to take the subjects. Early contact with the programme would provide background skills necessary for future development.

Mari and Tembo Government group B and Mau and Mbizi rural schools were found to have strong traditions of excelling in arts subjects and concentrated their efforts in the special subjects at the expense of technology subjects which they said were expensive to run. These traditions were perceived as vestiges of a past colonial thinking that schools needed to specialise in areas of consumer interest. Unfortunately for design and technology subjects, many Zimbabwean education consumers tend to favour academic subjects. There was also the colonial thinking at the back of the public mind that technical education, no matter how modified it may be by giving it new flashy names like design and technology, remained largely second class knowledge to academic knowledge. Added to that, society experiences with employers and training institutions that demanded academic subjects at the expense of technical subjects tended to emphasise the little vocational worth of technical subjects in Zimbabwe.

On the other hand, the practice of not allowing technology departments to stand alone but to be under either the mathematics or science departments as was found at Mari urban government group B low SES school, tended to affect the taking of the subjects by some girls. Coupled with the subjects being optional, not many girls were found to be willing to take them citing the subjects' close relationship with mathematics. Consistent with Beynon (1993, p. 167), the "huge aversion felt by many girls towards mathematics

and science was transferred to technology studies". This calls for reorganisation of school departments to reflect their autonomy.

Findings also revealed that for as long as design and technology subjects are not considered of university, training and career value like academic subjects, parents and students will continue to perceive these subjects as of little future help except for non-achievers who may want the skills for self-employment purposes. Most parents in Zimbabwe believe in a university education for their children and subjects not leading to such goals are considered of restrictive vocational worth. In this respect, not many girls may find cause to put effort and achieve in design and technology subjects but concentrate on academic subjects such as English language, mathematics, science, history and geography. The Ministry needs to rethink seriously the nature of the present technical and design and technology subjects curriculum to see what they support, their educational and career worth if the subjects will not continue to be labeled second class knowledge, and procedural knowledge serving a gendered, short school stay and non-academic constituency (McKenzie, 1992). Zimbabwe could take a cue from Wren (1977, p. 3) that if learning is to be an active process, it is no longer sufficient to learn sequences of techniques and manual rhetoric skills.

### **8.3 Theorisation In Terms of the Local Context**

In order to explore local conditions, the gender perspective was preferred in this study as it is inclusive of sociological and psychological views emphasising difference according to Ma (2001). From the literature reviewed and findings of this study, it has become apparent that sociological, psychological and gender perspectives undermining girls' participation and achievement in design and technology subjects operate in the social context, the school curriculum and the personal agency to sustain a social system of inequality. These topics are examined in the section below.

#### **8.3.1 The Social Context**

The social context is the field that Bourdieu (1977) called the setting in which the social action takes place. I have portrayed the Zimbabwean colonial and contemporary society as embodied in the philosophy of African humanism (Unhu/Ubuntu) emphasising a way of educating that stresses differences rather than similarities between females and males in the same field. Findings presented in this study confirm gender in Zimbabwe as a way of assigning different life experiences and opportunities to females and males. 'Unhu/Ubuntu' was found to prescribe the social curriculum or group expectations and behavioural norms based on gender, rank and precedence that shaped individual or group

self-images of who they were in the Zimbabwean way of life. 'Unhu/Ubuntu' was also found to tailor informal and formal education differently in response to perceived biological differences between girls and boys.

Crawford and Chaffin (1997) posit that since females and males encounter different social contexts, it is no wonder that they act differently in order not to violate norms and expectations. Since it was difficult to act out of context, girls in this study placed value in subjects that provided the opportunity to fulfill or were consistent with their self-image of being girls from years of orientation through the pedagogy of difference. As such, activities that did not fit this image were considered as for the other gender.

By assessing Unhu/Ubuntu ideology's focus on difference, radical feminists would perceive gender differences in the Zimbabwean context as a system of meanings in which sex is both polarised (men and women are opposite sexes) and hierarchically ordered (women as inferior). This places Unhu/Ubuntu as not neutral and objective, but as a social enterprise that silently organises relations of status and power. Through their desire to maintain and reproduce power relationships, those who hold power (men) have manipulated the Zimbabwean field (social context) through rhetorical practices paraded as natural for the maintenance of social order. The emphasis on women having their own sphere of influence through structures of family, religion, the school and the workplace masks Unhu/Ubuntu's prime focus of perpetuating differences. The emphasis on the contribution of women as complementary has only served to legitimate and defend existing differences in power that narrowly limit choices that females make as regards to daily activities, relationships and careers (Crawford and Chaffin, 1997).

### ***8.3.2 The School Curriculum***

While the study found that schools continued to prepare children for their place in society in a social context or field structured by difference, this sat in tension with notions of democratic citizenship education advocated by Enslin and Horsthemke (2004). Through gender, difference operated in the school curriculum to reinforce the wider notions of Zimbabwean male superiority into the school curriculum. Owing to perceptions of self-image and notions of a male or female curriculum bordering on naturalness, rigid structures were found in schools that channeled girls to home economics subjects and boys to technical and design and technology subjects. Such structures did not recognise girls' individual freedoms and rights "to participate in the cultural life they choose" where girls "participate on free and equal terms" to equip individuals to be members of a diverse Zimbabwean society (Enslin and Horsthemke, 2004, p. 556).

The Ministry needs to rethink seriously the nature of the present technical and design and technology subjects curriculum to see what they support, their educational and career worth if the subjects will not continue to be labelled 'second class knowledge', and 'procedural knowledge' serving a gendered, short school stay and non-academic constituency. As was the case with early technical education in New Zealand (McKenzie, 1992), in the public mind, technical and design and technology education is seen in Zimbabwe as associated with "second class knowledge which provides limited skills and disciplined work habits required of a docile working class" (p.32). For parents and their children, such knowledge is viewed with skepticism and as bend on creating "an underclass excluded by policy from participating in "knowledge of the most worth" (McKenzie, 1992, p.33). Because of societal pressures for a tertiary education and employer demands, many students and parents in Zimbabwe are persuaded to perceive academic education as distinct and superior to technical and design and technology education.

By introducing design to traditional boys technical subjects only, the Zimbabwean government may have overlooked implications for learners, educators and parents. By leaving out the design component in traditional female subjects like fashion and fabrics and food and nutrition, the implication could be that girls should not be involved in this type of work because they are girls or, are not qualified or capable to engage in this kind of cognitive activity or, if they wanted, should simply join boys in these traditional boys subjects where the design and technology component was made part of the curriculum. If girls were to join boys, they would be required to fit into traditional male structures existing including the unfamiliar subject environment, culture, skills and resources which would have further implications on their success in the domain. If they preferred not to join boys and continued taking traditional female subjects, they would also continue to be disenfranchised through loss of vast future training and job opportunities associated with traditional male subjects.

Tensions between females and males in the classroom that made girls feel unwelcome were found operating outside the awareness of perpetrators in this study. This may mean difficulties in implementing change, as the perpetrators need to be aware of the problem. Findings revealed that Unhu/Ubuntu patriarchal culture in curriculum issues made classroom oppression of girls by boys and male teachers seem invisible and normal. For example, while teachers believed that they treated girls and boys the same, boys tended to receive more positive attention than girls. Teachers also taught lessons as if girls were absent and boys were allowed to dominate class time and resources leaving girls feeling isolated and unwanted. This all revealed the enactment and implementation

of the wider views of Zimbabwean society that reinforce male control, use, subjugation and oppression of females as was theorised in chapter three.

### **8.3.3 *The Personal Agency***

At the personal agency level, girls were found to have developed their sense of self within prevailing social context discourses of gender difference. Individual females and males were found to accept gender distinctions as normal and part of their self-image. They ascribed to themselves the traits, behaviours and roles that were deemed the norm for people of their sex within Zimbabwean culture. As a result, females and males engaged in activities they had assimilated as their own and which were deemed appropriate for their sex by wider cultural ascriptions. Thus, being male and female in Zimbabwe became “a salient social and cognitive means through which information is filtered, selectively processed, and differentially acted upon” to satisfy conceptions of self-image (Crawford and Chaffin, 1997, p. 88). Sadly, this also included girls’ internalising “their own devaluation and subordination” (ibid, p. 94).

Being female or male also affected behaviour, feelings, interactions and perceptions of subjects. Consistent with Wigfield and Eccles (2000), activities that were considered for the other sex were rejected as not fitting with the individual’s self-image. Girls who adopted and acted according to cultural and gender expectations of being female were considered well adjusted. Those who acted out of this context were considered unfeminine and abnormal. In this way, self-image became a way of individuals making sense and fitting into transactions in their social context. It is no wonder fourth form girls could not act out of context.

Apart from conceptions of self-image, I also found that fourth form girls tended to enrol and achieve in a subject for altruistic reasons as well as for instrumental and career point reasons (Eccles et al., 1983). For example, girls wanted to remain together as a group in order to help each other in schoolwork as well as avoiding disappointing friends. On the other hand, the perceived value of taking a subject and expectations of success in it also played crucial roles. The cost factor was also important in choice and achievement decisions as girls weighed structural factors that provide different opportunities and rewards for women and men and those posing potential conflict to their self-image.

## **8.4 Conclusion**

This study set out to explore the case of fourth form girls’ participation and achievement in design and technology subjects in Zimbabwean secondary schools. This chapter while explaining the extent of girls’ participation and achievement, focused on

explaining the major question of the study: “Why does few fourth form girls participate and achieve in design and technology subjects in selected Zimbabwean secondary schools?” The aim was to explore, discover, shed light, integrate and interpret the case as an issue or a phenomenon needing situated comparisons from various participants in different schools to give the reader “a sense of the meanings and intentions inherent” (Gall, Gall and Borg, 1999, p. 290).

The study found that difference’s apparent presence in all spheres of Zimbabwean society tends to stratify people according to gender and assigns them different educational and employment routes. The Shona/Ndebele people’s lives, embodied in Unhu/Ubuntu, were found to have difference and complementarity as their driving philosophies. Findings have shown that Unhu/Ubuntu teachings, beginning quite early in a person’s life, emphasise separate but complimentary roles and domains of exercising power without encroaching onto the other gender’s roles. This was a strong factor throughout this study. While purporting to socialise individuals for their adult roles and status, traditional education has been confirmed in this study as a recipe for differential socialisation limiting girls to domestic roles while assigning boys to more enterprising roles of blacksmithing, jewelery design and making, wood and stone carving and building. Boys’ choosing of these subjects at school were thus seen in this study as an extension of their home roles. Females’ aversion of design and technology subjects was found to be largely a result assimilated identities of femaleness (*habitus*) which saw these subjects as outside their socialisation and for the ‘Other’ gender. This also affected their expectation of success. This supports Palmer and Birch (1992) who argue that cultural norms work to malign females from participating and achieving in traditional male areas. Parents as initial socialisers, were found to reinforce societal expectations of gender by the subjects they suggested and sometimes demanded their daughters to take at school.

Girls’ identity of being female did not support girls engaging successfully in design and technology subjects and related careers beyond schooling where employers were seen as biased in favour of male employees. Furthermore, many fourth form girls saw the subjects as irrelevant and not yielding better opportunities for them hence the low utility value they attached to the subjects.

Schooling was found to reinforce role socialisation by following colonial practices of channeling girls and boys to separate subject areas, giving little or no chance to girls to venture into traditional male subjects. Teachers’ rigid and essentialist worldview, solidified by many years of silent and active socialisation and Western training was seen as patriarchal and reinforcing traditional Shona/Ndebele Unhu/Ubuntu philosophy that uplifted boys than girls. Teachers’ rigid mindsets were seen as affecting the way they,

both male and female, selected students into design and technology subjects, conducted their lessons and influenced their classroom decisions. Those girls who participated and achieved in design and technology tended to legitimise that the competition was fair when in fact it benefitted boys who had more of the subject background through earlier growing up experiences (Lewis, 1995). Prior design and technology experiences tended to reduce anxiety and to generate interest, giving girls more locus of control to engage in similar future activities and expectations to succeed in them. However, since girls' socialisation excluded tinkering experiences, this reduced their propensity to identify with design and technology subject matter at school.

Embedded in the strong cultural milieu present in Shona/Ndebele Unhu/Ubuntu was maturation. Findings gave an indication that when girls began to mature, they no longer wanted to be associated with dirty, messy and heavy work associated with design and technology subjects lest they did not present their femininity to male suitors in the correct light. Pressure to marry was seen as a push factor to take what society considers appropriate subjects at school supporting domestic roles of women in marriage.

To many girls, design and technology subjects were espoused by male ethos and values that supported male dispositions of masculinity. The invisibility of females in the subjects did not help the matter as this portrayed in the minds of girls that the subjects were 'indeed' for males. The exertion of peer pressure by both girls and boys for girls not to take design and technology subjects induced anxiety and only helped to reduce interest and isolate girls further from the subjects. This was exacerbated by the lack of support girls experienced from both boys who harassed them in the subjects and teachers whose approaches to teaching favoured boys. This gave an indication of power struggles in society being played in the classroom situation.

Findings also pointed to some form of educational apartheid existing in Zimbabwean schools where educational institutions are hierarchically ordered according to socio-economic status. This tended to privilege children of high socio-economic class families who could afford the high fees charged at these institutions. To go with the high fees were also high standards of education and wide curricula including most design and technology and technical subjects which poor schools could not afford to offer. Many girls who wanted to take some subjects at poor schools could not access these because they were not offered there. The fact that many rural schools are not electrified worked against these schools offering courses demanding machine driven tasks.

Schools were also implicated in failing to implement and enforce Government policy of gender equality in the provision of education through selective enrolment policies separating girls and boys subjects and activities. This clearly reinforced Unhu/Ubuntu policy of separate gender engagement pointing to strong cultural and

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structural constraints of the home and school hindering girls' participation in design and technology subjects. As such this case study has provided insight into some local Zimbabwean contexts that are problematic to female engagement in design and technology subjects that have been overlooked by previous researchers.

## CHAPTER NINE

### CONCLUSIONS

The focus of this thesis was to unravel factors affecting fourth form girls' participation and achievement in design and technology subjects in selected Zimbabwean secondary schools. Through discussion of the results, a number of implications for policy, theory, research and practice emerged which are explored in this chapter. By identifying the reasons for fourth form girls' choice, achievement and non-achievement of design and technology subjects, it is possible for Ministry of Education, Sport and Culture in Zimbabwe, who are the major audience of this study, to plan curriculum and schooling processes with disadvantaged groups like girls in mind. Findings of the study also compel teachers, principals and education officers to adjust practices that benefit only one group of people to benefit all in schools. I will address key findings of the study and then implications of the findings for practice, policy and theory and future research.

#### 9.1 Major Findings

The major findings of this study were that:

- Few fourth form girls enrol in technical graphics and design, building technology and design, wood technology and design and metal technology and design when compared to three academic subjects namely English language (literacy), mathematics (numeracy), integrated science (sciences) and a traditional female subject, fashion and fabrics.
- Girls who enroll in technical graphics and design, wood technology and design, building technology and design and metal technology and design achieve as well as they do in academic subjects and traditional female subjects
- generally fourth form girls placed value in subjects that provided the opportunity to fulfil or were consistent with their self-image (Eccles, 1994, p. 597).
- pressure and persuasion of affectively significant others influenced girls' participation and achievement in general subjects in the curriculum as well as in design and technology subjects.
- fourth form girls engaged and achieved more in tasks to which they attached instrumental or utility value (Eccles et al., 1983).
- fourth form girls engaged and achieved more in subjects whose background knowledge they already possessed.

- fourth form girls engaged and achieved more in activities in which they perceived the greatest likelihood of success (Wigfield and Eccles, 2000).
- Activities that generated interest and less anxiety were selected and achieved in more than those generating no interest and anxiety.
- fourth form girls preferred a classroom atmosphere where there was ready and positive support for their learning.
- Socio-economic concerns provided barriers to fourth form girls' access to and success in general subjects in the curriculum as well as in design and technology subjects.
- Colonial, Ministry and school policies and practices were institutional factors affecting fourth form girls' participation and achievement in design and technology subjects.

These eleven findings have implications for practice, policy and theory and future research that are addressed in the next sections.

## **9.2 Implications for Practice, Policy and Theory**

Since the right to education is recognised as a basic human right, it seems to follow that females and males should profit equally from education as recommended by the Southern Africa Development Council (SADC) Gender Monitor (1999). From the eleven major findings of this study, I present the following recommendations in order for the Zimbabwe education system, as exemplified in the technical and design and technology curriculum, to have relevance to all students irrespective of gender.

### ***9.2.1 Implications for Practice***

Fewer fourth form girls than boys enrolling in design and technology subjects suggests that Zimbabwean schools were failing to implement Government policy on equal opportunities for all and removing obstacles that prevent girls' full participation. There is need by curriculum planners to overhaul the present design and technology and technical subjects curricula to make them appeal to both genders. This may call on reviewing the current design and technology and technical subjects curricula in line with development in Britain and New Zealand discussed in chapter 2.

Since self-image, as found in this study, operates to decrease the probability of girls to engage in design and technology subjects because activities that are perceived to be inconsistent with girls' definition of self are rejected, design and technology learning material should be recontextualised to include contexts consistent with female identities and experiences in order for girls to feel a sense of belonging. Nicholls and Sutton (2001) argue that the key to student entry and retention in a subject is a sense of belonging as opposed to alienation. Curriculum planners need to realise that it is not girls who are the

problem when they fail to take traditional male subjects, but that it is the culture of design and technology subjects that “needs to change to open itself more fully to girls” so that they encounter the subjects “free of gender stereotypes” (Lynn, Raphael, Olensky & Bachen, 2003, p. 147). Girls need to see a demonstrated connection between design and technology subject content and their traditional interests. Inclusion of home economics among design and technology subjects would bring more familiar contexts that girls can relate to since previous researchers (Head, 1996; Pacey, 1993; Harding, 1987) found that the nature of the subject could be the main reason why girls avoid technology and science subjects. This is also likely to result in girls achieving more highly in these subjects.

The finding that girls engaged more in subjects whose background knowledge they already possessed (see section 7.2.4 i and appendix xxxi) explains why the late engagement of girls into design and technology subjects is seen in this study as one of the roots of girls’ limited comprehension, less attraction to subjects, alienation and subsequent withdrawal. There is need for a design and technology curriculum at infant and primary school level to introduce basic concepts, equipment, materials and skills to generate curiosity and imagination in preparation for a broader secondary schools technology curriculum as recommended to the Ministry of Education, Sport and Culture (1998). Tinkering with toys to discover how things work, taking things apart and reassembling them may be a strategy which could be used early in the schooling process to encourage girls’ familiarity with and participation in traditional male subjects as this builds technological literacy. Government should realise that if the home does not offer the necessary experiences for girls, schooling should provide early experiences from the level of infant centres to “allow the children to see what is inside the machines” and “to provide them with opportunities to use screwdrivers and work with mechanical things” (Fleer and Jane 1999, p. 170). The long-term implication may be enhancing girls’ ability to conceptualise and work technologically and viewing design and technology subjects with less assimilated gender role biases.

The finding that girls engaged more in subjects in activities in which they perceived the greatest likelihood for success help in the understanding of how students use previous knowledge as building blocks and stepping-stones to accessing higher knowledge. This finding also calls for the inclusion of female experiences in the curriculum. Teachers have a role to teach students to succeed, as prior success on a task tends to build a feeling of control and expectation for further success. As they succeed, girls would not look down upon themselves or undervalue their capabilities in design and technology subjects or any other subject.

One important finding of this study is that fourth form girls engaged in tasks in which they derived the greatest enjoyment and were interested in. This finding calls on educators in Zimbabwe to work on developing early competencies that would form the foundational interest and familiarity for future tasks. The finding casts more light onto the role of familiarity with subject matter, which works to remove anxiety associated with subject remoteness. Instead, more interest would be aroused in learners for greater success in a subject area.

