

MIDLANDS STATE UNIVERSITY



FACULTY OF EDUCATION

DEPARTMENT OF APPLIED EDUCATION

Factors influencing the enrolment of female students studying civil engineering at tertiary institutions: A case study of Bulawayo Polytechnic.

BY

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APPROVAL FORM

The undersigned certify that they have supervised/read and recommend for the acceptance, a research project entitled: **Factors influencing the enrolment of female students studying Civil Engineering at Tertiary institutions** : this was submitted by **Takaza Tracy** in partial fulfillment of the requirements for the bachelor of education degree in fashion and textiles(Midlands State University).

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(Signature of Chairperson)

Date

DEDICATION

This project is a special dedication to my loving husband Percy who showed great concern over my effort to undertake my studies and my children, Nyasha, Tadiwanashe and Tinashe for their love and patience.

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I would like to express my sincere gratitude to my supervisor, Mrs. B. Shoko for her patience, commitment and dedication in helping me put this project together. Without her help and commitment I would not have successfully completed this project. Many thanks to the permanent secretary of the Ministry of Higher and Tertiary Education and the principal of Bulawayo Polytechnic College for the permission granted to carryout the research project. My sincere thanks also go to lecturers and students of Bulawayo Polytechnic College, Civil Engeneering Department for your assistance. Lastly my sincere thanks goes to my mother and my father for their morale and financial support

ABSTRACT

The study investigated on the factors influencing enrolment of female students studying civil engineering. The low enrolment of female students studying civil engineering prompted the researcher to carry out the study. Research questions were highlighted and the significance of the study, delimitations of the study, limitations of the study were presented. The literature review revealed factors which influences the enrolment of female students studying civil engineering which were socio-cultural, personal and socio-economic factors. The descriptive case study was chosen because of its ability to give in-depth information about the phenomenon understudy. The population consisted of eighty students of which fifty five were male and twenty five were female students. Five lecturers also constituted the population. Simple random sampling was used to select a sample of students and purposive sampling was used to select a sample of lectures. The researcher used questionnaires and interviews to collect data. Data collected were presented and analyzed descriptively using quantitative and qualitative sampling. Research study revealed that the causes of low enrolment were lack of proper Science and Mathematical background, lack of career guidance in schools and socio-cultural factors as well as lack of role models in the society. Challenges faced by female students included social challenges, physical capabilities and financial challenges. Intervention strategies proposed were effective career guidance at secondary level, encouragement of female students to do Mathematics, Science and Technical drawing at secondary level to enhance the chances of studying civil engineering

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CHAPTER ONE

THE RESEARCH PROBLEM

1.0 Introduction

In this 21st century we are witnessing a rapid growth of the engineering division where the need for engineering experts grows but on the other hand the participation of women in this field is not convincing. This chapter will discuss the background to the study as well as the statement of the problem. It will highlight the research questions, the significance of the study, assumptions of study, limitations and delimitations of the study. Finally the chapter presents definition of terms and a summary.

1.1 Background to the Study

The Zimbabwe Government, after independence embarked on redressing gender imbalances in the allocation of educational opportunities. Technical Education has since received a great deal of consideration especially as it seen as key to alleviating school leaver unemployment. It plays a vital role in preparing students to acquire technical skills and knowledge which they use to contribute to national growth. (Zvobgo 1999).

In Zimbabwean schools at least one of the technical subjects or vocational subjects are to be taken at Ordinary level (Secretary's Circular number 2 of 2001). Pupils at Primary and Secondary Education level are encouraged to undertake practical subject regardless of sex . such as Metal work , Building Carpentry , Fashion and fabrics , Food and nutrition and Technical Graphics. . However there are disparities in terms of sex when it comes to pupils

choosing practical subjects which are labeled as masculine and feminine practical subjects. Most female students tend to choose practical subjects such as Fashion and Fabrics, Food and Nutrition and Home management whereas male students choose subjects such as Technical Graphics, Building and Metalwork.

A study by Matope and Makotese (2007) revealed that school labelling of practical subjects as suited for males and females was still going on in schools as indicated by 77% of female students and 82% of lecturers in the study.