Biases found in the way teachers interact with their students along gender lines, open up the need to introduce gender equity in-service programmes for design and technology teachers and principals to reposition their thinking that all students, regardless of gender, have the right to self-determination and free choice of subjects without the interference of teachers based on gender. Findings also call for more female teachers to be trained for design and technology subjects as they were found to be more accommodating of gender issues and to relate more to both genders than male teachers who clearly favoured boys. Government on its part should support girls by overhauling all learning materials being used in the current technical and design and technology subjects' curricula, which are male, centered and plan new curriculum with girls in mind.

Pressure and persuasion of affectively significant others influencing girls' participation and achievement in design and technology subjects could be dealt with by reorientation of parents' thinking through community and national educational programmes that emphasise gender equity in education, training and employment. Such programmes aimed at changing attitudes and perceptions would see parents' thinking positioned as not gendered and able to influence children's futures free of gendered mindsets. Combined parents and students career days were proposed by some respondents in this study to educate both parents and children on available school subjects and careers they lead to. Schools would send invitations to local and national industry leaders to mount displays concerning the employment they offered and the related requirements. Such a link between schools and industry is perceived to alleviate the paucity of information in schools concerning careers. Serious attention to guidance and counseling is also called for in all schools to highlight the advantages for both females and males that could be accrued from taking design and technology subjects.

The significance of the finding that girls engaged and achieved more in tasks to which they attached instrumental or utility value, is in making design and technology subjects more appealing to both girls and boys and removing the procedural, second class and slow learner knowledge tags attached to them presently. What Ministry of Education, Sport and Culture need to do is to raise the subjective worth of design and technology and technical subjects with clear links to tertiary courses and employment opportunities

so that both parents and students feel that the subjects lead to worthwhile endeavours. Technical and design and technology subjects ought not be limited to basic craft skills only, but should evolve into one fully-fledged technology subject that brings together all former technical subjects with scientific, technology and mathematical concepts.

Fourth form girls' concern that taking design and technology subjects would leave them socially isolated from other girls because they would be alone among boys, is a problem that could be solved by enrolling equal numbers of girls and boys in each subject and class making the subjects compulsory to all students. The study's finding of differing classroom interactional processes for girls and boys raises the need to re-look at the practice of mixing boys and girls in group activities. Male-female partnerships were found to frequently result in males working with equipment at the expense of females. This power over girls was perceived as a reflection of enactments of power relations in Zimbabwean society. To counter this, Zimbabwean teachers could pair girls in activities requiring personal skills acquisition and experiments to allow them uninterrupted experience.

One critical classroom finding is that girls prefer a learning atmosphere where there was ready and positive support for their learning. This calls for more cooperative and interactive modes of learning, emphasising discussion and collaboration, to benefit girls whose preferences are in these modes of teaching and learning. Teachers need to recognise the unique and diverse experiences and learning preferences that students bring into the classroom. Girls may also benefit from teachers slowing the pace of design and technology lessons as new experiences may require more time to be assimilated by new students in a new subject area. Teachers need to give supportive guidance and praise, rather than bland comments and non-supportive attitudes which girls currently said they endured daily from male teachers. These findings call for gender inclusive classroom environments where teachers are supportive of their students academically and emotionally, are friendly toward them, and help build cooperation among them to elicit higher academic functioning and accomplishment. Findings also call for retraining of teachers to change their attitudes, perceptions and handling of gender issues.

The school timetabling process, found in this study to put constraints on some girls' participation, needs serious consideration. In a deliberate way to involve more students, schools need to desist from timetabling technical and design and technology lessons in the hot Zimbabwean afternoons as the subjects are considered more physical than academic subjects. Morning would be ideal time to timetable these subjects before the heat of the afternoon takes over. Timetabling the subjects after all other lessons have ended for the day only helps to worsen the situation, as fewer students would want to remain in the school after other subjects have closed for the day.

### ***9.2.2 Implications for Policy***

Low enrolment for girls in design and technology subjects call for policy decisions by Ministry of Education, Sport and Culture for purposive inclusion of girls in the subjects. This may mean making the subjects compulsory to all students otherwise girls will continue to be disenfranchised from enrolling in future technology and engineering courses. The study's finding that pressure and persuasion of affectively significant others influenced girls' participation and achievement in design and technology subjects, calls for gender issues to be taught in schools to re-orient teachers, especially male teachers and boys, on gender issues and appropriate conduct in mixed gender situations.

Since much pressure was found to come from Zimbabwean parents demanding a university education for their children, Ministry of Education, Sport and Culture could make deliberate policy shifts, to develop some subjects in the technical and design and technology subjects curriculum as pre-requisites for certain university courses and careers in order to motivate takers. The finding linking subjective value and career aspirations with subject participation, calls for the Ministry to re-think the policy of having some subjects terminating at ordinary level only while others are pre-requisites for university entrance. Zimbabwean parents and students presently attach low value to design and technology subjects that they consider as for short school stay students aiming to enter trades. For the many parents and students who want a university education, this is not appealing enough. Technical graphics and design, which is a pre-requisite subject to some engineering courses, seems to have a pull effect on girls as many now see clear pathways of this subject to worthwhile courses. Of the 321 girls in this study, all 12 who were taking a design and technology subject, were taking technical graphics and design.

There is also need for policy change from prevailing notions of education for employment that was the focus of technical education to education for empowerment as emphasised in design and technology education. Curriculum should aim to meet not only the needs of immediate requirements of employers that include specific skills as this restricts people. Rather, it should be constructivist and aim to build students' cognitive skills through creative and engaging tasks (Sandholtz, 2001).

The Zimbabwe Government need to revisit its policy on women which says that there is need to "develop special incentives to increase the number of women undertaking technological training" (Government of Zimbabwe, 1998, p. 49) and on education to "reinforce and refocus government commitment to human resource development" by improving education outcomes for girls (p. 45). Commitment to such policy initiatives will see government committing incentives to educationally disadvantaged groups like females to participate more in education and to programmes like design and technology

subjects. While affirmative action has helped some girl students to enrol at the University of Zimbabwe with lesser entry points than boys, the move has only helped to view girls as inadequate and in need of help to succeed. Scholarships and educational grants to girl achievers in school design and technology are perceived to bring more competition among girls themselves to participate and achieve highly more. This could also see more women move into traditional male areas of employment who would act as visible role models for others to follow.

The introduction of design as a problem solving cognitive activity to traditional boys' subjects, such as technical graphics and design, metal, wood, and building technology and design, appears an oversight on the part of Ministry of Education, Sport and Culture as it implies gender bias. This requires urgent redress in policy as this has left many girls feeling that technology problem solving activities are the province of boys only since boys mainly have continued to take these subjects. Furthermore, it gives weight to Shona social messages that girls are not adequately equipped cognitively to handle work that requires problem solving. A favourable policy starting point would be to include design, as problem-solving, into all technical curriculum subjects, including home economics, remove male laden values in design and technology textbooks and include contexts consistent with girls' self-image and identity in order to encourage and increase their participation and achievement. This could be done following Gipps (1996) who suggests "a constructivist view which takes account what pupils bring to the learning situation, ...a social constructivist theory which takes account the cultural basis of knowledge and knowing, ...different cognitive styles and motivations of different groups of people, ...the variation among groups of girls and among groups of boys" (p. 265). Such approaches would see both girls' and boys' experiences catered for and open doors to more egalitarianism in education.

The finding that girls engaged more in subjects whose background knowledge they already possessed and in activities in which they perceived the greatest likelihood for success demands policy shifts accommodating girls' background knowledges and skills into the design and technology curriculum. Policy changes should allow children early engagement in a subject to learn relevant skills and knowledge to act as background knowledge in future endeavors. Since the design and technology curriculum was found to espouse male values which made it difficult for girls to fit as they would be acting out of context, there is need by Ministry of Education, Sport and Culture to remove the male laden values (Burns, 1997) while adding concepts consistent with girls' self image to make the subjects appeal more to girls (Wigfield and Eccles, 2000). The present set-up where girls are required to fit into male structured design and technology curriculum and knowledge was found to work further to alienate girls (Burns, 1997). This finding calls

for curriculum changes targeting subject knowledge. Objectionable school curricular materials that still portray men above women need to be banned to leave the playing field (setting in which the social action takes place) level for girls and boys as Dumais (2002) recommended.

Findings on socio-economic differences between schools resulting in differences in student participation and achievement in design and technology subjects call for urgent measures to uplift standards in low socio-economic schools to match those of high socio-economic schools. In this respect, all schools need to be electrified and adequate provision of financial and material resources be made by Ministry of Education, Sport and Culture if educational equality is to be achieved. Connected to the availability of resources, there is also need by Ministry of Education, Sport and Culture as a matter of policy, to widen the technical and design and technology curriculum in all schools to allow students a wider choice of subjects.

During focus group interviews, findings revealed that when English is used as the mode of communication with rural and Government group B school girls, there was inadequate expression of girls' lived experiences. However, when the questions were translated into the local Shona language, girls express themselves more freely and participate more in the focus group proceedings. This raises the question of the possibility of using the vernacular Shona or Ndebele languages in school learning to enhance local people's understanding, participation and success in school. Studies elsewhere, including those of Ejie (2004) in Nigeria and Smith (1999) in New Zealand, raise hope in using the vernacular to enhance learning of indigenous peoples rather than the use of a foreign language like English, with its cultural baggage.

There is also need for policy on teacher education to focus on gender studies to reorient teachers to mixed-gender design and technology classrooms and workshops in which all students are treated the same. As new subject changes come into effect, there is also need for corresponding teacher re-education to handle new curricula and its evaluation demands. As a new curriculum, design and technology needs a lot of positive publicity on its educational importance.

### ***9.2.3 Implications for Theory and Future Research***

The present study's findings contribute to understanding of girls' participation and achievement in design and technology in the African context, a dimension which has been largely missing from mainstream debates on the subject. The student and school dimension model of girls' participation and achievement in design and technology subjects presented in this study (figure 7.4, page 201), offers a fresh approach at studying subject participation and achievement with its two major dimensions, six categories of

factors and twenty-five themes. Regrouping of the twenty-five themes provided nine of the eleven findings on which the study's discussion is premised in section 8.2.

Results support findings from past research by Eccles et al., (1983); Woolnough, (1994); Eccles, (1994); Lewis, (1995); Pannizon and Levin, (1997) and Wigfield and Eccles, (2000). The study however, offers a detailed exploration of the factors affecting fourth form girls' participation and achievement in design and technology subjects and provides context driven data unique to Zimbabwe and its geographical, political, economic, social and cultural setting that have not been reported before. The six findings endorsing results of past research are impact of self-image, utility value, subject background experiences, expectations for success, subject interest and anxiety, and ready and positive support for learning. Pressure and persuasion from effectively significant others, impact of socio-economic issues and colonial, Ministry and school policies offer further insight into some processes and build on previous theory on the subject. The uniqueness of the Zimbabwean experience is that cultural inclinations have a strong bearing on all the eleven findings, be they traditional, colonial or contemporary. The study has also brought out processes affecting girls in a country which has emerged from colonial rule. Such contexts, to my knowledge, have not been reported in previous studies.

While attempting to explain girls' participation and achievement related choices and decisions, the present research findings also raise some issues pertinent to future research in various areas. For example, while design and technology subject choice and decision-making processes have been explored in this research, further work on the impact of school type (private, Government group A and B, and rural) on technology subjects choice and decision-making processes may be a worthwhile dimension to explore in various subject areas. This issue is made significant because the impact of school socio-economic status, location and neighbourhood could be explored unravelling their influences on students' sense of belonging, selection of and success in some subjects (Zyngier, 2004; Orr, 2003; Bell, 2003). Exploration of these factors in this research has been limited because of adopted qualitative methods of data collection and a much wider focus of processes affecting subject choice and performance. A more focused investigation into the effects of school socio-economic status, location and neighbourhood on students' subject choice and performance may enhance greater understanding of student participation and achievement related choices.

While this study concentrated on the variety of factors affecting fourth form girls' participation and achievement in design and technology subjects, teacher effects and teaching practices that enhance girls' learning of and success in design and technology are worthy of more detailed investigation. Teacher expectations and biases are mentioned

in this study as related to girls' negative interest in design and technology subjects and further work could quantify the extent of the influence. The effect of role model influence of learners taking related subjects and careers need further research as this study (see 8.2.2) and others for example, Milner, Ben-Zvi and Hofstein (1987) in an Israeli study found inconsistent results.

This study acknowledges previous studies on the impact of unconscious behaviour learning processes in identity formation, for example Freud's (1960) Ego and Id. This study's limitations on size could not allow this dimension to be followed adequately and further research could bring to light the importance of such processes. Researchers who have attempted studies in this area, for example, Freud (1960), Lacan, (1977), Grosz (1989), Gilbert (1997) and Irigaray (1993), call for a fresh look not only at the conscious level, but also the unconscious level which they identify as the root of and identity behaviour formation for any meaningful deconstruction to take place.

Qualitative and quantitative studies on how school culture encourages or discourages Zimbabwean girls into design and technology subjects and succeed in them offers another possibility of widening knowledge of participation and achievement choice decisions especially in various school set-ups and cultural groups. The impact of the strong Shona rural environment and 'Unhu' culture was seen in this study as a powerful tool hampering girls' seeing subjective processes hindering their design and technology subject participation. Further studies could explore design and technology subject choices and decision making processes in urban areas. Comparisons in this study of rural and city girls reveal differences in the way the two groups view life experiences with urban girls more open to accepting change. Foreign language use in Zimbabwe may be causing girls to look at some subjects as inaccessible and remote from the culture of their socialisation. Future research in Zimbabwe could focus on the use of Shona and Ndebele languages to teach all subjects including design and technology from a local cultural perspective.

Future research could also look at girls' preferences within the four design and technology subjects to find which subjects appeal more to them and why. For example, why more girls consider technical graphics and design more appealing than any other design and technology subject, though the subject's content include geometry, physics, mathematical calculations and linkages to mechanical and structural engineering, domains which previous researches have pointed as difficult for girls, needs further investigation.

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## Appendix i

## Map of Zimbabwe



Zimbabwe is a Southern African land locked country comprising an area of 390 580 square kilometers and ten geographical provinces namely: Harare, Masvingo, Manicaland, Mashonaland Central, Mashonaland East, Mashonaland West, Matebeleland North, Matebeleland South, Bulawayo and Midlands. Presently the population is estimated at 12.5 million people, with 98 percent being indigenous Africans (Shona 71%, Ndebele 16%, other 11%), 1 percent mixed Asians and 1 percent Europeans.

Seventy percent of the population live in rural areas while thirty percent live in towns. The Demographic and Health Survey (1984, p. 180) gives the populations of the two provinces Harare and Masvingo under this study's investigation as 620 936 (5.97%) and 1 221 845 (11.75% respectively).

## Appendix ii

## Massey University Human Ethics Committee approval

Massey University Campus Human Ethics Committee: Palmerston North (HEC: PN)  
Old Main Building, Turitea Fax: 64 6 350 5622 <http://www.massey.ac.nz/~muhec>  
Professor Sylvia V Rumball, Chair Miss Karen A Kahukoti, Secretary  
Telephone: 64 6 350 5249 Telephone: 64 6 350 5573  
Email: S.V.Rumball@massey.ac.nz Email: K.A.Kahukoti@massey.ac.nz



Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099

25 October 2002

Mr Christopher C Chimwayange  
PG Student  
Technology Science & Mathematics Science  
**HOKOWHITU PN900**

Dear Christopher

**Re: HEC: PN Protocol – 02/121**  
**Factors influencing the under-representation and under-achievement of girls**  
**in design studies in selected co-educational secondary schools in Zimbabwe**

Thank you for your correspondence and the amended protocol.

The amendments you have made and explanations you have given now meet the requirements of the Massey University Human Ethics Committee and the ethics of your protocol are approved.

Any departure from the approved protocol will require the researcher to return this project to the Massey University Campus Human Ethics Committee: Palmerston North for further consideration and approval.

When received, please supply copies of the requested letters to be placed on your file.

A reminder to include the following statement on all public documents "This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this research, please contact Professor Sylvia V Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 06 350 5249, email S.V.Rumball@massey.ac.nz."

Yours sincerely

A handwritten signature in cursive script that reads "Sylvia Rumball".

Professor Sylvia V Rumball, Chair  
**Massey University Campus Human Ethics Committee: Palmerston North**

cc Associate Professor Janet Davies  
Technology Science & Mathematics Science  
HOKOWHITU PN900

Dr Patricia Johnston  
Maori & Multicultural Education  
HOKOWHITU PN900

## Appendix iii

## Application to the Secretary of Education, Sport and Culture


**Massey University**

 COLLEGE OF EDUCATION  
 Te Kupenga o Te Mātauranga
5<sup>th</sup> September 2002

The Secretary of Education, Sport and Culture


 Department of Technology,  
 Science and Mathematics  
 Education

 Private Bag 11 222,  
 Palmerston North,  
 New Zealand

Telephone: 64 6 356 9099

Facsimile: 64 6 351 3472

**RE: APPLICATION FOR PERMISSION TO CARRY OUT RESEARCH IN  
YOUR SCHOOLS**

I am a senior teacher at Victoria High School currently enrolled at Massey University in New Zealand as a PhD student. My research involves the investigation of factors influencing fourth form girls' participation and achievement in design and technology subjects with the hope of raising Ministry of Education, Sport and Culture awareness of the extent, probable causes and effects of the problem to girls and Zimbabwe as a whole.

The purpose of this letter is to request your permission to carry out research in Harare and Masvingo secondary schools from 10<sup>th</sup> January 2003 to 30<sup>th</sup> May 2003 as follows:

**Harare Province****Type of school**

1 Private  
 1 Government group A  
 1 Government group B  
 1 Rural

**Masvingo Province****Type of school**

1 Private  
 1 Government group A  
 1 Government group B  
 1 Rural

As part of my data collection, I am requesting your permission to interview school principals, design and technology teachers, guidance and counseling teachers, fourth form girls and parents on their perceptions concerning fourth form girls low participation and achievement in design and technology subjects.

I would like to assure you that all information gathered would be treated with the strictest confidence. Documents outlining the research are attached to this letter.

Yours faithfully

Christopher Chimwayange

PhD student

## Appendix iv

## Application to Regional Directors of Education

**Massey University**COLLEGE OF EDUCATION  
Te Kupenga o Te Matauranga7<sup>th</sup> January 2003

The Regional Director  
Ministry of Education, Sport and Culture



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

**RE: APPLICATION FOR PERMISSION TO CARRY OUT RESEARCH IN  
YOUR SCHOOLS**

I am a senior teacher at Victoria High School currently enrolled at Massey University in New Zealand as a PhD student. My research involves the investigation of factors influencing fourth form girls' participation and achievement in design and technology subjects with the hope of raising Ministry of Education, Sport and Culture awareness of the extent, probable causes and effects of the problem to girls and Zimbabwe as a whole.

The purpose of this letter is to request your permission to carry out research in your province secondary schools from 10<sup>th</sup> January 2003 to 30<sup>th</sup> May 2003 as follows:

**Type of school**

- 1 Private
- 1 Government group A
- 1 Government group B
- 1 Rural

As part of my data collection, I am requesting your permission to interview school principals, design and technology teachers, guidance and counseling teachers, fourth form girls and parents on their perceptions concerning fourth form girls low participation and achievement in design and technology subjects.

I would like to assure you that all information gathered would be treated with the strictest confidence. Documents outlining the research are attached to this letter.