Gordon (1998) sees formal education as a way by which gender inequalities can be minimised. The education system is expected to achieve gender parity where other factors such as the primary gender socialization of girls patriarchal society are widespread. Mwetulundila (2001) denotes that there is a general perception that boys are better suited to some subjects than others for example mathematics and science and technology which are linked with success in engineering. This perception is commonly what society, male students and female students themselves hold due to socialization., (Chabaya, Rembe and Wadesango, 2009). A study by Gordon (1998) of secondary school children in Zimbabwe found out that school subjects were gender stereotyped on the basis of apparent ability to master them as well as the occupations they lead to.

The phenomenon manifests itself in fields of study which are chosen for by males and females at institutions of higher learning leading them to study particular courses. Failure by females to study some technical subjects at secondary level result in less opportunities in technical related courses such as Engineering, Town planning and Architecture which contributes to under representation of females in some technical field. (Mwetulundulila 2001).

A report by ZIMSTAT on Education (2012) revealed that enrolment of female students increased to 65% in 2009 with female students dominant in courses such as Secretarial Studies and Textile and Clothing Technology and male students still dominating in areas of study such as Engineering where only 7% and 9% of students enrolled for Civil and Electrical Engineering respectively in 2010 were females and the rest were males.

Table 1 : Statistics from Bulawayo Polytechnic Civil Engineering Department showing the enrolment trends from 2010 to 2014.

Year	Males	Females	Totals
2010	20	8	28
2011	22	8	30
2012	28	4	32
2013	23	5	28
2014	39	8	47

The enrolment trends from 2011 to 2014 show that the enrolment of female students is relatively low compared to male students (Lecturer in Charge Civil Engineering Department)

The Principal of Bulawayo Polytechnic College in his speech at the 2014 Graduation ceremony informed the nation that there is a decline in the enrollment of female students compared to males in the male dominated courses such as Engineering. (ZimPapers Chronicle, 8 August 2014).

Female students studying Engineering encounter some challenges such as unfair and stereotypical attitude by male counterparts, sexual harassment, financial problems and cultural constraints. (Onokala and Onwurah 2001).

The study is therefore meant to find the causes of low enrolment of female students studying Civil Engineering and the challenges they encounter during their studies that may influence the enrolment

1.2 Statement of Problem

The number of female students who enrolled in the Civil Engineering Department at Bulawayo Polytechnic College from 2010-2014 is low compared to males. The study is therefore meant to find out the factors influencing the enrolment of female students studying Civil Engineering at Bulawayo Polytechnic College.

1.3 Research Questions

1. What factors influence the enrolment of female students studying Civil Engineering?

Sub questions

- What are the personal factors that influence the enrolment?
 - What are the socio –cultural factors that influence the enrollment?
 - What are the socio –economic factors that influence the enrolment?
2. What are the challenges encountered by female students studying Civil Engineering at Polytechnic colleges?
 3. What intervention strategies can be put in place to enhance female participation in Civil Engineering?

1.4 Significance of the Study

To the researcher

The researcher will have in depth knowledge on conducting academic research in various areas thus broadened the scope of research techniques.

The successful completion of the research contributed to the partial fulfillment of the degree being undertaken by the researcher.

To the University

The findings of the research will supplement existing literature in the field of Technical education and will be used as literature source by other researchers who might want to investigate similar problems and it is be a step building up knowledge on Technical Education.

To the Ministry

The findings of the research will assist the Ministry of Higher and Tertiary Education to formulate policies that will encourage female students to enroll in Civil Engineering at Technical Colleges which is male dominated.

To the students

It will encourage female students to enrol in Civil Engineering.

1.5 Delimitation of the Study

The study was carried out at Bulawayo Polytechnic College, Civil Engineering Department. The research focused on the Civil Engineering Department as a sample group. The Civil Engineering Department was chosen because it has the research characteristics of low enrolment of female students compared to male students.

The researcher also chose Bulawayo Technical college because it is also one of the larger Polytechnic College which offers Civil Engineering.

1.6 Limitations to the study

- Attitudes of respondents lecturers towards the research project were met .However they were not major barriers to the success of the research project.
- Shortage of time to carry out the study and finances.
- Administrative policies restricted the researcher to access all the information needed by the researcher, the research used information obtained from the participants to the research.

1.7 Assumptions of the study

The study assumed that:

- The enrollment of female students is low in Civil Engineering Department
- There are factors that affect the enrollment.
- Female students face different challenges during studying
- Characteristics of the Case Study (Bulawayo Polytechnic College) are similar with other Tertiary institutions in Zimbabwe offering Civil Engineering course.