Yours faithfully

Christopher Chimwayange  
(PhD student)

## Appendix v

## Application to principals of schools



25<sup>th</sup> January 2003



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

Dear Principal

**RE: APPLICATION FOR PERMISSION TO CARRY OUT RESEARCH IN  
YOUR SCHOOL**

I am a senior teacher at Victoria High School currently enrolled at Massey University in New Zealand as a PhD student. My research involves the investigation of factors influencing fourth form girls' participation and achievement in design and technology subjects with the hope of raising Ministry of Education, Sport and Culture awareness of the extent, probable causes and effects of the problem to girls and Zimbabwe as a whole.

The purpose of this letter is to request your permission to carry out research in your school. As part of my data collection, I am requesting your permission to interview the principal, design and technology teachers, guidance and counseling teachers and fourth form girls on their perceptions concerning fourth form girls low participation and achievement in design and technology subjects.

I would like to assure you that all information gathered would be treated with the strictest confidence. Enclosed are letters supporting this research from the Secretary and Regional Director in the Ministry of Education, Sport and Culture.

Yours faithfully

Christopher Chimwayange

PhD student

## Appendix vi

## Secretary of Education, Sport and Culture's consent letter

Ref: C/426/3

*all communications should be addressed to*  
*"The Secretary for Education Sport and Culture"*  
**Telephone: 734051/59 and 734071**  
**Telegraphic address :**  
**"EDUCATION"**  
**Fax: 794505**



**Ministry of Education Sport and Culture**  
**P.O Box CY 121**  
**Causeway**  
**Zimbabwe**

13 November 2002.

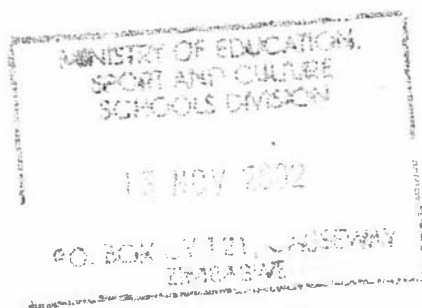
MR. C CHIMWAYANGE  
 Victoria High School  
 P.O. Box 241  
 Masvingo.

**RE: PERMISSION TO CARRY OUT RESEARCH ON AN INVESTIGATION OF FACTORS INFLUENCING THE DIFFERENTIAL PARTICIPATION AND ACHIEVEMENT BY GENDER OF STUDENTS IN DESIGN AND TECHNOLOGY.**

With reference to your application to carry out research on the above mentioned topic in the Ministry of Education's institutions, permission is hereby granted. You are, however, required to liaise with the Regional Directors Harare and Masvingo for clearance before carrying out your research.

You are also required to supply the Ministry of Education, Sport and Culture with a copy of your research that may contain information instrumental to the development of Education in Zimbabwe.

For: **SECRETARY FOR EDUCATION, SPORT AND CULTURE**



## Appendix vii

## Masvingo Regional Director of Education's consent letter

*All communications should be addressed to  
"The Regional Director for Education  
Sport and Culture"  
Telephone: 63585/63542  
Fax: 039-63261*



ZIMBABWE

Reference: P/Chimwayange C.

Ministry of Education Sport and Culture  
P.O Box 89  
MASVINGO

10 January, 2003

Mr. C Chimwayange  
Victoria High School  
P. O. Box 241  
MASVINGO

**RE: PERMISSION TO CARRY OUT RESEARCH ON AN INVESTIGATION OF  
FACTORS INFLUENCING THE DIFFERENTIAL PARTICIPATION AND  
ACHIEVEMENT BY GENDER OF STUDENTS IN DESIGN AND  
TECHNOLOGY.**

With reference to your application to carry out research on the above-mentioned topic in the Ministry of Education's institutions, the Regional Director, Masvingo Province, is hereby granting you permission to carry out the research in his schools.

**REGIONAL DIRECTOR: MASVINGO**

/ism/chimwayange

Appendix viii

Harare Regional Director of Education's consent letter

All communications should be addressed to "THE REGIONAL DIRECTOR "

Telephone : 792671/9
Telex : 22287
Fax : 796125
E-mail : maeschre@yahoo.com



Ref: C/440/1HRE
Ministry of Education, Sport and Culture
Harare Regional Office
P.O Box CY 1343
Causeway
Zimbabwe

MR C. CHIMWAYANGE
VICTORIA HIGH SCHOOL

Dear Sir/Madam

RE: PERMISSION TO CARRY OUT A RESEARCH ON FACTORS INFLUENCING THE DIFFERENTIAL PARTICIPATION AND ACHIEVEMENT BY GENDER OF STUDENTS IN DESIGN & TECHNOLOGY

Reference is made to your letter dated 10/10/02
And the Secretary's clearance letter dated 13/11/02

Please be advised that you have the Regional Director's permission to carry out your research in schools under Harare Region.

Please liaise with the Heads of Schools of your choice and show them this letter before you make firm arrangements with them on the conduct of your research.

By copy of this minute all Heads approached by Mr/Mrs/Miss Chimwayange are kindly requested to assist him/her with his/her research.

FOR: REGIONAL DIRECTOR
HARARE REGION



## Appendix ix



COLLEGE OF EDUCATION  
Te Kupenga o Te Matauranga



Department of Technology,  
Science and Mathematics  
Education

Private Bag 11 222,  
Palmerston North,  
New Zealand

Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

## Information sheet for students taking and not taking design and technology subjects

### An Exploration Of factors Affecting Fourth Form Girls' Participation And Achievement In Design And Technology Subjects In Selected Secondary Schools Of Zimbabwe

Thank you for expressing interest in the proposed research. Details of the confirmed proposal and the extent of your involvement should you agree to take part are described below.

#### About the researcher

My name is Christopher Chimwayange. I am a New Zealand Overseas Development Assistance (NZODA) scholar and a doctoral student with the Massey University College of Education, (Department of Technology, Science and Mathematics Education) in New Zealand.

#### Support for this study

This research is part of my PhD thesis supervised by Associate Professor Janet Davies and Dr. Patricia-Maringi Johnston. The research has full approval of the Massey University College of Education's Department of Technology, Science and Mathematics Education. It is funded by the New Zealand Overseas Development Agency (NZODA) and Massey University Postgraduate Research Fund. The research has been approved by the Massey University Human Ethics Committee, PN protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, New Zealand, telephone 0064 6 350 5249, email [S.V.Rumball@massey.ac.nz](mailto:S.V.Rumball@massey.ac.nz).

#### What is the research about?

I am interested in exploring factors affecting fourth form girls' participation and achievement in design and technology subjects (metal technology and design, wood technology and design, building technology and design and technical graphics and design). In particular, I will be looking at:

- Finding out the girls' representation in design and technology subjects at national level and in selected schools.
- Investigating key influences affecting fourth form girls' decisions to study or not to study design and technology subjects.
- Investigating how the key influences affect fourth form girls' decisions to participate and achieve in design and technology subjects.

### **Why is this research important?**

The Presidential Commission of Education and Training (1999) report reveals the general absence of girls in design and technology and science subjects especially as girls progress to ordinary level and worse still at advanced level. Concern was raised that there is no empirical scrutiny of even basic questions such as who takes what kind of courses and the subsequent consequences of students' course of study on their academic achievement and future career opportunities. As a result, there has been little on national pointers as to who is losing out in the nation's quest to offer equality in education. While policy advocates for equal opportunities in education, over the eleven year period (1990 to 2001) that design and technology subjects have been included in the technical curriculum, observations have revealed that the subjects continue to be taken on strong gender lines with girls being largely disadvantaged. Factors affecting fourth form girls participation and achievement is the subjects of this investigation in line with the Presidential Commission Into Education and Training recommendations for further research into this crucial area to achieve equality in the provision of education to all.

### **What is the benefit of this research to participants?**

- Factors affecting girls' participation and achievement in design and technology subjects can be identified and strategies adopted to increase their participation.
- Awareness to the extent and form of differential subject participation by gender is raised and discrepancies between policy initiatives and educational implementation can be identified for Ministry of Education, Sport and Culture to act upon.
- Awareness of gender issues by educators, parents and students could increase learning and career opportunities for all.

### **What will you be required to do?**

- Complete a questionnaire for fourth form girls.
- Attend a focus group interview (tape recorded) of about 1 hour long.

### **What would be the effect of my presence on your daily routines?**

- My presence may cause minor disturbances to your daily routines. However, save for the interview, every effort will be made to reduce any disruptions to your busy schedule.

### **What assurances can I give?**

- Interviews will be carried out at a mutually agreed venue and time.
- Participation is voluntary in this study.
- Consent can be withdrawn, either temporarily or permanently at any time. A point will be made to reconfirm consent before any interviews
- Participants can ask questions about the study at any time during their participation. Negative responses from participants will be respected without consequence.
- All information gained will be treated with the strictest confidence. Information gathered will remain confidential to the research and any subsequent publications resulting from it. All data will be kept secure in a locked filing cabinet including all tapes, questionnaires, notes and transcripts for at least 5 years from research publication date as outlined in the Massey University Policy on Research Practice, Section 2.2.
- Pseudonyms rather than real names will be used in the raw data and final reports, unless participants give their expressed permission for their real names to be used.

- Participants will have the right to refuse to answer any questions and to ask for the tape recorder to be turned off at any time during interviews or informal conversations.
- The research will do all the data capture, transcription and analysis without a second person handling the data for confidentiality and anonymity purposes.
- Responses to questions are anonymous such that participants will not be identified with any comments they make.
- Raw data gathered and transcripts will remain the property of the participants while ownership for the final thesis document will be that of the researcher. Where possible, participants will be invited to verify transcripts of any audio recordings and researcher notes. They will be allowed to strike out any material they do not wish to be used or make corrections where necessary.
- Thesis documents will be lodged with Massey University School of Education in New Zealand and with the Secretary of Education, Sport and Culture in Zimbabwe for any individual, school or province to access.
- Participants have the right to request the original tape recordings of the interviews or have them destroyed once the thesis has been successfully examined.
- Where a participant incurs a cost as a result of this research, the researcher may consider compensation limited to evidence of actual receipted costs submitted. It remains the prerogative of the participant to decline payment or seek recompense in an equivalent manner. Parental approval will be needed for any payments to students.

Despite these assurances, it cannot be guaranteed that it will remain impossible for readers of any report, thesis or journal article emanating from information gathered in this study to identify the source of information. However, extra care will be put for the confidentiality and anonymity of information and participants. At all times I will endeavor to make the data gathering experience rewarding and hassle free for all concerned. I look forward to learning from you. Contact details should you have any questions to ask or points clarified about this study are:

<b>Doctoral student</b>	<b>1<sup>st</sup> Supervisor</b>	<b>2<sup>nd</sup> Supervisor</b>
Christopher Chimwayange Dept. Of Technology, Science and Mathematics Education P. Bag. 11 222 Palmerston North New Zealand  Phone: 00 64 6 359 2816 E-mail: chimwaya@yahoo.co.nz	Assoc. Prof. Janet Davies Massey University Wellington Campus 63 Wallace Street P. Bag 756 Wellington New Zealand  Phone: 00 64 4 801 2794 E-mail: <a href="mailto:j.r.davies@massey.ac.nz">j.r.davies@massey.ac.nz</a>	Dr. Patricia-Maringi Johnston Dept. Of Maori and Multicultural Education P. Bag. 11 222 Palmerston North New Zealand  Phone: 00 64 6 351 3345 E-mail: <a href="mailto:p.johnston@massey.ac.nz">p.johnston@massey.ac.nz</a>

Thank You

**Christopher Chimwayange**  
(Doctoral Student)

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, Telephone 00 64 6 350 5249, E-mail: [S.V.Rumball@massey.ac.nz](mailto:S.V.Rumball@massey.ac.nz)

## Appendix x



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472



## Information sheet for design and technology subject teachers, guidance and counseling teachers and parents

### An Exploration Of factors Affecting Fourth Form Girls' Participation And Achievement In Design And Technology Subjects In Selected Secondary Schools Of Zimbabwe

Thank you for expressing interest in the proposed research. Details of the confirmed proposal and the extent of your involvement should you agree to take part are described below.

#### About the researcher

My name is Christopher Chimwayange. I am a New Zealand Overseas Development Assistance (NZODA) scholar and a doctoral student with the Massey University College of Education, (Department of Technology, Science and Mathematics Education) in New Zealand.

#### Support for this study

This research is part of my PhD thesis supervised by Associate Professor Janet Davies and Dr. Patricia-Maringi Johnston. The research has full approval of the Massey University College of Education's Department of Technology, Science and Mathematics Education. It is funded by the New Zealand Overseas Development Agency (NZODA) and Massey University Postgraduate Research Fund. The research has been approved by the Massey University Human Ethics Committee, PN protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, New Zealand, telephone 0064 6 350 5249, email [S.V.Rumball@massey.ac.nz](mailto:S.V.Rumball@massey.ac.nz).

#### What is the research about?

I am interested in exploring factors affecting fourth form girls' participation and achievement in design and technology subjects (metal technology and design, wood technology and design, building technology and design and technical graphics and design). In particular, I will be looking at:

- Finding out the girls' representation in design and technology subjects at national level and in selected schools.
- Investigating key influences affecting fourth form girls' decisions to study or not to study design and technology subjects.
- Investigating how the key influences affect fourth form girls' decisions to participate and achieve in design and technology subjects.

### **Why is this research important?**

The Presidential Commission of Education and Training (1999) report reveals the general absence of girls in design and technology and science subjects especially as girls progress to ordinary level and worse still at advanced level. Concern was raised that there is no empirical scrutiny of even basic questions such as who takes what kind of courses and the subsequent consequences of students' course of study on their academic achievement and future career opportunities. As a result, there has been little on national pointers as to who is losing out in the nation's quest to offer equality in education. While policy advocates for equal opportunities in education, over the eleven year period (1990 to 2001) that design and technology subjects have been included in the technical curriculum, observations have revealed that the subjects continue to be taken on strong gender lines with girls being largely disadvantaged. Factors affecting fourth form girls participation and achievement is the subjects of this investigation in line with the Presidential Commission Into Education and Training recommendations for further research into this crucial area to achieve equality in the provision of education to all.

### **What is the benefit of this research to participants?**

- Factors affecting girls' participation and achievement in design and technology subjects can be identified and strategies adopted to increase their participation.
- Awareness to the extent and form of differential subject participation by gender is raised and discrepancies between policy initiatives and educational implementation can be identified for Ministry of Education, Sport and Culture to act upon.
- Awareness of gender issues by educators, parents and students could increase learning and career opportunities for all.

### **What will you be required to do?**

- Attend focus group interviews (tape recorded) of about 1 hour long.
- Design and technology teachers to allow me to observe you teaching one of your mixed gender lesson.

### **What would be the effect of my presence on your daily routines?**

- My presence may cause minor disturbances to your daily routines. However, save for the interview, and observation, every effort will be made to reduce any disruptions to your busy schedule.

### **What assurances can I give?**

- Interviews will be carried out at a mutually agreed venue and time.
- Participation is voluntary in this study.
- Consent can be withdrawn, either temporarily or permanently at any time. A point will be made to reconfirm consent before any interviews
- Participants can ask questions about the study at any time during their participation. Negative responses from participants will be respected without consequence.
- All information gained will be treated with the strictest confidence. Information gathered will remain confidential to the research and any subsequent publications resulting from it. All data will be kept secure in a locked filing cabinet including all tapes, questionnaires, notes and transcripts for at least 5 years from research publication date as outlined in the Massey University Policy on Research Practice, Section 2.2.

- Pseudonyms rather than real names will be used in the raw data and final reports, unless participants give their expressed permission for their real names to be used.
- Participants will have the right to refuse to answer any questions and to ask for the tape recorder to be turned off at any time during interviews or informal conversations.
- The research will do all the data capture, transcription and analysis without a second person handling the data for confidentiality and anonymity purposes.
- Responses to questions are anonymous such that participants will not be identified with any comments they make.
- Raw data gathered and transcripts will remain the property of the participants while ownership for the final thesis document will be that of the researcher. Where possible, participants will be invited to verify transcripts of any audio recordings and researcher notes. They will be allowed to strike out any material they do not wish to be used or make corrections where necessary.
- Thesis documents will be lodged with Massey University School of Education in New Zealand and with the Secretary of Education, Sport and Culture in Zimbabwe for any individual, school or province to access.
- Participants have the right to request the original tape recordings of the interviews or have them destroyed once the thesis has been successfully examined.
- Where a participant incurs a cost as a result of this research, the researcher may consider compensation limited to evidence of actual receipted costs submitted. It remains the prerogative of the participant to decline payment or seek recompense in an equivalent manner. Parental approval will be needed for any payments to students.

Despite these assurances, it cannot be guaranteed that it will remain impossible for readers of any report, thesis or journal article emanating from information gathered in this study to identify the source of information. However, extra care will be put for the confidentiality and anonymity of information and participants. At all times I will endeavor to make the data gathering experience rewarding and hassle free for all concerned. I look forward to learning from you. Contact details should you have any questions to ask or points clarified about this study are:

<b>Doctoral student</b>	<b>1<sup>st</sup> Supervisor</b>	<b>2<sup>nd</sup> Supervisor</b>
Christopher Chimwayange Dept. Of Technology, Science and Mathematics Education P. Bag. 11 222 Palmerston North New Zealand  Phone: 00 64 6 359 2816 E-mail: chimwaya@yahoo.co.nz	Assoc. Prof. Janet Davies Massey University Wellington Campus 63 Wallace Street P. Bag 756 Wellington New Zealand  Phone: 00 64 4 801 2794 E-mail: <a href="mailto:j.r.davies@massey.ac.nz">j.r.davies@massey.ac.nz</a>	Dr. Patricia-Maringi Johnston Dept. Of Maori and Multicultural Education P. Bag. 11 222 Palmerston North New Zealand  Phone: 00 64 6 351 3345 E-mail: <a href="mailto:p.johnston@massey.ac.nz">p.johnston@massey.ac.nz</a>

Thank You

**Christopher Chimwayange**  
(Doctoral Student)

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, Telephone 00 64 6 350 5249, E-mail: [S.V. Rumball@massey.ac.nz](mailto:S.V. Rumball@massey.ac.nz)

## Appendix xi



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

### Information sheet for principals and education officers

#### An Exploration Of factors Affecting Fourth Form Girls' Participation And Achievement In Design And Technology Subjects In Selected Secondary Schools Of Zimbabwe

Thank you for expressing interest in the proposed research. Details of the confirmed proposal and the extent of your involvement should you agree to take part are described below.

#### About the researcher

My name is Christopher Chimwayange. I am a New Zealand Overseas Development Assistance (NZODA) scholar and a doctoral student with the Massey University College of Education, (Department of Technology, Science and Mathematics Education) in New Zealand.

#### Support for this study

This research is part of my PhD thesis supervised by Associate Professor Janet Davies and Dr. Patricia-Maringi Johnston. The research has full approval of the Massey University College of Education's Department of Technology, Science and Mathematics Education. It is funded by the New Zealand Overseas Development Agency (NZODA) and Massey University Postgraduate Research Fund. The research has been approved by the Massey University Human Ethics Committee, PN protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, New Zealand, telephone 0064 6 350 5249, email [S.V.Rumball@massey.ac.nz](mailto:S.V.Rumball@massey.ac.nz).

#### What is the research about?

I am interested in exploring factors affecting fourth form girls' participation and achievement in design and technology subjects (metal technology and design, wood technology and design, building technology and design and technical graphics and design). In particular, I will be looking at:

- Finding out the girls' representation in design and technology subjects at national level and in selected schools.
- Investigating key influences affecting fourth form girls' decisions to study or not to study design and technology subjects.
- Investigating how the key influences affect fourth form girls' decisions to participate and achieve in design and technology subjects.

**Why is this research important?**

The Presidential Commission of Education and Training (1999) report reveals the general absence of girls in design and technology and science subjects especially as girls progress to ordinary level and worse still at advanced level. Concern was raised that there is no empirical scrutiny of even basic questions such as who takes what kind of courses and the subsequent consequences of students' course of study on their academic achievement and future career opportunities. As a result, there has been little on national pointers as to who is losing out in the nation's quest to offer equality in education. While policy advocates for equal opportunities in education, over the eleven year period (1990 to 2001) that design and technology subjects have been included in the technical curriculum, observations have revealed that the subjects continue to be taken on strong gender lines with girls being largely disadvantaged. Factors affecting fourth form girls participation and achievement is the subjects of this investigation in line with the Presidential Commission Into Education and Training recommendations for further research into this crucial area to achieve equality in the provision of education to all.

**What is the benefit of this research to participants?**

- Factors affecting girls' participation and achievement in design and technology subjects can be identified and strategies adopted to increase their participation.
- Awareness to the extent and form of differential subject participation by gender is raised and discrepancies between policy initiatives and educational implementation can be identified for Ministry of Education, Sport and Culture to act upon.
- Awareness of gender issues by educators, parents and students could increase learning and career opportunities for all.

**What will you be required to do?**

- Attend an in-depth interview (tape recorded) of about 1 hour long.

**What would be the effect of my presence on your daily routines?**

- My presence may cause minor disturbances to your daily routines. However, save for the interview, and observation, every effort will be made to reduce any disruptions to your busy schedule.

**What assurances can I give?**

- Interviews will be carried out at a mutually agreed venue and time.
- Participation is voluntary in this study.
- Consent can be withdrawn, either temporarily or permanently at any time. A point will be made to reconfirm consent before any interviews
- Participants can ask questions about the study at any time during their participation. Negative responses from participants will be respected without consequence.
- All information gained will be treated with the strictest confidence. Information gathered will remain confidential to the research and any subsequent publications resulting from it. All data will be kept secure in a locked filing cabinet including all tapes, questionnaires, notes and transcripts for at least 5 years from research publication date as outlined in the Massey University Policy on Research Practice, Section 2.2.
- Pseudonyms rather than real names will be used in the raw data and final reports, unless participants give their expressed permission for their real names to be used.

- Participants will have the right to refuse to answer any questions and to ask for the tape recorder to be turned off at any time during interviews or informal conversations.
- The research will do all the data capture, transcription and analysis without a second person handling the data for confidentiality and anonymity purposes.
- Responses to questions are anonymous such that participants will not be identified with any comments they make.
- Raw data gathered and transcripts will remain the property of the participants while ownership for the final thesis document will be that of the researcher. Where possible, participants will be invited to verify transcripts of any audio recordings and researcher notes. They will be allowed to strike out any material they do not wish to be used or make corrections where necessary.
- Thesis documents will be lodged with Massey University School of Education in New Zealand and with the Secretary of Education, Sport and Culture in Zimbabwe for any individual, school or province to access.
- Participants have the right to request the original tape recordings of the interviews or have them destroyed once the thesis has been successfully examined.
- Where a participant incurs a cost as a result of this research, the researcher may consider compensation limited to evidence of actual receipted costs submitted. It remains the prerogative of the participant to decline payment or seek recompense in an equivalent manner. Parental approval will be needed for any payments to students.

Despite these assurances, it cannot be guaranteed that it will remain impossible for readers of any report, thesis or journal article emanating from information gathered in this study to identify the source of information. However, extra care will be put for the confidentiality and anonymity of information and participants. At all times I will endeavor to make the data gathering experience rewarding and hassle free for all concerned. I look forward to learning from you. Contact details should you have any questions to ask or points clarified about this study are:

<b>Doctoral student</b>	<b>1<sup>st</sup> Supervisor</b>	<b>2<sup>nd</sup> Supervisor</b>
Christopher Chimwayange Dept. Of Technology, Science and Mathematics Education P. Bag. 11 222 Palmerston North New Zealand  Phone: 00 64 6 359 2816 E-mail: chimwaya@yahoo.co.nz	Assoc. Prof. Janet Davies Massey University Wellington Campus 63 Wallace Street P. Bag 756 Wellington New Zealand  Phone: 00 64 4 801 2794 E-mail: <a href="mailto:j.r.davies@massey.ac.nz">j.r.davies@massey.ac.nz</a>	Dr. Patricia-Maringi Johnston Dept. Of Maori and Multicultural Education P. Bag. 11 222 Palmerston North New Zealand  Phone: 00 64 6 351 3345 E-mail: <a href="mailto:p.johnston@massey.ac.nz">p.johnston@massey.ac.nz</a>

Thank You

**Christopher Chimwayange**  
(Doctoral Student)

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, Telephone 00 64 6 350 5249, E-mail: [S.V. Rumball@massey.ac.nz](mailto:S.V.Rumball@massey.ac.nz)

Appendix xii



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

**Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.**

**STUDENT QUESTIONNAIRE CONSENT FORM**

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

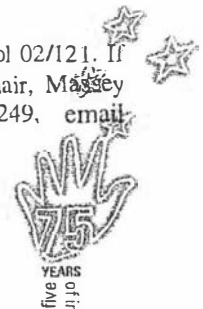
- I agree / do not agree to participate in the filling in of a questionnaire for the purpose of selecting participants for focus group interviews and contributing group and individual information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).

I understand that I have the right to withhold information temporarily or permanently, or to terminate participation at any time.

I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: ... ..  
Name: .. ..  
Date: .. ..

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 00 64 6 350 5249, email S.V.Rumball@massey.ac.nz



## Appendix xiii

## Students' focus group interview consent form



Department of Technology,  
Science and Mathematics  
Education  
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Palmerston North,  
New Zealand  
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Facsimile: 64 6 351 3472

**Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.**

### STUDENT FOCUS GROUP INTERVIEW CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

- I agree / ~~do not~~ agree to participate in focus group interviews for the purpose of contributing group and individual information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).
- I agree to interviews being audio-tape recorded.

I understand that I have the right to withhold information temporarily or permanently, or to terminate participation at any time during the interviews.

I also understand that I have the right to ask for the audio-tape to be turned off at any time during the interview.

I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: .....  
Name: .....  
Date: .....

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 00 64 6 350 5249, email S.V.Rumball@massey.ac.nz



Appendix xiv

Design and technology teachers focus group interview and observation consent form



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.

DESIGN AND TECHNOLOGY TEACHERS FOCUS GROUP INTERVIEW AND OBSERVATION CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

- I agree / do not agree to participate in focus group interviews for the purpose of providing information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).
- I agree to interviews being audio tape recorded.
- I agree / do not agree to provide access to my classroom for the purposes of a lesson observation. (delete as appropriate).

I understand that I have the right to stop you entering the classroom temporarily or permanently, or ask you to leave the classroom, at any time during the observation session.

I also understand that I have the right to ask for the audio tape to be turned off at any time during the focus group interview.

I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: .....  
Name: .....  
Date: .....



## Appendix xv

## Guidance and counseling teachers' focus group interview consent form



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.

### GUIDANCE AND COUNSELLING TEACHERS FOCUS GROUP INTERVIEW CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

- I agree / do not agree to participate in interviews for the purposes of providing information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).
- I agree to interviews being audio-tape recorded.

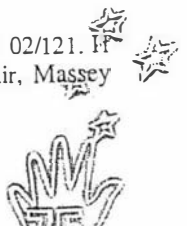
I understand that I have the right to withhold information temporarily or permanently, or to terminate participation at any time during the interviews.

I also understand that I have the right to ask for the audio-tape to be turned off at any time during the interview.

I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: . . . . .  
Name: . . . . .  
Date: . . . . .

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 00 64 6 350 5249, email [S.V.Rumball@massey.ac.nz](mailto:S.V.Rumball@massey.ac.nz)



## Appendix xvi

## School principals/headmasters' interview consent form



COLLEGE OF EDUCATION  
Te Kōwhiri o Te Mātauranga

Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.

## SCHOOL HEADMASTERS INTERVIEW CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

- I agree / do not agree to participate in interviews for the purposes of providing information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).
- I agree / do not agree to interviews being audio-tape recorded. (delete as appropriate).

I understand that I have the right to withhold information temporarily or permanently, or to terminate participation at any time during the interviews.

I also understand that I have the right to ask for the audio-tape to be turned off at any time during the interview.

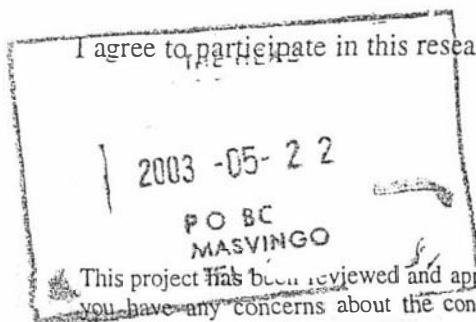
I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: . . .

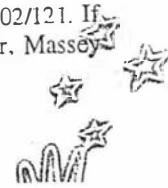
Name: ...

Date: . . .

....



This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 00 64 6 350 5249, email S.V.Rumball@massey.ac.nz



## Appendix xvii

## Design and technology subjects Education Officers' interview consent form



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.

## TECHNICAL SUBJECTS EDUCATION OFFICERS' INTERVIEW CONSENT FORM

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

- I agree / ~~do not agree~~ to participate in interviews for the purposes of providing information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).
- I agree / ~~do not agree~~ to interviews being audio-tape recorded. (delete as appropriate).

I understand that I have the right to withhold information temporarily or permanently, or to terminate participation at any time during the interviews.

I also understand that I have the right to ask for the audio-tape to be turned off at any time during the interview.

I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: .....

Name: .....

Date: .....

.....

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 00 64 6 350 5249, email S.V.Rumball@massey.ac.nz



Appendix xviii

Parents' interview consent form



Department of Technology,  
 Science and Mathematics  
 Education  
 Private Bag 11 222,  
 Palmerston North,  
 New Zealand  
 Telephone: 64 6 356 9099  
 Facsimile: 64 6 351 3472

**Factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe.**

**PARENTS INTERVIEW CONSENT FORM**

I have read the Information Sheet and have had the details of the study explained to me. All my questions have been answered satisfactorily, and I understand that I may ask further questions at any time.

I understand that I have the right to withdraw from the study, either temporarily or permanently, at any time and may decline to answer any particular questions.

I agree to provide information to the researcher, Christopher Chimwayange, on the understanding that my name will not be used without my permission and all information passed on will be held in the strictest confidence. (Information will only be used for this research and publications arising from this research project).

- I agree / do not agree to participate in interviews for the purposes of providing information on factors influencing the under-representation and under-achievement of girls in design and technology in selected co-educational high schools in Zimbabwe. (delete as appropriate).
- I agree / do not agree to interviews being audio-tape recorded. (delete as appropriate).

I understand that I have the right to withhold information temporarily or permanently, or to terminate participation at any time during the interviews.

I also understand that I have the right to ask for the audio-tape to be turned off at any time during the interview.

I agree to participate in this research under the conditions as set out in the Information Sheet.

Signed: .....  
 Name: .....  
 Date: .....

This project has been reviewed and approved by the Massey University Human Ethics Committee, PN Protocol 02/121. If you have any concerns about the conduct of this project, please contact Professor Sylvia V. Rumball, Chair, Massey University Campus Human Ethics Committee: Palmerston North, telephone 00 64 6 350 5249, email S.V.Rumball@massey.ac.nz



## Appendix xix

## Application for archival enrolment and performance data

**Massey University**COLLEGE OF EDUCATION  
Te Kupenga o Te MataurangaDepartment of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 347225<sup>th</sup> January 2003The Director  
Zimbabwe Schools Examinations Council

Dear Sir

**RE: APPLICATION FOR ARCHIVAL INFORMATION ON ORDINARY LEVEL  
SUBJECT ENTRY AND PERFORMANCE STATISTICS**

I am a senior teacher at Victoria High School currently enrolled at Massey University in New Zealand as a PhD student. My research involves the investigation of factors influencing fourth form girls' participation and achievement in design and technology subjects with the hope of raising Ministry of Education, Sport and Culture awareness of the extent, probable causes and effects of the problem to girls and Zimbabwe as a whole.

The purpose of this letter is to request your permission obtain archival data on ordinary level examinations enrolment by gender in all subjects for the years 1991 to 2001. This information is necessary for the completion of the PhD degree qualification I am studying towards.

I would like to assure you that all information gathered would be treated with the strictest confidence. Documents outlining the research are attached to this letter including letters supporting this research from the Secretary and Regional Directors in the Ministry of Education, Sport and Culture.

Yours faithfully

Christopher Chimwayange  
PhD student



## Appendix xxi

## Accuracy of information verification letter to principals



Department of Technology,  
Science and Mathematics  
Education  
Private Bag 11 222,  
Palmerston North,  
New Zealand  
Telephone: 64 6 356 9099  
Facsimile: 64 6 351 3472

1<sup>st</sup> September 2003

Dear School Principal

As per our agreement, I am posting the transcripts and results of the study for your perusal. Please feel free to add anything, comment and even to delete anything you consider inaccurate. I would appreciate it if you could return the corrected transcripts and results to me by 31<sup>st</sup> October 2003. I have enclosed an international return post envelop for you to return the documents. If I do not hear from you, I will presume you are happy with the accuracy of the information.

I look forward to hearing from you.

Regards

Christopher Chimwayange

PhD student

## Appendix xxii

## Fourth form girls' questionnaire

Code name \_\_\_\_\_

**Individual and Demographic Profiles.** Please answer this section by ticking in the appropriate box for your response  or by writing in the spaces provided \_\_\_\_\_

1. Age (years)  15  16  17  18
2. (a) Race/ Ethnicity  African  European \_\_\_\_\_ Other (please specify) \_\_\_\_\_  
 (b) Other than English which other language(s) do you speak? \_\_\_\_\_
3. What is your favourite hobby/pastime and why? \_\_\_\_\_  
 \_\_\_\_\_
4. (a) Do you live with both your parents?  father only  mother only  both  
 (b) Father's occupation \_\_\_\_\_  
 (c) Mother's occupation \_\_\_\_\_
5. Which design and technology subject are you taking this year? \_\_\_\_\_
6. (i) Which technical subjects did you do  
 (a) at primary school \_\_\_\_\_  
 (b) at form 1 and 2 levels \_\_\_\_\_  
 (ii) What were your reasons then for taking / not taking the technical subjects? \_\_\_\_\_  
 \_\_\_\_\_  
 (iii) What are your reasons for taking / not taking design and technology now? \_\_\_\_\_  
 \_\_\_\_\_  
 (iv) Who/ what helped you make the decision to take / not to take design and technology?  
 \_\_\_\_\_
7. Which practical subject would you have taken if it were offered at your school? \_\_\_\_\_  
 Reason(s): \_\_\_\_\_
8. List all the subjects you are taking this year in the order you think best describes your interest in the subject (*If MATHS is your best interested subject, put it at the number (a) position. Your worst subject should be put last*)  
 (a) \_\_\_\_\_ (f) \_\_\_\_\_  
 (b) \_\_\_\_\_ (g) \_\_\_\_\_  
 (c) \_\_\_\_\_ (h) \_\_\_\_\_  
 (d) \_\_\_\_\_ (i) \_\_\_\_\_
9. (i) What is your intended future career? \_\_\_\_\_  
 (ii) Who/What helped you to choose this career? \_\_\_\_\_  
 (iii) Reasons for choosing this career \_\_\_\_\_

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**Appendix xxiii****Focus group interview guide for girls taking and not taking design and technology subjects**

1. From the information you and other girls provided in the questionnaire, we see that girls choose a wide selection of subjects to study. In your opinion, what influences girls to choose these subjects at school?
2. A number of schools I have visited have different methods by which they encourage their students to take non-traditional subjects for study. How does your school help you with the selection of your subjects? How does this school encourage girls to take design and technology subjects?
3. What do you think of design and technology subjects? How do you feel about taking the subjects?
4. What are the problems faced by girls when they choose to take design and technology subjects at this school? How do these problems affect girls in learning the subject?
5. I note in the questionnaire that not many girls take design and technology subjects at this school. The rates of participation in design and technology in the past ten years also show that more boys than girls enrolled in the subjects. What do you think are the factors affecting fourth form girls' participation in the subjects?
6. The performance of girls in the past 10 years in design and technology subjects at 4<sup>th</sup> form level show that they do not do as well in these subjects as they do in other subjects. What do you think are the factors that influence 4<sup>th</sup> form girls to underperform in design and technology subjects?
7. I note in the questionnaire responses that you have thought about the careers you want to pursue after school. In what way does your school help you with information on careers? How do you girls feel about taking a career in engineering or building construction?

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**Appendix xxiv****Focus group interview guide for design and technology subject teachers and guidance and counseling teachers**

1. Do you see males and females as having different and distinct roles to play in Zimbabwean society today? Which are these roles and what is your feeling concerning these roles?
2. A number of schools I have visited have different methods by which they encourage their students to take non-traditional subjects for study. How does your school help students in the selection of their subjects? How does this school encourage girls to take design and technology subjects?
3. I noticed in questionnaire responses that not as many girls as boys take design and technology subjects for study at this school. In your opinion, why do fewer girls choose to take design and technology subjects at this school than boys?
4. Do schools observe any traditions that you think (a) enhance girls' participation and achievement in design and technology subjects? (b) inhibit girls' participation and achievement in design and technology subjects?
5. What is it about design and technology subjects that 4<sup>th</sup> form girls in secondary schools in Zimbabwe are rejecting or finding problematic to the extent of hindering their participation?
6. What is your perception of design and technology subjects? How do you feel about girls taking the subjects and employment in engineering or building construction?
7. In your opinion, why do girls currently perform lowly in design and technology subjects compared to other subjects they take?
8. What are the problems faced by girls when they choose to take design and technology subjects at this school? How do these problems affect girls in learning the subject?
9. What changes do you think need to be made by school and Ministry of Education, Sport and Culture to improve girls' participation in design and technology subjects?

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**Appendix xxv****Interview guide for design and technology subject education officers and school principals**

1. Do you see males and females as having different and distinct roles to play in Zimbabwean society today? Which are these roles and what is your feeling concerning these roles?
2. A number of schools I have visited have different methods by which they encourage their students to take non-traditional subjects for study. How do schools help students in the selection of their subjects? How do schools encourage girls to take design and technology subjects?
3. I noticed in questionnaire responses that not as many girls as boys take design and technology subjects for study at this school. In your opinion, why do fewer girls choose to take design and technology subjects at this school than boys?
4. Do schools observe any traditions that you think (a) enhance girls' participation and achievement in design and technology subjects? (b) inhibit girls' participation and achievement in design and technology subjects?
5. What is it about design and technology subjects that 4<sup>th</sup> form girls in secondary schools in Zimbabwe are rejecting or finding problematic to the extent of hindering their participation?
6. What is your perception of design and technology subjects? How do you feel about girls taking the subjects and employment in engineering or building construction?
7. In your opinion, why do girls currently perform lowly in design and technology subjects compared to other subjects they take?
8. What are the problems faced by girls when they choose to take design and technology subjects at this school? How do these problems affect girls in learning the subject?
9. What changes do you think need to be made by school and Ministry of Education, Sport and Culture to improve girls' participation in design and technology subjects?

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**Appendix xxvi****Interview guide for parents**

1. Do you see males and females as having different and distinct roles to play in Zimbabwean society today? Which are these roles and what is your feeling concerning these roles?
2. I noticed in questionnaire responses that not as many girls as boys take design and technology subjects for study at this school. In your opinion, why do fewer girls choose to take design and technology subjects at school than boys?
3. What is your perception of design and technology subjects? How do you feel about girls taking the subjects and employment in engineering or building construction?
4. Do schools observe any traditions that you think (a) enhance girls' participation and achievement in design and technology subjects? (b) inhibit girls' participation and achievement in design and technology subjects?
5. What is it about design and technology subjects that 4<sup>th</sup> form girls in secondary schools in Zimbabwe are rejecting or finding problematic to the extent of hindering their participation?
6. The performance of girls in the past 10 years in design and technology subjects at 4<sup>th</sup> form level show that they do not do as well in these subjects as they do in other subjects. What do you think are the factors affecting 4<sup>th</sup> form girls performance in design and technology subjects?
7. I note in the questionnaire I gave girls in schools that they have thought about careers they want to pursue after school. What role do you play as parents concerning your daughter's future?