1.8 Definition of Terms

Technical education-refers the academic and vocational preparation of students for jobs

involving applied Science and Modern Technology and it

emphasizes the understanding and practical application of basic principle of Science and Mathematics.

(<http://www.britannica.com>)

Gender .Refers to human traits associated by culture to each sex(Holborn and Haralambos 2004) "Gender can also be defined as a set of characteristics ,roles and behavior patterns that distinguish women from men which are constructed not biologically but sociallyand culturally”.

Gender Equality.Refers to the act of treating women and men equally but does not imply that women and men are the same but they have equal worth and should be accorded equal treatment.(Cambridge Dictionary online) .

1.9 Summary

The enrolment of female students in civil engineering is low compared to the males as shown by enrolment trends obtained from ZIMSTAT And Bulawayo Polytechnic College Civil Engineering Department . This phenomenon became the main focus of the study and the studytherefore is meant to investigate factors influencing enrolment of femalestudents studyingCivil Engineering and challenges they encounter during the course of their studies.The study will help the researcher to have in depth knowledge on conducting

academic research and the findings will supplement existing literature in the field of technical education. The study will be carried out at Bulawayo Polytechnic College where the problem of low enrollment has been identified. Finally the limitations and definition of terms were clearly presented. The next chapter will focus on the literature review.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter looked at literature review of different scholars concerning the factors influencing the enrolment of female students studying civil Engineering, challenges they faced during the course of their studies which contribute to low enrolment as well as intervention strategies to increase the enrolment of female students studying Civil Engineering at Polytechnic Colleges.

2.1 Socio-cultural factors that influence the enrollment of female students

The Socio-cultural aspects such as customs, socio-economic status, gender career norms and family background play a vital role on inspiring students learning and career choice in Engineering.

The family is seen as the primary driving force that shapes the learners beliefs, basic attitudes, sex role identity image. (Haralambos and Holborn 2004). Furthermore they explained that this identity is further shaped and reinforced by the school system which formally transmits society's fundamental cultures to learners. Career advice by parents and teachers influence students selection of subjects especially in Africa (Whitelaw, Molosevic and Daniels 2000). In a related investigation Okeke (2000) revealed that parents have a significant influence on the choice of career and subjects.

Kassim, Onalede and Kadel (2011) in their study indicated that lack of interest in some technical courses was based on their parent's view about the field of study. Borchet (2002) cited that parents are potentially a main source of information to support their children on the choice of courses to undertake at Tertiary level.

A study by Otto (2000) which investigated young people's on parental influence on career choice concluded that boys and girls relied to their parents when they me career choice. Parents who think that their own role is significant for their children's success tend to be more controlling in developing the child's interest.

Cunningham (2001) cited that parental influence are transmitted through children gender roles assignment in homes and in some societies. Girls are restricted to certain roles and boys have unlimited role. For example girls are assigned indoor household chores and boys more often are assigned outdoor tasks . In support of the above statement Murdock in Haralambos (2004) sees the family as the one that construct gender through interaction, treatment and assignment of roles as well as types of toys they give to their children. For example girls are given dolls as toys and boys cars as toys. Gender roles that a particular cultural group considered suitable for its males and female depend on the basis of meaning attached to their sexual identity.

Research shows that male and female students hold predetermined ideas regarding engineering as a discipline and about the characteristics of engineers as individuals. For example students maintain that engineering requires physical labour (Brawner ,Comacho ,Lard ,Onland 2012). Female students who hold traditional gender stereotypes within the engineering related domains of Mathematics and Science accept as true that boys are better at

Mathematics and Science that girls report to achieve lower grades in these fields thereby fail to take up Engineering at Tertiary level. (Chatara, Guimand and Sikembegovic 2007) .As a result the belief that engineering is a field in which men succeed may affect girls and women's success in engineering.

Numerous authors have speculated that the engineering profession suffers from an image problem (Mary and Chubin 2003) A few pre-college girls know what engineering is or what the job description entails. According to Tietjen (2003), this problem can be at least partly contribute to the fact that all interactions with doctors, dentists and other professionals but rarely with engineers The media has also been responsible for giving little representation of female engineers .Instead some scholars feel media perpetuates gender stereotypes by representing women in traditionally female occupations such as nursing and teaching;. The other cause commonly cited for the shortage of women in entering engineering majors in colleges in lack of encouragement by high school councilors ,teachers, relatives, parents and other important people. (Windnall 2006).

The masculinity surrounding the image of engineering over the years remained very influential and in turn reinforced the belief that the field unsuitable for women than men. Agapiou (2002) cited that the image of construction is that of a male dominated industry requiring both strength and tolerance for outdoor environment, bad weather and bad language. The family values and attitude influence their career choice. Demenico and Jones (2006) in his study sees the social status of mothers occupation as opposed to fathers occupation had a stronger connection within the social status of female students career aspirations.The research attributed this finding to the fact that mothers have a greater influence in many homes and also noted the positive correlation between teenager females

career aspirations to their mothers educational attainment. This explains why a few female students take up engineering at tertiary level.

Several studies on the factors impacting the career decision making process have been conducted. Agapiou (2002) conducted an empirical review on the attitudes of school age girls, their parents and educators about career prospects in Civil Engineering. His study found out some reservation holding girls were mostly to do with issues such as the physical nature of the work, social dynamic of male dominated environment, recognition of own aptitudes and preferences in Mathematics which is a prerequisite to study Civil Engineering. A few showed interests in Engineering and this explain why a few female students enroll in Civil Engineering.

2.2 Personal Factors

Personal factors such as lack of interest in science and mathematics has been the cause of low enrollment in Engineering. Attitudes largely determine what students learn and their keenness to learn. Attitudes like values originate from socialization a child is likely to experience with parents, teachers or society at large. In support of the above the self efficacy and Science self concept theory by Bandura (1994) states that self efficacy influence students studies and career choice and it impacts aspirations, determination and motivation. Pajares and Schunk (2009) defines self efficacy as , " the confidence in ones ability to succeed, while set concept is more broadly conceptualized as an evaluation judgment of self work." Research reveals that there is a positive link between students self efficacy beliefs and their academic performance .People with low self efficacy toward anassignment are more likely to avoid the task while those with high self efficacy are more likely to attempt the

assignment .It influences what students choose and how much effort they put in order to succeed.(.wikipedia .org|wik|self efficacy) .Both are strongly related to students attitude and decisions about Science and Mathematics. Students are more likely to make Science related secondary and past secondary choices and profession choices if they have enough high self concepts , thus high expectations of achievement in Science and Mathematics hence stand better chances to study Civil Engineering (Eccles 2009).According to research female students have low self efficacy and a negative attitude when it comes to Mathematics and when it comes to selection of subjects they avoid it and this influences their decisions when choosing courses at Tertiary level thereby avoiding courses like Civil Engineering which requires Mathematics.

However the findings of a study by Aderemi, etal (2013) factors that motivated female students to study civil engineering revealed that it was due to personal interest and academic competence and they wanted to challenge the status quo for example a common belief that girls cannot cope with civil engineering courses because they involve Mathematical computations. Chabaya et al (2009) stated that a research on women established that women even those who are competent have a tendency of hesitating to enter previously dominated courses like engineering and this explains why women are underrepresented in Civil Engineering

In addition the expectancy value theory by Wighfield and Eccles (2004) states that," motivation and achievement are affected by individuals stereotypes and academic perceptions that is the individuals self perceived abilities, interest and value for an academic domain".

Research supports this proposition showing that stereotypes influence academic perceptions and these perceptions considerably predict later performance and course enrollment if a student believes that she will not achieve highly in civil engineering that is not significant to her to be educated in engineering, she will likely avoid to apply herself in engineering and explain the why they are few women who apply for civil Engineering.

Tietjen (2005) mentioned that a survey of high school girls, the National foundation found that there is a detachment between motivation factors for high school girls in selecting career paths and the message communicated by engineering community. They found that high school girls stressed the following factors such as enjoying their work, having a good working environment, earning good income and having flexibility. The message from engineering on the other hand indicates that engineering is demanding but rewarding and requires Mathematics and Science. It is concluded that none of these factors are motivators for young women surveyed.

2.3 Socio- economic factors

The socio- economic status also affects the students decision making process. According to Othman (2006), parent's education is a important element because educated parents are concerned with their children educational needs. The parent's occupation influences their abilities to provide basic needs to family members which include fees, clothing and food.

Taylor etal (2004) in their study concluded that educated parents value education greatly and have high expectations of their children and in turn their children tend to aim of high status occupations like Engineering. The study also revealed that parental and teacher expectations were a critical factor influence students career choice and aspirations. The results are the

same with the findings of Otto (2000) who observed that parents often put pressure on their children with regard to their future anticipated occupations. In support of the above findings of a research by Knowles (1998) indicated that families play a significant role in their children's career aspirations and that parents occupations influence children's career choice.