## Appendix xxvii

## Design and technology subjects enrolment

(a) **Technical graphics and design enrolment** (English language has been used as an indicator of total enrolment since it is compulsory for every fourth form student to enroll in it).

Year	1990	1992	1994	1996	1998	2000	2001
National girls	161/64407 0.3%	122/68098 0.2%	189/67464 0.3%	295/78395 0.4%	567/95177 0.6%	489/102220 0.5%	547/95177 0.6%
National boys	1846/97669 1.9%	1976/99835 2%	2046/95454 2.1%	2533/103971 2.4%	3709/118342 3.1%	3472/125808 2.8%	3616/118342 3.0%
Harare girls	-	-	-	111/13797 0.8%	242/15480 1.6%	231/16496 1.4%	190/17266 1.1%
Harare boys	-	-	-	758/16594 4.6%	1191/17745 6.7%	942/18795 5.0%	923/19294 4.8%
Masv girls	-	-	-	18/11211 0.2%	33/13811 0.2%	17/14219 0.1%	27/13509 0.2%
Masv boys	-	-	-	190/15157 1.3%	260/18043 1.4%	248/18459 1.3%	297/17732 1.7%

Masv = Masvingo

## (b) Building technology and design enrolment

Year	1990	1992	1994	1996	1998	2000	2001
National girls	245/64407 0.4%	315/68098 0.5%	177/67464 0.3%	290/78395 0.4%	525/95177 0.6%	631/102220 0.6%	678/95177 0.7%
National boys	5012/97669 5.1%	5155/99835 5.2%	4751/95454 5.0%	6370/103971 6.1%	9591/118342 8.1%	11501/125808 9.1%	12236/118342 10.3%
Harare girls	-	-	-	76/13797 0.6%	91/15480 0.6%	78/16496 0.5%	68/17266 0.4%
Harare boys	-	-	-	598/16594 3.6%	602/17745 3.4%	721/18795 3.8%	730/19294 3.8%
Masv girls	-	-	-	23/11211 0.2%	48/13811 0.3%	53/14219 0.4%	5/13509 0.03%
Masv boys	-	-	-	742/15157 4.9%	1122/18043 6.2%	1384/18459 7.5%	1395/17732 7.9%

Masv = Masvingo

## (c) Wood technology and design enrolment

Year	1990	1992	1994	1996	1998	2000	2001
National girls	181/64407 0.3%	90/68098 0.1%	69/67464 0.1%	86/78395 0.1%	164/95177 0.2%	210/102220 0.2%	307/95177 0.3%
National boys	6012/97669 6.1%	5086/99835 5.1%	4470/95454 4.6%	5073/103971 4.9%	6257/118342 5.3%	6660/125808 5.3%	6867/118342 5.8%
Harare girls	-	-	-	11/13797 0.1%	25/15480 0.2%	44/16496 0.3%	99/17266 0.6%
Harare boys	-	-	-	1444/16594 8.7%	1914/17745 10.8%	1973/18795 10.4%	1961/19294 10.2%
Masv girls	-	-	-	5/11211 0.04%	11/13811 0.07%	14/14219 0.1%	11/13509 0.1%
Masv boys	-	-	-	320/15157 2.1%	445/18043 2.5%	542/18459 2.9%	553/17732 3.1%

Masv = Masvingo

## (d) Metal technology and design enrolment

Year	1990	1992	1994	1996	1998	2000	2001
National girls	110/64407 0.2%	48/68098 0.1%	18/67464 0.02%	21/78395 0.02%	86/95177 0.1%	121/102220 0.1%	200/95177 0.2%
National boys	3762/97669 3.9%	2496/99835 3.0%	2718/95454 2.80%	3003/103971 2.90%	3977/118342 3.4%	4063/125808 3.2%	3872/118342 3.3%
Harare girls	-	-	-	2/13797 0.01%	39/15480 0.3%	57/16496 0.3%	97/17266 0.6%
Harare boys	-	-	-	1211/16594 7.3%	1725/17745 9.7%	1591/18795 8.5%	1666/19294 8.6%
Masv girls	-	-	-	4/11211 0.03%	5/13811 0.03%	1/14219 0.007%	6/13509 0.04%
Masv boys	-	-	-	87/15157 0.6%	215/18043 1.2%	226/18459 1.2%	259/17732 1.5%

Masv = Masvingo

## Appendix xxviii

## Academic subjects enrolment

(a) English language enrolment (English language has been used as an indicator of total enrolment since it is compulsory for every fourth form student to enrol in it.)

Year	1990	1992	1994	1996	1998	2000	2001
National girls	64407	68098	67464	78395	95177	102220	95177
National boys	97669	99835	95454	103971	118342	125808	118342
Harare girls	-	-	-	13797	15480	16496	17266
Harare boys	-	-	-	16594	17745	18795	19294
Masv girls	-	-	-	11211	13811	14219	13509
Masv boys	-	-	-	15157	18043	18459	17732

Masv = Masvingo

## (b) Mathematics enrolment

Year	1990	1992	1994	1996	1998	2000	2001
National girls	31526/64407 48.9%	31273/68098 45.9%	34401/67464 51%	41308/78395 43.4%	50237/95177 52.8%	55087/102220 53.9%	45909/95177 48.2%
National boys	55815/97669 57.1%	53634/99835 53.7%	52418/95454 54.9%	57427/103971 55.2%	65801/118342 55.6%	69767/125808 55.5%	55644/118342 47%
Harare girls	-	-	-	8494/13797 62%	11564/15480 74.7%	10398/16496 63%	10934/17266 63.3%
Harare boys	-	-	-	10725/16594 64.6%	9344/17745 52.7%	12301/18795 65.4%	12640/19294 65.5%
Masv girls	-	-	-	4918/11211 43.9%	6131/13811 44.4%	6564/14219 46.2%	7425/13509 55%
Masv boys	-	-	-	7683/15157 50.7%	9239/18043 51.2%	9599/18459 52%	10396/17732 58.6%

Masv = Masvingo

## (b) Integrated science enrolment

Year	1990	1992	1994	1996	1998	2000	2001
National girls	48791/64407 75.8%	53699/68098 78.9%	55857/67464 82.8%	63487/78395 81%	75928/95177 79.8%	87911/102220 86%	92319/95177 97%
National boys	76741/97669 78.6%	78186/99835 78.3%	74252/95454 77.8%	77444/103971 74.5%	87304/118342 73.8%	98743/125808 78.5%	100429/118342 84.9%
Harare girls	-	-	-	10662/13797 77.3%	11768/15480 76%	14090/16496 85.4%	15614/17266 90.4%
Harare boys	-	-	-	11097/16594 66.9%	11924/17745 67.2%	13513/18795 71.9%	14113/19294 73.1%
Masv girls	-	-	-	8819/11211 78.7%	10454/13811 75.7%	11754/14219 82.7%	11983/13509 88.7%
Masv boys	-	-	-	11285/15157 74.5%	13011/18043 72.1%	14458/18459 78.3%	14515/17732 81.9%

Masv = Masvingo

## (d) Fashion and fabrics enrolment

Year	1990	1992	1994	1996	1998	2000	2001
National girls	11597/64407 18%	11585/68098 17%	11435/67464 16.9%	15559/78395 19.8%	23085/95177 24.3%	26067/102220 25.5%	27776/95177 29.2%
National boys	239/97669 0.2%	265/99835 0.26%	269/95454 0.28%	309/103971 0.3%	613/118342 0.5%	833/125808 0.7%	891/118342 0.8%
Harare girls	-	-	-	2390/13797 17.3%	3245/15480 20.9%	3274/16496 19.8%	3638/17266 21.1%
Harare boys	-	-	-	20/16594 0.1%	87/17745 0.49%	120/18795 0.6%	128/19294 0.7%
Masv girls	-	-	-	2152/11211 19.2%	3292/13811 23.8%	3812/14219 26.8%	4193/13509 31%
Masv boys	-	-	-	54/15157 0.35%	70/18043 0.4%	87/18459 0.5%	92/17732 0.5%

Masv = Masvingo

## Appendix xxix

## Design and technology subjects performance statistics 1990-2001

## (a) Metal technology and design girls passing with grades A, B and C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National	0/110	12/48	8/18	10/21	16/86	40/121	50/200
girls %	0%	25%	44%	48%	19%	33%	25%
National	960/3762	1151/2496	1468/2718	1640/3003	2193/3977	2460/4063	2283/3872
boys %	26%	46%	54%	55%	55%	61%	59%
Hre girls				1/2	3/79	21/57	41/97
%	-	-	-	50%	8%	37%	42%
Hre boys				528/1211	793/1725	863/1591	828/1666
%	-	-	-	44%	46%	54%	50%
Masv girls				4/4	1/5	0/1	1/6
%	-	-	-	100%	20%	0%	17%
Masv boys				62/87	169/215	182/226	181/259
%	-	-	-	71%	79%	81%	70%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## (b) Wood technology and design girls passing with grades A, B and C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National	39/181	10/90	23/69	48/86	66/164	74/210	97/307
girls %	22%	11%	33%	56%	40%	35%	32%
National	3908/6012	1761/5086	3339/4470	3864/5073	4385/6357	4920/6660	5080/6867
boys %	66%	35%	75%	76%	70%	74%	74%
Hre girls				4/11	6/25	11/44	27/99
%	-	-	-	36%	24%	25%	27%
Hre boys				958/1444	1111/1914	1299/1973	1310/1961
%	-	-	-	66%	58%	66%	67%
Masv girls				4/5	6/11	5/14	8/11
%	-	-	-	80%	55%	36%	72.7%
Masv boys				280/320	361/445	452/542	455/553
%	-	-	-	88%	81%	83%	82%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## (c) Building technology and design girls passing with grades A, B and C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National	23/245	26/315	17/177	27/290	89/525	79/631	81/678
girls %	9%	8%	10%	9%	17%	13%	12%
National	1843/5012	1699/5122	1751/4751	2775/6370	3941/9591	3535/11501	4090/12236
boys %	37%	33%	37%	44%	41%	31%	33%
Hre girls				0/21	17/91	9/78	7/68
%	-	-	-	0%	19%	12%	10%
Hre boys				95/142	147/602	120/721	146/332
%	-	-	-	67%	24%	17%	44%
Masv girls				1/6	89/525	5/53	4/59
%	-	-	-	17%	17%	9%	7%
Masv boys				371/742	469/1122	441/1384	406/1395
%	-	-	-	50%	42%	32%	29%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## (d) Technical Graphics and design girls passing with grades A, B and C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National	23/161	22/122	71/189	99/295	229/567	127/489	184/547
girls %	14%	18%	38%	34%	40%	26%	34%
National	759/1846	878/1861	1121/2046	1380/2533	2195/3709	1853/3472	1810/3616
boys %	41%	47%	55%	55%	59%	53%	50%
Hre girls				22/111	59/242	24/231	45/190
%	-	-	-	20%	24%	10%	24%
Hre boys				350/758	633/1191	435/942	420/923
%	-	-	-	46%	53%	46%	46%
Masv girls				9/18	23/33	9/17	16/27
%	-	-	-	50%	70%	53%	59%
Masv boys				136/190	170/260	158/248	202/297
%	-	-	-	72%	65%	64%	68%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## Appendix xxx

## Academic subjects performance statistics 1990-2001.

## (a) English language students passing with grade A, B or C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National girls %	11793/64407 18%	12864/68098 19%	16497/67464 25%	22863/78395 29%	25038/95177 26%	35022/102220 34%	25038/95177 26%
National boys %	18254/97669 19%	20460/99835 21%	21328/95454 22%	27497/103971 26%	28240/118342 24%	34263/125808 27%	28240/118342 24%
Hre girls %	-	-	-	4807/13797 35%	5122/15480 33%	6983/16496 42%	6573/17266 38%
Hre boys %	-	-	-	5030/16594 30%	5147/17745 29%	6638/18795 35%	6216/19294 32%
Masv girls %	-	-	-	2838/11211 25%	2991/13811 22%	4013/14219 28%	4078/13509 30%
Masv boys %	-	-	-	3852/15157 25%	4273/18043 24%	4594/18459 25%	5171/17732 29%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## (b) Mathematics students passing with grade A, B or C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National girls %	4520/31526 14%	5289/31273 17%	6191/34401 18%	5455/41308 13%	5718/50237 11%	6181/55087 11%	5316/45909 12%
National boys %	15945/55815 29%	15856/53634 30%	15016/52418 29%	13692/57427 24%	14666/65801 22%	14237/69767 20%	11741/55644 21%
Hre girls %	-	-	-	585/8494 7%	613/11564 5%	684/10398 7%	712/10934 7%
Hre boys %	-	-	-	1735/10725 16%	1802/9344 19%	1780/12301 15%	1836/12640 15%
Masv girls %	-	-	-	978/4918 20%	956/6131 16%	1064/6564 16%	1182/7425 16%
Masv boys %	-	-	-	2531/7683 33%	2801/9239 30%	2620/9599 27%	2728/10396 26%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## (d) Integrated science students passing with grade A, B or C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National girls %	7011/48791 14%	8414/53699 16%	10936/55857 20%	14852/63487 23%	17396/75928 23%	17594/87911 20%	18730/92319 20%
National boys %	24438/76741 32%	25924/78186 33%	27587/74252 37%	30079/77444 39%	31379/87304 36%	34482/98743 35%	35980/100429 36%
Hre girls %	-	-	-	2323/10662 22%	2409/11768 21%	2404/14090 17%	2870/15614 18%
Hre boys %	-	-	-	3963/11097 36%	3726/11924 31%	4442/13513 33%	4645/14113 33%
Masv girls %	-	-	-	2394/8819 27%	2709/10454 26%	2651/11754 23%	2492/11983 29%
Masv boys %	-	-	-	5183/11285 46%	5450/13011 42%	5847/14458 40%	5866/14515 40%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## (d) Fashion and fabrics students passing with grade A, B or C

Year	1990 NP/Total	1992 NP/Total	1994 NP/Total	1996 NP/Total	1998 NP/Total	2000 NP/Total	2001 NP/Total
National girls %	4265/11597 37%	4547/11585 39%	5063/11435 44%	6673/15559 43%	10302/23085 45%	7925/26067 30%	13235/27776 48%
National boys %	62/239 26%	100/265 38%	119/269 44%	96/309 31%	243/613 40%	192/833 23%	301/891 34%
Hre girls %	-	-	-	890/2390 37%	1182/3245 36%	988/3274 30%	1665/3638 46%
Hre boys %	-	-	-	3/20 10%	30/87 35%	22/120 18%	45/128 35%
Masv girls %	-	-	-	1094/2152 51%	1589/3292 48%	1262/3812 33%	2284/4193 55%
Masv boys %	-	-	-	20/54 37%	22/70 31%	27/87 31%	45/92 49%

NP= Number Passing, Masv= Masvingo, Hre= Harare

## Appendix xxxi

**Technical subjects and D&T enrolment to ordinary level (answering question 6)****(a) Mau and Mbizi fourth form girls' primary school technical subjects enrolment (1999)**

Subject	Art/Craft	Sewing	Cookery	W/T	M/T	TG	Agric	Nil	Total
Students	10	22	10	0	0	0	4	38	85
%	11.7	25.9	11.7	0	0	0	4.7	44.7	100%

Agric. = Agriculture; W/T = Wood Technology; M/T = Metal Technology; TG = Technical Graphics

**Mau and Mbizi fourth form girls' technical subjects enrolment at form one and two level (2000-2001)**

Subject	Agric	Weaving	F/F	F/N	W/T	M/T	TG	Music	Art	Nil	Total
Students	35	0	47	0	0	0	0	0	0	3	85
%	41	0	55.3	0	0	0	0	0	0	3.5	100%

Agric. = Agriculture; W/T = Wood Technology; M/T = Metal Technology; TG = Technical Graphics; F/F = fashion and Fabrics; F/N = Food and Nutrition

**Mau and Mbizi fourth form girls' technical subjects enrolment (2002-2003)**

Subject	Agric	Weaving	F/F	F/N	W/T	M/T	TG	Music	Art	Nil	Total
Students	34	0	47	0	0	0	0	0	0	4	85
%	40	0	55.3	0	0	0	0	0	0	4.7	100%

Agric. = Agriculture; W/T = Wood Technology; M/T = Metal Technology; TG = Technical Graphics; F/F = fashion and Fabrics; F/N = Food and Nutrition

**(b) Mari and Tembo fourth form girls' primary school technical subjects (1999)**

Subject	Art & craft	Sewing	Comp	F/N	W/T	M/T	T/G	Buil	Nil	Total
Students	5	27	1	1	2	0	0	0	24	60
%	8.3	45	1.7	1.7	3.3	0	0	0	40	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Agric = Agriculture; Buil= Building; F/N = Foods and Nutrition

**Mari and Tembo fourth form girls' technical subjects at form one and two level (2000-2001)**

Subject	Agric	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art/ Craft	Nil	Total
Students	2	1	22	11	0	0	2	0	1	20	60
%	3.3	1.7	36.7	18.3	0	0	3.3	0	1.7	33.3	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Agric = Agriculture; Buil= Building; F/N = Food and Nutrition; F/F = Fashion and Fabrics

**Mari and Tembo fourth form girls' technical subjects enrolment (2002-2003)**

Subject	Agric	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Nil	Total
Students	0	0	25	10	0	0	0	0	0	25	60
%	0	0	41.7	16.7	0	0	0	0	0	41.7	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Agric = Agriculture; F/N = Food and Nutrition; F/F = Fashion and Fabrics; Buil = Building

**(c) Denlow and Gemston fourth form girls' primary school technical subjects (1999)**

Subject	Art/ craft	Sewing	Comp	F/N	W/T	M/T	T/G	Buil	Nil	Total
Students	17	25	0	12	1	0	0	0	73	128
%	13.3	19.5	0	9.4	0.8	0	0	0	57	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Buil= Building; F/N = Food and Nutrition

**Denlow and Gemston fourth form girls' technical subjects enrolment at form one and two level (2000-2001)**

Subj	Typ	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Mus	Nil	Total
Stud	10	6	28	16	0	0	10	0	9	6	43	128
%	7.8	4.7	21.9	12.5	0	0	7.8	0	7	4.7	33.6	100%

Subj. = Subjects; Stud. = Students; W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Buil= Building; F/N = Food and Nutrition; F/F = Fashion and Fabrics; Typ = Typing; Mus = Music

**Denlow and Gemston fourth form girls' technical subjects enrolment (2002-2003)**

Subj	Typ	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Mus	Nil	Total
Stud	10	6	26	23	0	0	5	0	7	3	48	128
%	7.8	4.7	20.3	18	0	0	3.9	0	5.5	2.3	37.5	100%

Subj. = Subjects; Stud. = Students; W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Buil= Building; F/N = Food and Nutrition; F/F = Fashion and Fabrics; Typ = Typing; Mus = Music

**(d) Riverdale and Telford fourth form girls' primary school technical subjects (1999)**

Subject	Art / craft	Sewing	F/N	Agric	W/T	M/T	T/G	Buil	Nil	Total
Students	17	15	3	0	0	0	0	0	6	48
%	35.4	31.3	6.3	0	0	0	0	0	12.5	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Agric = Agriculture; Buil= Building; F/N = Food and Nutrition