2.4 Challenges faced by female students

A study by Ederemi et al (2006) indicated that some of the challenges encountered by female students during the cause of study included gender discrimination, sexual harassment, financial problems and domestic issues. Most of those with domestic challenges were married and had children and this distracted them during the course of study. Indicated that Civil engineering course are quite challenging and it demands ones full concentration and therefore combining domestic duties makes studying a difficult task.

2.4.1 Sex discrimination and Sexual Harassment

Fielden et al (2000) discuss in his study that women studying construction related courses which are dominated by men find it hard to fit into male colleagues social activities. Greed (2000) stated that most men do not know how to treat women and are frequently humiliated. Sex discrimination exists when a person or a group of people are treated unfairly only on the basis of their biological sex. Sexual favours and other physical manner of a sexual nature. It affects apersons performance or create an threatening, hostile, unpleasant environment (Quick Takes 2011) .

Sexual harassment in educational settings is a common problem worldwide and has posed a great challenge to women and has affected their efficacy and performance. Literature reports

that sexual harassment has impacted on female students self esteem as well as their academic, social and mental well being (Mashingaizde 2003, Labedo 2003).

Research studies on different institutions in many African countries have revealed trends and nature of sexual harassment experienced by female students. The include undignified verbal remarks, unwanted touching of a sexual nature. Okeke (2011) in his study cited that , Haruhanga (2006) reported that 42% of women atMakerere University in Uganda have been sexually harassed by colleague male students. Banyu (2009) also indicated that 37,2% of female students have been harassed at a Technical college in Tanzania.

Sexual harassment has a disturbing effect on the general performance of an institution as the perpetrators are colleague students and lecturers whose responsibility include imparting knowledge and giving psychological and moral support to female students engage to behavior divergent to ethics (Labedo 2003). He further noted that there are no practical polices that protects victims and this explains why sexual harassment is underreported. Victims fear being harassed, humiliated and when some can no larger handle the pressure they drop out.

2.4.2Attitude of male students

Civil Engineering as it falls under the construction has a male dominated environment which is a major influence of male students to study civil engineering (Taylor 2010) In class discussions male students consciously or unconsciously discriminate female students. They are distracted more frequently and their contributions are often not seen and hence feel uncomfortable with the aggressive style that men adapt when points of concern arise (Kelly 2000). Gordon (2006) pointed out that female students pursuing engineering courses develop

low self esteem and low self confidence due to the fact that they are perceived as incompetent. As a result they refrain from asking questions for fear of being looked down upon by their lecturers and male students who dominate classes. Klein (2007) in this study find out that male students control class equipment and technology in classes and that female students fear handling machines and equipment during class projects as they feel that they are incapable due to fear instilled to them by lectures and male students.

However Matope (2007) in her study find out that it was apparent that female students are intellectually capable just as male students and competent all the engineering tasks as indicated by 77% of the lectures. However 61% of the lectures strongly agreed that female engineering students did not cope physically as male students with manual tasks which Civil Engineering require. and commented that this should not rule out female students from engineering because their shortcomings in physical fitness might lead them into designing machinery that overcome this weakness.

2.4.3 Attitude of male lectures towards female students.

Female students face challenges in learning technical courses like Engineering and it is a universal experience (UNESCO 2008). In their research Richard and Susan (2009) unfolded that in the United States Female Students studying Engineering courses receive discouragement and insulting remarks from male lectures and make them uncomfortable leading to low achievement.

In addition the learning environment is not conducive and as a result female students pursuing engineering are viewed as incapable and these stereotypes can hinder their performance. (Peterson (2007) states that in Ghana, some lectures do not provide an

environment in which female students often receive more attention and praise from and on the other hand female, receive less attention which is usually in form of negative comments. Kombo (2004) posits that in Kenya most times lectures treat male students in Engineering courses with higher expectations while female students are treated with lower expectation and are humiliated. As a result female students undertaking engineering courses are viewed as incompetent and these stereotypes can have a negative impact of the performance of female student. A study by Elijah et al (2014) in Nigeria pointed out 60,9% of female students reported male dominance in class discussions and class activities. Male students also noted that lectures paid more notice to male students than female students and praised male students more often during class discussions and class activities compared to female student.

2.5 Intervention Strategies to improve the enrolment of female students

Kapungu in her essay (2007) suggested that there should be a move to encourage and develop career guidance programmes in schools so as to equip students with reliable information on possible career prospects such programmes should emphasize the link between higher levels of education and the private and social rated return to education. Schools should ensure that guidance counselors are gender sensitive and will promote girls venturing into careers that they would not enter due to tradition and socio cultural norms. The Ministry of Education should provide skilled career guidance teachers in schools to ensure that students make informed decisions in future.

2.5.1 Cultivating life skills

The Zimbabwean curriculum is academic and exam oriented. This produces individually who cannot deal with harsh challenges of work environment (Sunday Mail 3 May 2015) There is

need for development of life skills existing subjects can be used to impart various life skills. In one study education officers equated life skills to practical subjects such as carpentry, agriculture building, technical graphics that develop psychomotor skills Dyanda and Mavhuna (2004). The permanent secretary for primary and secondary education Dr Sylvia Utete Masango announced ,”that they had come up with a draft of curriculum which advocates for the introduction of industrial attachment and is aimed at developing life and leadership skills in students.”

2.5.2 Gender Mainstreaming

Bennet (2002) observed that the majority Tertiary Institutions in Africa do not have any form of equity policies let alone interventions to increase female students enrolment. The gender mainstreaming reform should aim at strategies that enable equal opportunity to boys and girls in education. Increased productivity and economic growth results from targeting gender equality in education. The role of the Government in facilitating gender equity in education is in implementing appropriate policies that will encourage female students to enroll in courses seen as male dominated consequently societies should provide equal opportunities and participation for both male and female students in learning technical courses.

2.5.3 The Science Education reform

Kapungu (2007) stated in her essay that reforms in the education sector should aim to provide educational programmes that empower women and promote girls in Science and Technology. The immediate challenge to increased enrolment for Tertiary Institutions is that due to the poor quality of girls secondary school education where in most countries female student perform badly in mathematics which a requirement for Engineering. A study in

Zambia found out that teachers valued and encouraged boys participation in class more than girls and tended to give tasks along gender lines (UNESCO 2003). Misconception and gender stereotyping should be addressed at an early stage in education and should equip female students to enable them to take part in hard core courses like engineering. This can be achieved by training teachers through gender sensitization seminars, conferences and workshops (Mlama 2001) The gender sensitization programme, will present teachers from focusing their attention and classifying boys and girls subjects leaving girls out of Science and Technology.

2.5.4 Affirmative Action

In most African countries it has been noted that female students perform poorly in mathematics which is a requirement for Civil Engineering and as a result few females attain high marks to compete on equal footing with males. Many countries should introduce Affirmative Action policies. They can lower admission cut off points and offer remedial classes (Chivaura 2000, Musisi 2000) But however lowering cut off points faces a shortcoming of acceptance as it reinforces the notion of women as intellectually weaker gender.

2.6 Summary

This chapter has noted that several factors influence the enrolment of female students studying Civil Engineering and has also stated the reasons for low enrolment which include lack of career guidance, lack of mathematical background and criticism and discouragement from parents and society at large due to preconceived beliefs about civil engineering not suitable for female students. Challenges faced were raised and finally intervention strategies to increase the enrolment were suggested. The next chapter will focus on research methodology which will be used in the research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.0 Introduction

This chapter describes how the research study was conducted. It mainly focuses on the research design which was used, population, sampling and instruments which were used to collect data together with data collection “procedures .Also data analysis procedures were described.

3.1 Research Design

Churchill (2002) defines a research design as, “ the framework or plan study used as guide in collecting data” .It is used to structure the research, to show how all major parts of the research project work together to address the central questions. In addition Bell (1999) postulates that a research design is a detailed outline of how the investigation will take place and include how data is to be collected, what instruments will be employed ,how instruments will be used and intended means for analyzing data.