**Riverdale and Telford fourth form girls' technical subjects enrolment at form one and two level (2000-2001)**

Subject	Agric	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Nil	Total
Students	4	0	23	5	0	0	7	0	20	2	48
%	8.3	0	47.9	10.4	0	0	14.6	0	41.7	4.2	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Agric = Agriculture; Buil= Building; F/N = Food and Nutrition; F/F = Fashion and Fabrics

**Riverdale and Telford fourth form girls' technical subjects enrolment (2002-2003)**

Subject	Agri	Bak	F/F	F/N	W/T	M/T	T/G	Buil	Art	Nil	Total
Students	3	1	17	0	0	0	3	0	8	16	48
%	6.3	2.1	35.4	0	0	0	6.3	0	16.7	33.3	100%

W/T = Wood Technology; M/T = Metal technology; TG = Technical Graphics; Agri = Agriculture; F/N = Food and Nutrition; F/F = Fashion and Fabrics; Buil = Building; Bak = Bakery

## Appendix xxxii

**Current and desired subjects** (answering questions 5 and 7 on student questionnaire)

**Mau and Mbizi fourth form girls' current and desired technical subjects**

Subject	Agric	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Mus	Nil	Total
Current Subject	34	0	47	0	0	0	0	0	0	0	4	85
%	40	0	55.3	0	0	0	0	0	0	0	4.7	100%
Desired subject	5	2	7	56	1	3	0	2	0	3	6	85
%	5.9	2.4	8.2	65.9	1.2	3.5	0	2.4	0	3.5	7.1	100

Agric= Agriculture; Comp= Computers; F/F= Fashion and Fabrics; F/N= Food and nutrition; Mus= Music  
M/T = Metal Technology; W/T = Wood Technology; T/G = Technical Graphics; Buil = Building

**Mari and Tembo fourth form girls' current and desired technical subjects**

Subject	Agric	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Nil	Total
Current Subject	0	0	25	10	0	0	0	0	0	25	60
%	0	0	41.7	16.7	0	0	0	0	0	41.7	100
Desired subject	3	4	13	5	5	6	15	7	2	0	60
%	5	6.7	21.7	8.3	8.3	10	25	11.7	3.3	0	100%

Agric= Agriculture; Comp= Computers; F/F= Fashion and Fabrics; F/N= Food and nutrition;  
M/T = Metal Technology; W/T = Wood Technology; T/G = Technical Graphics; Buil = Building

**Denlow and Gemston fourth form girls' current and desired technical subjects**

Subject	Agr	Co/ Ty	F/F	F/N	W/T	M/T	T/G	Buil	Art	Phot	Mus	Nil	Total
Current Subject	0	6/10	26	23	0	0	5	0	7	0	3	48	128
%	0	12.5	20.3	18	0	0	3.9	0	5.5	0	2.3	37.5	100
Desired subject	15	6/3	5	8	2	2	12	8	7	2	1	57	128
%	11.7	7.0	3.9	6.3	1.6	1.6	9.4	6.3	5.5	1.6	0.8	44.5	100%

Agr= Agriculture; Co/Ty= Computers/Typing; F/F= Fashion and Fabrics; F/N= Food and nutrition;  
Mus= Music; M/T = Metal Technology; W/T = Wood Technology; T/G = Technical Graphics;  
Buil = Building; Phot= Photography.

**Riverdale and Telford fourth form girls' current and desired technical subjects**

Subject	Agri	Comp	F/F	F/N	W/T	M/T	T/G	Buil	Art	Nil	Total
Current Subject	3	0	17	1	0	0	3	0	8	16	48
%	6.3	0	35.4	2.1	0	0	6.3	0	16.7	33.3	100%
Desired subject	0	5	7	12	4	3	7	0	2	8	48
%	0	10.4	14.6	25	8.3	6.3	14.6	0	4.2	16.7	100%

Agri= Agriculture; Comp= Computers; F/F= Fashion and Fabrics; F/N= Food and nutrition;  
M/T = Metal Technology; W/T = Wood Technology; T/G = Technical Graphics; Buil = Building

(A total of 77 out of 321 girls or 24% desired to take D&T in the four school types)

## Appendix xxxiii

## Fourth form girls' questionnaire response themes (answering question 6 ii and iii)

## Mau and Mbizi questionnaire responses

Response Category	Mau	Mbizi	Response Total	%
1. Future value of the subject	27(54%)	1(2.9%)	28	32.9
2. School systemic organization	8(16%)	13(37%)	21	24.7
3. Nature of the subject (easy/difficult-domain specific subject efficacy)	5(10%)	10(28.6%)	15	17.6
4. Assimilated gender role schema	0(0%)	8(22.9%)	8	9.4
5. Interest/lack of interest in the subject	5(10%)	0(0)	5	5.9
6. Paucity of information	0(0%)	1(2.9%)	1	1.2
7. No reason	5(10%)	2(5.7%)	7	8.2
Total	50(100%)	35(100%)	85	100

## Mari and Tembo questionnaire responses

Response Category	Mari	Tembo	Response Total	%
1. Future value of the subject	6(16.2%)	9(39.1%)	15	25
2. Gender stereotyping of subjects by sex.	10(27%) 7(18.9%)	2(8.7%) 2(8.7%)	12 9	20 15
3. Self-concept of ability (domain specific subject efficacy)	4(10.8%) 3(8.1%)	5(21.7%) 0	9 3	15 5
4. Interest or lack of interest in the subject	0 1(2.7%)	3(13%) 0	3 1	5 1.7
5. Cost of engaging in activity	6(16.2%)	2(8.7%)	8	13.3
6. Lack of home support	-	-	-	-
7. Social isolation avoidance	-	-	-	-
8. No comment	-	-	-	-
Total	37(100%)	23(100%)	60	100

## Denlow and Gemston questionnaire responses

Response Category	Denlow	Gemston	Response Total	%
1. School systemic organisation	16(47.1%)	12(12.8%)	28	21.9
2. Assimilated gender role schema	4(11.8%)	23(24.5%)	27	21.1
3. Interest/lack of interest in the subject	1(2.9%)	19(20.2%)	20	15.6
4. Future value of the subject	0	20(21.3%)	20	15.6
5. Cost of engaging in an activity	2(5.9%)	11(11.7%)	13	10.1
6. Domain specific subject efficacy	8(23.5%)	4(4.3%)	12	9.4
7. Nature of subject	0	4(4.3%)	4	3.1
8. Paucity of information	0	2(2.1%)	2	1.6
9. Advice of significant others	3(8.8%)	0	3	2.3
10. No response	0	0	0	0
Total	34(100%)	94(100%)	128	100

## Riverdale and Telford questionnaire responses

Response Category	Riverdale	Telford	Response Total	%
1. Future value of the subject	2(7.1%)	15(75%)	17	35.4
2. Interest/lack of interest in the subject	8(28.6%)	3(15%)	11	22.9
3. Domain specific subject efficacy	7(25%)	1(5%)	7	14.6
4. Cost of engaging in the subject	6(21.4%)	0	6	12.5
5. System of organisation	0	1(5%)	1	2.1
6. Assimilated gender role schema	1(3.6%)	0	1	2.1
7. No response	4(14.3%)	0	4	8.3
Total	28(100%)	20(100%)	48	100

## Appendix xxxiv

**Fourth form girls desired career aspirations** (answering question 9 i )

(Those in bold letters can be linked directly to design and technology subjects in the Zimbabwean curriculum presently)

**Mau and Mbizi Rural Schools**

Perceived Future Career	Mau	Mbizi	Total	% of Total	Career Perceptual Orientation
1. Nurse	16(32%)	7(20%)	23	27.1	Female
2. Dressmaker	9(18%)	4(11.4%)	13	15.3	Female
3. Teacher	6(12%)	4(11.4%)	10	11.8	Both male and female
4. Businessperson	3(6%)	1(2.9%)	4	4.7	Male
5. Secretary/Clerk	2(4%)	2(5.7%)	4	4.7	Female
6. Medical doctor	2(4%)	1(2.9%)	3	3.5	Both male and female
7. Accountant	0	3(8.6%)	3	3.5	Male
8. Lawyer	2(4%)	0	2	2.4	Both male and female
9. Agri-demonstrator	2(4%)	0	2	2.4	Male
10. Air attendant	2(4%)	0	2	2.4	Female
11. Police	0	2(5.7%)	2	2.4	Both male and female
12. Computer programmer	2(4%)	0	2	2.4	Male
13. Journalist	0	2(5.7%)	2	2.4	Both male and female
14. Farmer	1(2%)	1(2.9%)	2	2.4	Male
15. Pilot	1(2%)	1(2.9%)	2	2.4	Male
16. Labourer	1(2%)	0	1	1.2	Male
17. Prison Officer	0	1(2.9%)	1	1.2	Male
18. Soldier	0	1(2.9%)	1	1.2	Male
19. Musician	0	1(2.9%)	1	1.2	Both male and female
20. <b>Electrician</b>	0	1(2.9%)	1	1.2	Male
21. Food Caterer	0	1(2.9%)	1	1.2	Female
22. Nil	3(6%)	0	3	3.5	-
<b>Total</b>	<b>50(100%)</b>	<b>35(100%)</b>	<b>85</b>	<b>100</b>	

**Mari And Tembo Government Group B**

PERCEIVED FUTURE CAREER	Mari	Tembo	Res. Total	% of Total	PERCEIVED CAREER ORIENTATION
1. Accountant	7(18.9%)	11(47.8%)	18	30	Female
2. Nurse	9(24.3%)	3(13%)	12	20	Female
3. Medical doctor	8(21.6%)	2(8.7%)	10	16.7	Male
4. Lawyer	2(5.4%)	0	2	3.3	Both male and female
5. Physiotherapist	2(5.4%)	0	2	3.3	Female
6. Police	1(2.7%)	1(4.3%)	2	3.3	Both male and female
7. Flight attendant	1(2.7%)	1(4.3%)	2	3.3	Female
8. Fashion designer	1(2.7%)	2(8.7%)	2	3.3	Female
9. <b>Motor mechanic</b>	0	2(8.7%)	2	3.3	Male
10. Computer scientist	1(2.7%)	0	1	1.7	Male
11. Receptionist	1(2.7%)	0	1	1.7	Female
12. Hairdresser	1(2.7%)	0	1	1.7	Female
13. <b>Architect</b>	1(2.7%)	0	1	1.7	Male
14. Radiographer	1(2.7%)	0	1	1.7	Female
15. Manager	0	1(4.3%)	1	1.7	Male
16. Nil	1(2.7%)	0	1	1.7	-
<b>Total</b>	<b>37(100%)</b>	<b>23</b>	<b>60</b>	<b>100%</b>	

**Denlow and Gemston Government Group A**

PERCEIVED FUTURE CAREER	Denlow	Gemston	Res. Total	% of Total	PERCEIVED CAREER ORIENTATION
1. Nurse	8(23.5%)	11(11.7%)	19	14.8	Female
2. Accountant	5(14.7%)	14(14.9%)	19	14.8	Both male and female
3. Medical doctor	3(8.8%)	16(17%)	19	14.8	Both male and female
4. Lawyer	6(17.6%)	11(11.7%)	17	13.3	Both male and female
5. Fashion designer	0	7(7.4%)	7	5.5	Female
6. <b>Engineer</b>	1(2.9%)	6(6.4%)	7	5.5	Male
7. Catering	1(2.9%)	4(4.3%)	5	3.9	Female
8. <b>Computer progr.</b>	0	4(4.3%)	4	3.1	Male
9. Air flight attendant	3(8.8%)	1(1%)	4	3.1	Female
10. Journalist	2(5.9%)	1(1%)	3	2.4	Both male and female
11. Musician	2(5.9%)	1(1%)	3	2.4	Both male and female
12. Interior decorator	0	2(2.1%)	2	1.6	Female
13. Businessperson	0	2(2.1%)	2	1.6	Male
14. Artist	0	1(1%)	1	0.8	Male
15. <b>Architect</b>	0	1(1%)	1	0.8	Male
16. Scientist	0	1(1%)	1	0.8	Male
17. Physiotherapist	0	1(1%)	1	0.8	Female
18. Tourism admin	0	1(1%)	1	0.8	Female
19. Cosmetologist	0	1(1%)	1	0.8	Female
20. Secretary	0	1(1%)	1	0.8	Female
21. Economist	0	1(1%)	1	0.8	Male
22. Veterinary doctor	0	1(1%)	1	0.8	Male
23. Pharmacist	0	1(1%)	1	0.8	Male
24. Counsellor	0	1(1%)	1	0.8	Female
25. <b>Builder</b>	0	1(1%)	1	0.8	Male
26. Film maker	0	1(1%)	1	0.8	Male
27. Geophysicist	0	1(1%)	1	0.8	Male
28. Teacher	1(2.9%)	0	1	0.8	Both male and female
29. Don't know	2(5.9%)	0	2	1.6	-
Total	34(100%)	94(100%)	128	100%	

Computer progr = Computer programming

**Riverdale and Telford Private Schools**

PERCEIVED FUTURE CAREER	Riverdale	Telford	Res. Total	% of Total	PERCEIVED CAREER ORIENTATION
1. Accountant	5(17.9%)	6(30%)	11	22.9	Male and female
2. Doctor	6(21.4%)	1(5%)	7	14.6	Male and female
3. Lawyer	4(14.3%)	2(10%)	6	12.5	Male and female
4. Nurse	0	6(30%)	6	12.5	Female
5. Fashion designer	3(10.7%)	0	3	6.25	Male and female
6. Entertainer	3(10.7%)	0	3	6.25	Male and female
7. Dietician	0	2(10%)	2	4.2	Female
8. Agric. Ext. Officer	0	1(5%)	1	2.1	Male
9. <b>Electrician</b>	0	1(5%)	1	2.1	Male
10. Missionary	1(3.6%)	0	1	2.1	Male
11. Businessperson	1(3.6%)	0	1	2.1	Male and female
12. Tourism	1(3.6%)	0	1	2.1	Male and female
13. Beauty therapist	1(3.6%)	0	1	2.1	Female
14. <b>Computer engineer</b>	1(3.6%)	0	1	2.1	Male
15. <b>Architect</b>	1(3.6%)	0	1	2.1	Male
16. TV broadcaster	1(3.6%)	0	1	2.1	Male and female
17. Teacher	0	1(5%)	1	2.1	Male and female
Total	28(100%)	20(100%)	48	100%	

Agric. Ext. Officer = Agricultural Extension Officer

## Appendix xxxv

## Parents' Occupations For Fourth Form Girls In Sample (Question 4)

Mau and Mbizi rural schools mothers			Mau and Mbizi rural school fathers		
Occupation	Number	Percentage	Occupation	Number	Percentage
Housewife (f)	71	84	Peasant farmer	42	49
Vendors (f)	6	7	Bus Inspector	3	4
Teacher	2	2	General labourer	4	5
Dressmaker (f)	1	1	Soldier	3	4
Secretary (f)	1	1	Policemen	3	4
Prog. Director	1	1	Teacher	2	2
Dead	3	4	Agri-demonstrator	2	2
			Businessman	2	2
			Bus Driver	2	2
			Tailor	2	2
			Traditional healer	1	1
			Builder	1	1
			Counselor	1	1
			Hotel caterer	1	1
			Accountant	1	1
			Shop manager	1	1
			Field officer	1	1
			Book Editor	1	1
			Panel Beater	1	1
			Plumber	1	1
			Messenger	1	1
			Game scout	1	1
			Basketry	1	1
			Dead	5	6
<b>Total</b>	<b>85</b>	<b>100%</b>		<b>85</b>	<b>100%</b>

Mothers in 'female' occupations were 79 out of 85 = 93%

Mari and Tembo Gvt. Group B school mothers			Mari and Tembo Gvt. Group B fathers		
Occupation	Number	Percentage	Occupation	Number	Percentage
Housewife (f)	36	60	Teacher	10	16.7
Vendor (f)	8	13.3	Unemployed	10	16.7
Peasant farmer	3	5	Miner	6	10
Teacher	2	3.3	Soldier	5	8.3
Hairdresser (f)	2	3.3	Manager	4	6.7
Secretary (f)	1	1.7	Driver	3	5
Miner	1	1.7	Motor mechanic	2	3.3
Tailor (f)	1	1.7	Builder	2	3.3
Dressmaker (f)	1	1.7	Financial auditor	2	3.3
Nurse (f)	1	1.7	Industrial labourer	2	3.3
Deceased	2	3.3	Pensioner	2	3.3
			Farmer	2	3.3
			Lab technician	2	3.3
			Nurse	1	1.7
			Engineer	1	1.7
			Welder	1	1.7
			Diesel fitter	1	1.7
			Soldier	1	1.7
			Policeman	1	1.7
			Deceased	2	3.3
<b>Total</b>	<b>60</b>	<b>100%</b>		<b>60</b>	<b>100%</b>

Mothers in 'female' occupations (f) were 50 out of 60 = 83%

Denlow and Gemston mothers' occupations			Denlow and Gemston fathers' occupations		
Occupation	Number	Percentage	Occupation	Number	Percentage
Housewife (f)	41	32	Unemployed	32	25
Lecturer/teacher	31	24.2	Technician	14	10.9
Businesswoman	15	11.7	Manager	13	10.2
Nurse (f)	10	7.8	Businessman	11	8.6
Secretary/clerk (f)	8	6.3	Lecturer/teacher	11	8.6
Accountant	5	3.9	Driver	6	4.7
Dressmaker (f)	4	3.1	Soldier	5	3.9
Manager	3	2.3	Police Officer	4	3.1
District admin.	2	1.6	Accountant	3	2.3
Evangelist	1	0.8	Lawyer	3	2.3
Medical doctor	1	0.8	Insurance Broker	2	1.6
Police Officer	1	0.8	Salesperson	2	1.6
Salesperson	2	1.6	Engineer	1	0.8
Technician	1	0.8	Nurse	1	0.8
Dead	3	2.3	Carpenter	1	0.8
			Chemist	1	0.8
			Priest	1	0.8
			Court Messenger	1	0.8
			Politician	1	0.8
			Licensing Officer	1	0.8
			Waiter	1	0.8
			Soccer Coach	1	0.8
			Prison Officer	1	0.8
			Dead	11	8.6
<b>Total</b>	<b>128</b>	<b>100%</b>		<b>128</b>	<b>100%</b>

Mothers in 'female' occupations (f) were 63 out of 128 = 49.2%

Riverdale and Telford mother's occupations			Riverdale and Telford father's occupations		
Occupation	Number	Percentage	Occupation	Number	Percentage
Housewife (f)	7	14.6	Manager	11	22.9
Businessperson	15	31.3	Businessperson	6	12.5
Lecturer/Teacher	13	47.9	Driver	5	10.4
Secretary/Clerk (f)	4	8.3	Doctor	3	6.3
Accountant	3	6.3	Engineer	3	6.3
Manager	2	4.2	Accountant	2	4.2
Nurse (f)	2	4.2	Motor mechanic	2	4.2
Doctor	1	2.1	Lawyer	1	2.1
Technician	1	2.1	Soldier	1	2.1
			Farmer	1	2.1
			Clerk	1	2.1
			Unemployed	12	25
<b>Total</b>	<b>48</b>	<b>100%</b>		<b>48</b>	<b>100%</b>

Mothers in 'female' occupations (f) were 19 out of 48 = 39.6%

Appendix xxxvi

QSR NUDIST 6.0 qualitative results analysis

QSR N6 Full version, revision 6.0.  
Licensee: Peter Lind.

PROJECT: Project 11 Education Officer, User Chris, 4 39 pm, Oct 7, 2003.