The researcher used a descriptive case study research design. Yin (2009) defines a case study as “an empirical enquiry that investigates a contemporary phenomenon in depth and within its real life context especially when the boundaries between phenomenon and context are not clearly evident”. According to Bryman (2009: 89) a descriptive case study entails intensive investigation into specific aspects of an individual social unit or a small portion of community in an effort to gain deeper insight about these aspects. The study focused on Bulawayo Polytechnic Civil Engineering Department . The researcher adopted this design as it enabled the researcher to gather qualitative data on the factors influencing the enrolment of

female students , challenges they faced during their studies and intervention strategies using face to face unstructured interviews, questionnaires and an observation schedule. A descriptive case study was also chosen because of the nature of the research problem which required respondents to give their views ,experiences ,opinions and specialist knowledge . It provided adequate justification about the phenomenon under study as it is anchored in real life context and it results in rich and holistic description of the position and enabled the researcher to make recommendations on how to improve the situation(Stake 2005). It also enabled the researcher to gain insight and give an in- depth account of the factors influencing the enrolment of female students. However the descriptive case study has its limitations.One of the shortcomings as noted by Cuba and Lanolin (2002) is that the researcher is the primary instrument of data collection and analysis and there are no guidelines in the construction of the final report. The researcher overcame this limitation through constant reference to other studies done before by more experienced researchers and reading extensively about the descriptive case study and how it is conducted.

3.2 Population

Best and Khan (1993) define population as “a universal group of individuals that have one or more characteristics in common that are of interest to the researcher”. The population of this study consisted of 80 students of which 25 were female and 55 were male students studying their National Diploma in Civil Engineering at Bulawayo Polytechnic College as supported by the Lecturer in charge of the Civil Engineering Department. Twelve lecturers constituted the population.

3.3 Sample and Sampling Procedures

Chiromo (2006) define a sample as “the representation of the whole population which reflects the properties of the population under study”. A sample of 30 students and 5 Lecturers was chosen from the target population. The researcher used the simple random sampling to select fifteen female students and fifteen male students who participated in the study, which constituted 38% of the total target population. The hat system was used to select the respondents. This technique ensured that all students had an equal chance and independent chance of being selected and is unbiased and representative of the population.

Five lecturers including the head of Civil Engineering Department who participated in the study and were selected using the purposive sampling and constituted 41% of the target population. Purposive sampling involves researchers handpicking the respondents to be included in the sample on the basis of their experience.(Chiromo 2006).This technique will allowed the researcher to select the respondents with information rich in respect of the study. Experience and gender facilitated the sampling of the lecturers as participants to the study.

3.4 Research Instruments

These are techniques employed to collect the necessary information from the chosen sources by the researcher. In this study the researcher used an interview guide, questionnaires and an observation schedule.

3.4.1 Interview Guide

Macmillan and Schumacher (2001) views interview has “ an oral presentation of a set questions that are prepared in advance “.The researcher deduced from the above definition that an interview is a conversation between two people to have access what is inside a person’s mind. It involves asking questions from participants in study .Face to face

interviews were used to get detailed information from lecturers at Bulawayo Polytechnic College, Civil Engineering Department on factors influencing the enrolment of female students studying civil engineering ,challenges faced by female students during the course of their study and intervention strategies to improve the enrolment.. Interviews are helpful for collecting information about the participant`s experience and they were the most useful way to collect data in a survey to get the cooperation of respondents (Cohen, Manion and Morrison,2007).

A Semi-structured interview guide with open ended questions were used to gather primary data.This is because of its flexibility in allowing the researcher to clarify certain issues in order to collect comprehensive data.“This approach also allows for the possibility of probing interviewees as well as clearing any misunderstandings which may arise”.(Wiersma 1996).However the researcher failed to capture everything from the conversations and shortcoming was addressed by writing down important points as it allows the interviewer to focus on interacting with the participant and follow up the discussion.

3.4.2 Questionnaire

According to Mhlanga and Ncube (2003:103) a questionnaire is defined as ‘ a form of enquiry which contains systematically compiled and organized series of questions that are sent to the population samples’. The researcher used both closed and open ended questions in the questionnaire. Robson (2002) points out that a questionnaire will present information to the respondents in written form and will require the respondents to tick or fill in blank spaces provided. He further explained that close ended items minimizes irrelevant responses and to obtain standardized responses as respondents are give a list of predetermined responses from which they choose the answer and simply tick the appropriate box. Open ended questions

enabled the researcher to obtain information that reflects the opinions of the respondents as the respondents were asked to answer questions using their own words. The researcher chose questionnaires because they reduced prejudice and the researchers did will not pressure the respondents to answer in a certain manner. They also provide anonymity for respondents and enable respondents to confront the sort of the assumptions that may have been made. (Munn and Drever 1999).