REPORT ON NODE (F 1) 'Cultural sex role programming and stereotyping'  
Restriction to document: NONE

(F 1) //Free Nodes/Cultural sex role programming and stereotyping

\*\*\* Description:

Differential socialisation, low male teacher and societal expectation of women, role of language

+++++

+++ ON-LINE DOCUMENT: MasvingoEOinterview

+++ Document Description:

\* No Description

+++ Retrieval for this document: 74 units out of 366, = 20%

++ Text units 11-16:

EO: Ok, fine, in as far as we Zimbabweans are concerned, over the years 11  
we have tended to have duties that have sort of being lined for men and 12  
those that have been lined for women. And, we have over the years tended 13  
to think that the heavier duties are to be done by men and the lighter 14  
duties are to be done by women. And as such, this has gone on to 15  
influence the selection of subjects by pupils in our schools, where we 16

++ Text units 23-27:

EO: OK, from the onset, boys tend to be playing those roles which are 23  
played by their fathers. So in other words, you find that boys and men 24  
are the providers of whatever is mostly wanted by women. In particular, 25  
you would find that I would be tempted to think that these are the ones 26  
who go out hunting for wealth which will be utilized by the family. 27

++ Text units 30-32:

EO: Not quite that, (both EO and Res laugh) the woman will be of 30  
course, looking after the family and the home as such. So in other words 31  
they will be complimenting men's efforts but in a lighter manner. 32

++ Text units 39-44:

EO: This young man will be forced to look after the animals, will be 39  
forced to get out to fetch firewood, will be forced to go and assist in 40  
the tilling of the land using cattle, ploughs and so on whilst the girls 41  
will be forced to assist the mother in the house, sweeping the house, 42  
looking after the young babies, going out to fetch water and collecting 43  
firewood, doing the cooking and so on. 44

++ Text units 51-61:

Res: Just before we broke off, we took a break, we were talking about 51  
girls being forced into some roles. And you mentioned these very 52  
interesting words "girls forced to take". Who actual forces the girls to 53  
take those roles? 54

EO: OK, over the years we seem to have been forced in a situation where 55  
we are saying this girl by some circumstances surrounding her is forced 56  
to imitate the mother. And, the mother in actual fact would have learnt 57  
in a similar manner. So this girl by the circumstances which will be 58  
surrounding her will be forced to, is sort of being channeled into the 59  
footpaths of the mother whereby we are simply saying we have these duties 60  
which are defined as for ladies and the duties which are defined for boys. 61

++ Text units 75-77:

EO: Fine, ultimately I am saying towards the end of it all the girl 75  
should be a married mother who should be having a family and that family 76  
again will have its people divided along these expected duties. 77

++ Text units 89-100:

EO: It is unfortunate, from my own observations, from the moment this 89  
young person begins to play and wanting to play alone as an independent 90  
little thing. We tend to lead these youngsters into particular behaviour, 91  
particular roles which are in line with what that gender is expected to 92  
perform. This is seen ever coming from the nature of the toys which we 93  
give this young person. For a girl we know the sort of toys we will be 94  
imposing onto this young person. And for a boy of course in most cases 95  
you will be forced to attempt to behave like a small father. And that 96  
way, we are saying, and in as far as I am concerned, I will simply say 97  
the child is pushed into these expected duties, expected roles as early 98  
as perhaps three years of age, four years and upwards. 99

Res: Would you say language has a place to play in all this? 100

EO: Yes, definitely. 101

## Appendix xxxvii

## Manual data coding: categorisation and thematic grouping

(Huberman and Miles, 1994; Patton, 1990)

Res: I am at a rural school here in Masvingo province, in fact in Gutu district and I am interviewing here girls who do not do design and technology subjects especially metalwork, woodwork, technical graphics and building studies. Girls from the information that you and other girls provided in the questionnaire I gave you this morning, we see that you have chosen a wide selection of subjects. In your opinion, what influences you in choosing subjects for study.

Kuda: I think it is my ability to do that subject, whether I can pass it or not.

- Efficacy beliefs  
- Self-concept of ability

Res: What about the others, what do you think?

Jesca: I chose my subjects looking at how they will help me in the future.

- Future value of the subject

Res: What a wise answer. Surely you wouldn't do a subject that will not benefit you in the future.

Jane: The other thing is whether the subject is available at advanced level or not. I wouldn't like to take a subject that does not lead to "A" level and university.

- Subject continuity/  
discontinuity

Sekai: I think it is also important to do subjects that have a bearing to the career I want to pursue.

- Future career value

Res: Wonderful. Anything else that propels you to choose subjects?

Nyenge: I may take a subject for study because my friend will have chosen the subject as well. It means that we will be able to help each other.

- Peer pressure  
- Collaborative effort

Res: Aah, let us look at this point on friends a bit. Do friends influence you even when you don't like the subject?

Vongai: It all depends on whether you are the kind of person who just goes along with the water current. It is best to choose a subject because you will be able to do it and also that the subject will help you in the future and not because your friend has chosen it.

- Self-concept of ability  
- Future value of the subject

Res: Some friends perhaps say lets go and do building and some say let us go and do technical graphics. What do the others say?

Shumi: A good number follow the decision of their friends but some who are resolute about their futures will follow their own decisions. Sometimes you choose the same subjects as your friends because she is quite good in it and you will be able to get help from her as well.

- Peer influence / pressure  
- Collaboration in learning

## Appendix xxxviii

## Mau rural school questionnaire and interview themes (Q6 ii and iii)

## Fourth form girls taking D&amp;T

No girls taking design and technology subjects

## D&amp;T and guidance and counseling teachers

(N= 4)

- Culture:- gender role stereotypes/expectations  
-low male and society expectation of females, male domination of females
- Parents influence  
-expectation of girl's future, bias towards academic subjects, bias toward male child

## Fourth form girls not taking D&amp;T

(N= 8)

- Girls self-concept of D&T subjects ability.
- Future value of the subjects taken  
-pre-requisites for university entrance
- Peer pressure  
-intimidation/harassment of girls by boys, girls discouraging other girls, social isolation avoidance (need to be with other girls), lack of support and co-operation from boys, shy to assume male roles.
- Gender role socialization  
-separate spheres of activities, low male and society expectation of females
- Girls subject background  
-familiarity with knowledge, late engagement
- Parents and family influence  
-parental occupation and income, expectation of child's future, bias toward male child and curtailment of girl-child freedom.
- Role models/lack of role models  
-imitation of role, need for female role models.
- Girls' perception of D&T subjects  
-nature of subject (masculine, heavy, greasy, remote to female socialization)
- Teacher influence  
-girls' preference for a female teachers and fear of male teachers, active discouragement by male teachers, male teacher lack of support for girls, low male teacher expectation of girls, cultural impediments to girls seeking extra lessons with male teachers.
- School organization  
-culture e.g. streaming, academic thrust, governed by male ethos, rigid time-tabling, channeling of students into subjects, poor resources.
- The colonial aspect  
-active girls exclusion, career stereotypes, lack of women advancement, domesticity, low pay for females
- Guidance and counseling  
-lack of exposure, paucity of information.
- Subject fear and anxiety  
-fear of failure, negative attitudes towards subjects, low confidence, low achievement motivation and perseverance.
- Interest in the subject
- Male and society low perception of females.

## Principal (N= 1)

- Gender role stereotypes/expectations  
-low male and society expectation of females, male domination of females
- Guidance and counseling  
-lack of exposure, paucity of information.
- Parents influence  
-income, expectation of girl's future, bias

- 
- Future value of the subject:- does not lead to girls' expected and aspired careers
  - Interest in the subject/lack of interest
    - girls low motivation to enrol and achieve
  - Role models/lack of role models
    - very few female D&T teachers
  - Channeling of students into subjects
  - Lack of resources.
  - Teacher influence
    - exclusion of girls in D&T, low male teacher expectation of girls, teachers 'own negative attitudes towards technical subjects in general, unequal treatment of girls and boys.
  - Lack of exposure, paucity of information,
  - Teachers own lack of knowledge of what the subjects lead to.
  - The colonial aspect
    - biased learning material favouring males, biases towards academic subjects, stigma towards technical subjects as subjects for the less able, school structure based on socio-economic issues
  - Employer and media biases towards academic subjects and male employees.
  - Policy: - schools lack of adherence to Ministry policies
- toward male child.
  - Role models/lack of role models
    - very few female D&T teachers
  - Future value of the subject:- does not lead to girls' expected and aspired careers
  - Interest in the subject/lack of interest
    - girls low motivation to enrol and achieve
  - Girls' perception of D&T subjects
    - masculine, difficult
  - Colonial vestiges
    - biased learning material favouring males.
  - Lack of resources.
  - Teacher influence
    - low teacher expectation of girls
  - Girls self-concept of D&T ability
    - lack of familiarity with D&T subject skills and knowledge
  - Peer pressure
    - social isolation avoidance

## Appendix xxxix

### Mbizi rural school questionnaire and interview themes (Q6 ii and iii)

#### Fourth form girls taking D&T

No girls taking design and technology subjects

#### Design and technology teachers (N= 3)

- Culture:- gender role socialisation  
-low male and society expectation of females,
- Role models:- need for more female role models in schools and workplaces.
- The colonial aspect  
-different types of schools affecting resources, domesticity for females, employer biases towards male employees.

#### Fourth form girls not taking D&T

(N= 8)

- Role models/lack of role models  
-imitation of role, need for female role models
- Nature of subject (heavy, dirty, greasy, hard, difficult, remote to female socialisation.
- Future value of the subject  
-quest for a university education
- Teacher influence  
-girls' fear of male teachers, harsh treatment for girls by male teachers, male teacher lack of support for girls, low male teacher expectation of girls, difficulty in accessing male teachers.
- Girls' self-concept of ability  
- D&T self efficacy, girls low task persistence compared to boys.
- School organization  
- rigid time-tabling, channeling of students into subjects, poor resources
- Parents and family influence  
-parental occupation and income, expectation of child's future, bias towards academic subjects, curtailment of girls' freedoms and biases toward male child.
- Gender role stereotyping  
-differential socialization of girls and boys, low male and society expectation of females
- Girls subject background  
-familiarity with knowledge, late engagement
- Interest in the subject
- Peer pressure  
-intimidation/harassment of girls by boys, girls discouraging other girls,
- Lack of support and co-operation from boys.
- Need to be with other girls
- Guidance and counseling  
-lack of exposure, paucity of information
- Subject fear and anxiety  
-fear of failure, low confidence, low achievement motivation and task persistence, boys fear of girls competition.
- Future value of the subject
- Negative attitudes towards subjects,
- The colonial aspect  
-active girls exclusion, career stereotypes, domesticity

#### Principal (N= 1)

- Gender role stereotyping  
-low male and society expectation of females, male domination and female subordination
- Guidance and counseling  
-lack of exposure, paucity of information
- School organization  
- channeling of students into compulsory subjects

- Future value of the subjects
- School organization
  - academic subjects thrust, rigid time-tabling, channeling of students into subjects,
- Parents and family influence
  - occupation and income, lack of career knowledge to advise, expectation of girl's future, bias towards academic subjects, bias toward male child
- Teacher influence
  - exclusion of girls in D&T, low male teacher expectation of girls.
- Self-concept of ability (efficacy-Bandura, 1977)
  - self-efficacy, D&T self efficacy, girls' task persistence compared to boys
- Subject anxiety
  - female D&T teachers' own subjects anxiety, female teachers' low D&T subject skills and knowledge mastery, female teachers' confidence to teach D&T subjects, girls pressure for conformity to gender role stereotypes
- Student perception of D&T subjects
  - boys subjects, difficult for girls (subject anxiety), subjects for less able, negative attitudes towards subjects, lack of appeal.
- Lack of familiarity with D&T skills,
  - alienating subject knowledge for girls, girls late engagement in subjects
- Time-tabling constraints
- Inadequate resources to include girls
- Role models:- need for more female role models
- Girls' perception of subject
  - masculine, difficult for girls, subjects for the less able students, discontinue at ordinary level.
- Efficacy (self-concept of ability)
  - D&T subject efficacy, challenging males, too difficult for girls, subject fear and anxiety
- Future value of the subjects
- Self-concept of ability (efficacy, Bandura, 1977)
  - challenge status quo, D&T subjects efficacy
- Peer pressure
  - peer pressure to conform to expected roles, need to be with other females.
- Parents and family influence
  - expectation of girl-child's future, bias towards academic subjects, bias toward male child.
- Girls' background experiences
  - girls' familiarity with D&T, lack of skills, late engagement in subject

## Appendix xl

## Mari government group B school questionnaire and interview themes (Q6 ii and iii)

## Fourth form girls taking D&amp;T

(N= 3)

- Peer pressure
  - intimidation/harassment of girls by boys, girls discouraging other girls, need to be with other girls, stigmatization as Tomboys.
- Girls self-concept of ability
  - self-efficacy (Bandura, 1977), design and technology subjects efficacy, challenging traditional opinions
- School organization
  - rigid time-tabling, channeling of students into subjects, subjects discontinuity
- Perception of D&T subjects
  - nature of subject (interesting but challenging, subject relatedness, too gender competitive environment), biased literature towards males.
- Parents influence
  - expectation of child's future, bias toward male child.
- Gender role stereotyping
  - low male and society expectation of females.
- Future value of the subject
  - reach university, be an architect
- Interest in the subject
- Role models/lack of role models
  - need for female role models
- Teacher influence
  - girls' preference for a female teacher, harsh treatment by male teachers, active discouragement by male teachers, low male teacher expectation of girls, preferential treatment for boys in subjects.
- Guidance and counseling
  - lack of exposure, paucity of information
- The colonial aspect
  - segregated schools and unequal resource allocation, bias towards academic subjects, active girls' exclusion, career stereotypes, employer bias towards male employees, domesticity for girls,
- Girls subject background
  - familiarity with knowledge, late engagement

## Design and technology subject teachers

(N= 5)

- Culture:- gender role socialization,
  - low male and society expectation of females, male domination of females
- Teacher influence
  - exclusion of girls in D&T, low male teacher expectation of girls
- Student perception of D&T subjects
  - boys subjects, difficult for girls (subject

## Fourth form girls not taking D&amp;T

(N= 8)

- Girls' perception of D&T subjects
  - nature of subject (remote, heavy, hard, difficult, masculine, too expensive, mathematics/science emphasis).
- Interest in the subject
  - misplaced interest,
- School organisation
  - type and location of school, exclusion of girls in certain subjects, poor resources, academic thrust, rigid time-tabling
- Gender role stereotyping
  - differential socialization of girls and boys, low male and society expectation of females
- Teacher influence
  - low male teacher expectation of girls, male teacher lack of support for girls, girls' preference for female teachers, difficult in accessing male teachers, harsh treatment by male teachers, active discouragement by male teachers.
- Peer pressure
  - intimidation/harassment of girls by boys, girls discouraging other girls, social isolation avoidance, lack of support from boys, boys fear of girls competition.
- Parents and family influence
  - parents occupations, expectation of child's future, bias toward male child.
- Guidance and counseling
  - lack of exposure, paucity of information
- Girls' subject background
  - familiarity with knowledge, late engagement
- The colonial aspect
  - active girls' exclusion, subjects and career stereotyping by sex, lack of female advancement.
- Role models/lack of role models
  - need for female role models
- Subject fear and anxiety
  - fear of failure, negative attitudes towards subjects, low confidence, low achievement motivation and perseverance, misplaced/displaced interest.
- Self-concept of ability, design and technology subjects efficacy (Bandura, 1977).

## Principal (N= 1)

- Culture:- gender role socialisation
  - low male and society expectation of females, male domination of females
- Future value of the subjects
- Parents influence
  - expectation of girl's future, bias towards academic subjects, bias toward male child

- anxiety), subjects for less able, negative attitudes towards subjects, subjects end at ordinary level, incompatible background experiences for girls.
  - Self-concept of ability (efficacy-Bandura, 1977)
    - self-efficacy, D&T self efficacy, boys task persistence compared to boys
  - Girls' lack of D&T subject background
    - lack of familiarity with D&T skills, early and late engagement in subjects
  - School organization
    - staffing and enrolment, streaming, academic subjects thrust, rigid time-tabling, channeling of students into subjects, lack of resources
  - Guidance and counseling
    - lack of exposure, paucity of information
  - The colonial aspect
    - different types of schools affecting resources, domesticity for females, pay discrimination, employer biases towards male employees, biases towards academic subjects, stigma towards technical subjects
  - Peer pressure
    - intimidation/harassment of girls by boys, need to belong to same gender group.
  - Parents and family influence
    - expectation of girl's future, bias towards academic subjects, bias toward male child
  - Role models/lack of role models
  - Media influence
  - Future value of the subject
- Student perception of D&T subjects
    - masculine, difficult for girls (subject anxiety), subjects for less able, subjects end at ordinary level.
  - Schooling influences
    - separate technical subjects for girls and boys, D&T end at ordinary level, lack of resources
  - Guidance and counseling
    - lack of exposure, paucity of information
  - The colonial aspect
    - racism and different types of schools affecting resources
  - Peer pressure
    - need to belong to same gender group.

## Appendix xli

### Tembo government group B school questionnaire and interview themes (Q6 ii and iii)

#### Fourth form girls taking D&T

No girls were taking design and technology subjects

#### Design and technology teacher (N= 1)

- Marriage and parenting issues, gender role socialization, low male and society expectation of females, male domination of females.
- Peer pressure
  - intimidation and harassment of girls by boys, social isolation avoidance.
- Student perception of D&T subjects
  - boys subjects, difficult for girls
- Role models/lack of role models
  - need for female role models
- Teacher influence
  - exclusion of girls in D&T, low male teacher expectation of girls, lack of male teacher support for girls

#### Fourth form girls not taking D&T

(N= 8)

- Gender role stereotyping
  - differential socialization of males and females
- The colonial aspect
  - active girls exclusion, career stereotypes, lack of women advancement, domesticity
- Role models/lack of role models
  - need for female role models
- Interest in the subject
- Parents and family influence
  - parents occupations, family traditions, expectation of child's future, bias toward male child, parents lack of knowledge to advise.
- Future value of the subject
- School organisation
  - type and location of school, gender stereotyping of subjects, poor resources, academic subjects thrust, rigid time-tabling
- Teacher influence
  - active discouragement by male teachers, low male teacher expectation of girls, male teacher lack of support for girls.
- Peer pressure
  - intimidation of girls by boys, girls discouraging other girls, social isolation avoidance, lack of accommodation and support from boys, boys fear of girls competition.
- Girls' subject background
  - familiarity with knowledge
- Late engagement in subject
- Girls' perception of D&T subjects
  - nature of subject (remote, hard, difficult, masculine).
- Subject fear and anxiety
  - fear of failure, negative attitudes towards subjects, low confidence and esteem, low task persistence, misplaced/displaced interest.
- The colonial aspect
  - subjects and career stereotyping by sex.

#### Principal

Principal not interviewed

- 
- Girls' self-concept of ability
    - D&T self efficacy, girls low task persistence compared to boys
  - Girls' lack of D&T subject background
    - lack of familiarity with D&T skills, early and late engagement in subjects
  - School organization
    - rigid time-tabling, channeling of students into subjects, lack of resources
  - Low motivation to pursue subjects (Interest):
    - subject anxiety, lack of incentives for girls
  - Guidance and counseling
    - lack of exposure, paucity of information
  - Parents and family influence
    - expectation of girl's future, bias towards academic subjects,

## Appendix xlii

**Gemston government group A school questionnaire and interview themes (Q6 ii and iii)**

**Fourth form girls taking D&T (N= 5)**

- Parents influence
  - expectation of child's future, bias towards academic subjects, bias toward male child.
- Peer pressure
  - intimidation/harassment of girls by boys, girls discouraging other girls, need to be with other girls, stigmatization as Tomboys.
- Efficacy (Bandura, 1977)
  - self-efficacy, design and technology subjects efficacy, determination to succeed, challenging traditional opinions
- Girls' perception of D&T subjects
  - nature of subject (interesting, time-consuming, remote, masculine, too expensive, subject relatedness, too gender competitive environment), biased literature towards males.
- Future value of the subject
  - status attainment
- Gender role stereotyping
  - low male and society expectation of females.
- Role models/lack of role models
  - need for female role models
- School organization
  - streaming, academic thrust, governed by male ethos, rigid time-tabling, channeling of students into subjects, subjects discontinuity
- Guidance and counseling
  - lack of exposure, paucity of information
- The colonial aspect
  - segregated schools and unequal resource allocation, bias towards academic subjects, active girls' exclusion, career stereotypes, employer bias towards male employees, domesticity for girls,
- Interest in the subject
- Teacher influence
  - girls preference for a female teacher, harsh treatment by male teachers, active discouragement by male teachers, low male teacher expectation of girls, preferential treatment for boys in subjects.
- Girls subject background
  - familiarity with knowledge, late engagement
- Subject fear and anxiety
  - fear of failure, low confidence, low achievement motivation and perseverance.
- Negative attitudes towards subjects

**Design and technology teachers (N= 4)**

- Gender role stereotyping
  - low male and society expectation of females
- Girls' perception of subject
  - masculine, difficult, for the less able, discontinuous, lack of appeal, male biased curriculum, compatible/incompatible social traits

**Fourth form girls not taking D&T****(N= 8)**

- Peer pressure
  - intimidation/harassment of girls by boys, girls discouraging other girls, need to be with other girls.
- Guidance and counseling
  - lack of exposure, paucity of information
- Girls subject background
  - familiarity with knowledge, late engagement
- Role models/lack of role models
  - imitation of role, need for female role models
- Parents and family influence
  - parental occupation, family tradition, expectation of child's future, bias towards academic subjects, bias toward male child.
- Teacher influence
  - girls' preference for a female teacher, active discouragement by male teachers, male teacher lack of support for girls, low male teacher expectation of girls
- Girls' perception of D&T subjects
  - nature of subject, subject remoteness, subjects relatedness, too competitive environment, biased literature towards males.
- Stigma as subjects for the academically weak.
- Future value of the subject
  - linking subject to university requirements, status attainment
- Media influence
- Efficacy (Bandura, 1977)
  - self-efficacy, design and technology subjects efficacy.
- Subject fear and anxiety
  - fear of failure, negative attitudes towards subjects, low confidence, low achievement motivation and perseverance.
- Interest in the subject
- Gender role stereotyping
  - low male expectation of females
- School organization
  - culture e.g. streaming, academic thrust, governed by male ethos, rigid time-tabling, channeling of students into subjects, poor resources
- Maturation and effects of puberty
- The colonial aspect
  - active girls exclusion, career stereotypes, lack of women advancement, domesticity

**Principal**

Principal not interviewed

- 
- Self-concept of ability (efficacy, Bandura, 1977)
    - challenge status quo, D&T subjects efficacy
  - Peer pressure
    - intimidation of girls by boys, social isolation avoidance, boys' fear of competition from girls
  - Guidance and counseling
    - lack of exposure, paucity of information
  - The colonial aspect
    - domesticity for females, pay discrimination, employer biases towards male employees, biases towards academic subjects, stigma towards technical subjects
  - Family influence
    - expectation of child's future, bias towards academic subjects, bias toward male child
  - Role models/lack of role models
  - Teacher influence
    - active discouragement of girls, low male teacher expectation of girls
  - Subject anxiety
  - Media influence
  - School organization
    - streaming, academic subjects thrust, rigid time-tabling, channeling of students into subjects, resources, gendered subjects
  - Future value of the subject

## Appendix xliii

Denlow government group A school questionnaire and interview themes (Q6 ii and  
iii)

## Fourth form girls taking D&amp;T

No girls taking design and technology  
subjects

## Design and technology subject teachers

(N= 4)

- Gender role stereotyping
  - low male and society expectation of females, male domination and female subordination
- Efficacy (self-concept of ability)
  - D&T subject efficacy, challenging males, too difficult for girls
- Girls' perception of subject
  - masculine,
- Self-concept of ability (efficacy, Bandura, 1977)
  - challenge status quo, D&T subjects efficacy
- Peer pressure

## Fourth form girls not taking D&amp;T

(N=8)

- Interest/lack of interest in the subject
- School organization
  - academic subjects thrust, rigid time-tabling, exclusion of girls in certain subjects, subjects discontinuity
- Parents and family influence
  - occupations, family traditions, expectation of child's future, bias towards academic subjects, bias toward male child, lack of knowledge to advise.
- Gender role stereotyping
  - low male and society expectation of females.
- Teacher influence
  - active discouragement by male teachers, low male teacher expectation of girls, male teachers lack of support for girls.
- Peer pressure
  - intimidation/harassment of girls by boys, girls discouraging other girls, social isolation avoidance, low boys expectation of girls, lack of support from girls, boys fear of girls competition.
- Girls' subject background
  - familiarity with knowledge, late engagement
- Design and technology subjects
  - self-concept of ability
- Girls' perception of D&T subjects
  - masculine, remote, biased literature towards males, individualistic learning.
- Guidance and counseling
  - lack of exposure, paucity of information
- The colonial aspect
  - active girls' exclusion, career stereotypes, employer bias towards male employees
- Role models/lack of role models
  - need for female role models
- Subject fear and anxiety
  - fear of failure, negative attitudes towards subjects, low confidence.
- Media influence

## Principal (N= 1)

- Gender role stereotyping
  - low male and society expectation of women (attitudes/expectations)
- Guidance and counseling
  - lack of exposure
  - paucity of information
- Peer pressure
  - social isolation avoidance (need to belong)
- School organization
  - lack of freedom to choose own subjects (compulsory subjects)
- Time-tabling constraints

- 
- intimidation of girls by boys, social isolation avoidance, boys' fear of competition from girls
  - Role models/lack of role models
  - Parents influence
    - expectation of girl-child's future, bias towards academic subjects, bias toward male child
  - School organization
    - channeling of students into subjects, streaming, academic subjects thrust, rigid time-tabling, resources
  - Guidance and counseling
    - lack of exposure, paucity of information
  - Teacher influence
    - active discouragement of girls, low male teacher expectation of girls
  - Subject fear and anxiety
  - Future value of the subject
  - Girls' familiarity with D&T
    - lack of skills, late engagement in subject
  - Future value of the subject
  - Subjects ending at ordinary level
  - Role models (presence/lack of)
  - Students' perception of subjects
    - masculine, difficult
  - Interest in the subject
  - Inadequate resources
  - Lack of incentives for females
    - financial or other inducements

## Appendix xlv

## Riverdale private school questionnaire and interview themes (Q6 ii and iii)

**Fourth form girls taking D&T (N= 3)**

- Challenging traditional opinion.
- Self-concept of ability (efficacy- Bandura, 1977)
  - self-concept of D&T subject ability, task persistence
- Explore new area and knowledge
- Interest/lack of interest in D&T subject
- Parents and family influence
  - expectation of girl's future, encouragement and discouragement, bias towards academic subjects
- School organisation
  - lack of freedom to choose subjects, rigid time-tabling
- Future value of the subject (family status and be counted in society).
- Role models/lack of role models
  - need for more women role models
- Peer pressure
  - intimidation and harassment of girls by boys, girls discouraging other girls, lack of support from boys, social isolation avoidance (need to own belong to gender group)
- Girls' perception of D&T subjects
  - masculine nature, interesting but challenging, subject remoteness, biased literature towards males
- Too competitive environment
- Stigma as subjects for the academically weak.
- Girls' subject background
  - lack of pre-entry attributes/familiarity with D&T, late engagement in subject
- Effects of colonialism
  - gendered career stereotypes, gendered subject selections, employer biases toward male established architects
- Gender role stereotyping
  - low male and society expectation of women, male domination of females
- Guidance and counseling
  - lack of exposure, paucity of information
- Teacher influence -active discouragement of girls, low male teacher expectation of girls, male teachers' harsh treatment of girls, fear of male teachers
- Negative attitude toward D&T subjects
- School organization
  - discrimination/differentiation of activities between genders, male administrative structures, academic subjects thrust, rigid time-tabling.

**D&T and guidance and counseling teachers (N= 4)**

- Gender role stereotyping
  - male domination of women
- The colonial aspect
  - racism, domesticity, employer biases, stigma towards technical subjects
- Parents and family influence
  - parental qualifications, expectation of

**Fourth form girls not taking D&T (N= 8)**

- Parents and family influence
  - status attainment, what parents have achieved, expectation of girl's future, lack of career knowledge, bias towards academic subjects
- School organization
  - Lack of freedom to choose subjects, rigid time-tabling
- Interest/lack of interest in D&T subject
- Future value of the subject
- Gender role stereotyping
  - male domination and female subordination
- Guidance and counseling
  - lack of exposure, paucity of information
- Girls' familiarity with D&T
  - lack of skills, late engagement in subject
- Media influence (biased advertisements)
- Role models/lack of role models
- Effects of colonialism
  - gendered career stereotypes, gendered subject selections
- Teacher influence -active discouragement of girls, low male teacher expectation of girls
- Girls' perception of D&T subjects (masculine)
- Self-concept of ability (efficacy, Bandura, 1977)
  - D&T subjects efficacy
- Peer pressure
  - intimidation of girls by boys, social isolation avoidance, boys' fear of competition from girls

**Principal (N= 1)**

- Gender role stereotyping
  - low male expectation of females
  - low society expectation of women
- Inadequate resources in schools
- Guidance and counseling
  - lack of exposure, paucity of information

- 
- child's future, bias towards academic subjects, bias toward male child
  - Guidance and counseling
    - lack of exposure, paucity of information
  - Teacher influence
    - low male teacher expectation of girls, active discouragement,
  - Teacher perception of subjects
    - difficult for girls, discontinuous, biased masculine literature, ideal for the less able
  - Role models/lack of role models
  - School organization
    - culture e.g. streaming, academic thrust, governed by male ethos, rigid time-tabling, channeling of students into subjects, resources
  - Peer pressure
  - Efficacy (Bandura, 1977)
    - concept of subject ability
  - Future value of the subject

## Appendix xlv

## Telford private school questionnaire and interview themes (Q6 ii and iii)

## Fourth form girls taking D&amp;T

No girls were taking design and technology subjects

## Design and technology teacher (N= 1)

- Gender role stereotyping
  - low male and society expectation of females, male domination and female subordination
- Future value of the subject
- Parents and family influence
  - parents education, occupation and income, expectation of girl-child's future, bias towards academic subjects, bias toward male child.
- Guidance and counseling
  - lack of exposure, paucity of information
- School organization
  - channeling of students into subjects, streaming, academic subjects thrust, rigid time-tabling, resources
- Efficacy (self-concept of ability)
  - D&T subject efficacy, challenging males, too

## Fourth form girls not taking D&amp;T

(N= 8)

- Gender role stereotyping
  - low male and society expectation of females
- Role models/lack of role models
  - need for female role models
- Future value of the subject
  - quest for a university education, status attainment
- Girls subject background
  - familiarity with knowledge, late engagement
- Guidance and counseling
  - lack of exposure, paucity of information
- School organization
  - restricted choice of subjects, academic subjects thrust,
- Rigid time-tabling,
- Girls' perception of D&T subjects
  - nature of subject (interesting, time-consuming, greasy, dirty, remote, masculine) biased literature towards males.
- Parents and family influence
  - expectation of child's future, bias towards academic subjects, bias toward male child, lack of subject support
- Peer pressure
  - intimidation/harassment of girls by boys, labelling as Tomboys, girls discouraging other girls, need to be with other girls, lack of support from boys
- Interest in the subject
- Maturation and effects of puberty
- The colonial aspect
  - career stereotypes
- Subject fear and anxiety
  - fear of failure, low confidence in subject
- Efficacy (Bandura, 1977)
  - self-efficacy, design and technology subjects efficacy, determination to succeed.

## Principal

Principal not interviewed

- 
- difficult for girls
  - Girls' perception of subject
    - masculine, difficult for girls, subjects for less able students, discontinue at ordinary level.
  - Self-concept of ability (efficacy, Bandura, 1977)
    - D&T subjects efficacy
  - Teacher influence
    - active discouragement of girls, low male teacher expectation of girls
  - Peer pressure
    - intimidation of girls by boys, social isolation avoidance, boys' fear of competition from girls
  - Role models/lack of role models

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**Appendix xlvii****Themes from Education Officer's interview**

- Gender role stereotyping at home:
  - Low male and society expectation of females
  - male domination of women
  - separate spheres of activities
    - i.e. domesticity for females and outdoor activities for males
- Girls perception of subjects:
  - masculine nature, difficult subjects, heavy subjects, remote, too gender competitive environment, biased literature.
- Role models: -need for female role models in design and technology subjects
- Future value of the subjects:
  - need for a university education, subjects not fitting with girls' aspirations
- Leadership in schools:
  - aging leadership with rigid mindsets from their own gendered upbringings and continuing to implement separate spheres of activities in schools.
  - channelling of students into gendered subjects
- Rigid time-tabling system
- Girls' self-concept of design and technology ability
- Girls' background skills
  - alienation from design and technology activities from childhood
  - late engagement in the subjects at secondary school level
- Peer pressure:
  - lack of support and cooperation from boys
  - harassment by boys
  - social isolation avoidance (need to belong to gender group)
- Parents influence:
  - bias towards subjects leading to a university education
  - active discouragement in support of a culture of separate spheres of activity
- Teacher influence: -lack of male teacher support for girls
- Ineffective guidance and counseling:
  - paucity of information
  - teachers' own lack of exposure to advise students properly
- Policy enforcement in schools:- lack of Ministry of Education, Sport and Culture policy enforcement in schools,
- Inadequate resources in schools.

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**Appendix xlvii****Themes from parents' eight interviews**

- Cultural stereotypes:- marriage and parenting constraints
  - Low male and society expectation of females
  - male domination of women
  - separate activities (domesticity for females and outdoor activities for males)
- Future value of the subjects:
  - need for a university education.
  - subjects not fitting with girls' personal aspirations
- Parents influence:
  - own low knowledge levels and career awareness to advise daughters properly
  - low expectation of the girl-child
  - bias towards academic subjects leading to a university education
  - active discouragement in support of a culture of separate spheres of activity
  - have children do courses that will make parents proud and be counted in society
- Peer pressure:
  - lack of support and cooperation from boys
  - harassment by boys
  - social isolation avoidance (need to belong to gender group)
- Interest/lack of interest in subjects
  - girls' low motivation and confidence to engage in subjects
- Lack of resources in schools for technical subjects
- Role models:- need for more female design and technology teachers and females in former male careers.
- Girls' background:
  - alienation from design and technology activities from childhood
  - late engagement in the subjects at secondary school level
- Girls' subjects perception:- masculine nature, difficult subjects, heavy subjects, lonely
- Role models: -need for female role models in design and technology subjects
- Girls' self-concept of design and technology ability
  - D&T subject anxiety, fear of failure, unfamiliar subjects, girls' low confidence
- Employer biases favouring male employees in technical professions
- Segregated schools with different fee structures and resources:- poor to the poor and rich to the rich.

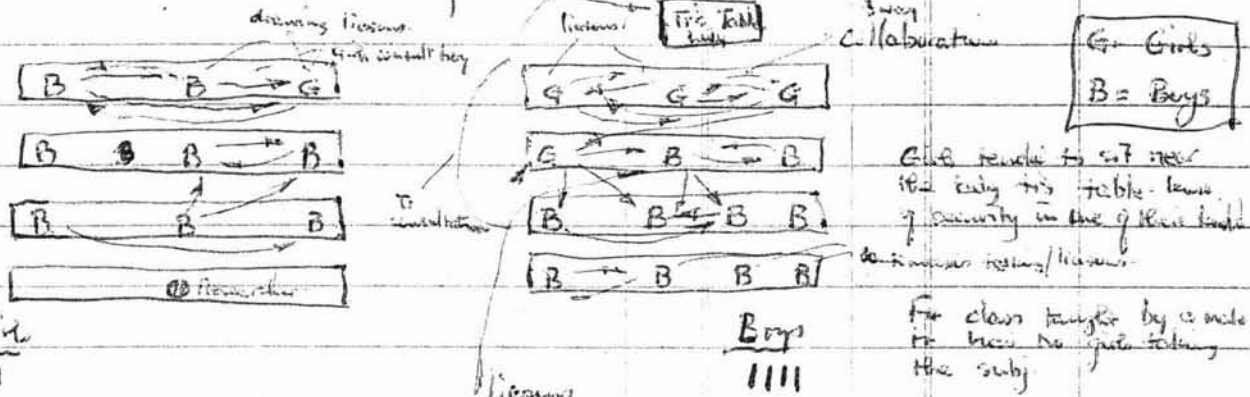
Appendix xviii

Classroom observation notes

Q TG Mixed classes Trinities Period 1, 2, 3, 4, Teacher: Lady Year 6  
Schedule Boys 18 Girls 5

Classroom space utilisation  
 One girl sat with a group of boys, 4 sat at the front of classroom in their own group.

Boys: Sat on their own from the second row to the 4<sup>th</sup> row



Girls  
 IIII

Boys  
 IIII

discuss between the two during drawings (construction) - girl consult boy to the right.

Girls

Boys

→ IIII One sitting with boys was first (front row).  
 (first 10 min 20 min 25 min 30 min)

→ To distribution of questions and B/B demonstrations was fair to the group of boys & girls.  
 Tr. did not show any favouritism to either group.

→ Pause 1 boy 1 girl  
 Now sexist

→ Now-sexist.

Girls

Boys

- Queer but attentive
- Raise hands and want to be called to give answer -
- 1
- Tr. call all students by their names to answer questions / demonstrate.
- Even where the number of boys outnumbered girls the tr. maintained a balance in
- ques/B/B distn distribution
- Pupils tended to sit according to friendships.
- Free discussion among themselves esp at back of classroom concerning construction - sharing ideas
- Raise hands but sometimes are quick to give answers before being called to answer.

### Appendix xlix

#### Pseudonyms used to report data

FP:	Female parent
MP:	Male parent
FPr:	Female principal
MPr:	Male principal
WMPr:	White male principal
FT:	Female teacher
MT:	Male teacher
FBTT:	Female building technology teacher
MBTT:	Male building and technology teacher
MWTT:	Male wood technology teacher
MTGT:	Male technical graphics teacher
WFGCT:	White female guidance and counselling teacher
FFFT:	Female fashion and fabrics teacher
FBAT:	Female building and agriculture teacher
MBAT:	Male building and agriculture teacher
WFFNT:	White female food and nutrition teacher
WG:	White girl
MbRSH:	Mbizi rural school, Harare
MRSM:	Mau rural school, Masvingo
MGBSM:	Mari group B school, Masvingo
TGBSH:	Tembo group B school, Harare
GGASM:	Gemston group A school, Masvingo
DGASH:	Denlow group A school, Harare
RPSM:	Riverdale private school, Masvingo
TPSH:	Telford private school, Harare
S:	Student
SMbRSH:	Student Mbizi rural school, Harare
SMRSM:	Student Mau rural school, Masvingo
SMGBSM:	Student Mari group B school, Masvingo
STGBSH:	Student Tembo group B school, Harare
SGGASM:	Student Gemston group A school, Masvingo
SDGASH:	Student Denlow group A school, Harare
SRPSM:	Student Riverdale private school, Masvingo
STPSH:	Student Telford private school, Harare

Abbreviations were combined in most titles for example:

MP:MGBSM:	Male parent, Mari group B school Masvingo
FBTT:MRSM:	Female building technology teacher, Masvingo
Clara:SRPSM:	Clara (name of girl): Student Riverdale private school, Masvingo