However questionnaires are standardized so it is not possible to explain any points in the questions that participants might misinterpret. This can be solved by piloting the questions on small group of students or colleagues.(Munn and Drever 2004)

3.4.3 Observation Schedule

Cohen , Manion and Morrison (2009), views observation as “ gathering information of what is happening in a school or classroom rather relying on second hand information “ It seeks to investigate what people think and do by watching them in action as they express themselves in various situations and activities.” (Chiromo, 2006). Observation is different from simply seeing but involves noticing and paying special interest to things that one inspects, remembers and contemplates. (Cuban and Lincoln 2002).A structured observation was used to clearly see the variable to be observed and how the observation was to be conducted. This was mainly used with regard to teacher and student interaction and student and student interaction and handling of equipment in the Civil Engineering Department . Data that was collected was very accurate and reliable in nature as the problem of relying on respondents was decreased. The observation was also valuable in counter checking and verifying information which was collected through interviews and questionnaires.

3.5 Data Collection Procedures

Tuckman(1994) describes data collection as the procedures that are followed in gaining data from a sample”. In this study the researcher used the introductory letter from the Midlands State University to seek permission from the Ministry of Higher and Tertiary Education to carry out a research at Bulawayo Polytechnic College which was used to seek consent from Principal to conduct the study.

The researcher made appointments with five lecturers including head of department in the sample. The interview was conducted after the researcher had fully explained the purpose of the study and sought to informed consent from the interviewees. The responses were written in a note book . the interviews lasted for 15 minutes per individual.

The researcher personally administered questionnaires to male and female students in the sample and collected the completed questionnaires personally to ensure hundred percent response rate. The researcher also observed theory and practical lecturers and used the complete observer method whereby the researcher observes the activities but does not contribute in the activities of the group.(Chiromo 2006). In order to ensure reliability and validity to the study, the researcher carried out a pilot study and administered the questionnaires to colleagues.

3.6 Data analysis procedures

Kumar (2005) states that, “the analysis of data involves a number of closely related operations such as the establishment of categories, and the application of the categories of raw data through coding, tabulation and drawing statistical inferences”. Data for this study was analysed according to research questions and was grouped according to data collection instruments used that is interview for schedule for lecturers , questionnaires for students and

observation schedule. The descriptive statistics was used to analyze data. Comparisons were be made between respondents and their responses .The data analyzed was presented in tables and figures graphs and pie charts. Qualitative data was analysed through a thematic approach and classified in the form themes, to which the major categories of information weren used as information for the presentation of the findings.

3.7 Summary

A case study design was employed in the study and helped the researcher to use questionnaires, interview guides and observation schedule..A sample of fifteen female and fifteen male students were randomly selected from the target population at Bulawayo Polytechnic College Civil Engineering department .Five lecturers were selected using the purposive sampling and included in the sample. Questionnaires consisting of open ended and closed ended questions ,unstructured interview guide and a structured observation schedule were used to collect data.. Sampling procedures that were adopted and data analysis techniques to be employed were discussed .The study will proceed to the presentation of data and statistical analysis and discussion of results in the next chapter.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS AND DISCUSSION

4.0 Introduction

This Chapter focuses on the presentation ,analysis and discussion of the results related to the research questions of the study. It presents the findings of the factors influencing the enrolment of female students studying civil engineering at Bulawayo Polytechnic College . The data were collected from male and female students as well as lecturers through questionnaires , interviews and observations .

4.1 Presentation, Analysis and discussion of findings

Table 2 : Summary of respondents

Category	Male	Females	Totals
Lecturers	4	1	5
Students	15	15	30

The above results show that the sample of lecturers was dominated by males . Male lecturers made up of 80 % of the total and female lecturer made up only 20%. Female students interviewed made up of 50% while male students were also 50% .

The sample of students indicated a gender balance and the opinions of both male and female were given.

Table 3 :Teaching experience of Lecturers

Experience in years (range)	Female	Male	Total	As Percentage
0-2 years	0	0		0
3-5years	0	1	1	20%
6-10years	1	0	1	20%
+11year	0	3	3	60%
Totals	1	4	5	100

The research findings show that lecturers in the Civil Engineering Department are experienced in the field . Twenty percent of lecturers has 3-5 years experience, 20% has between the range of 6-10 years and 60% of the lecturers has more than 11 years experience.

This experience enabled the researcher to gather relevant information on the reasons for low enrolment, challenge faced by female students and intervention strategies to increase the enrolment.

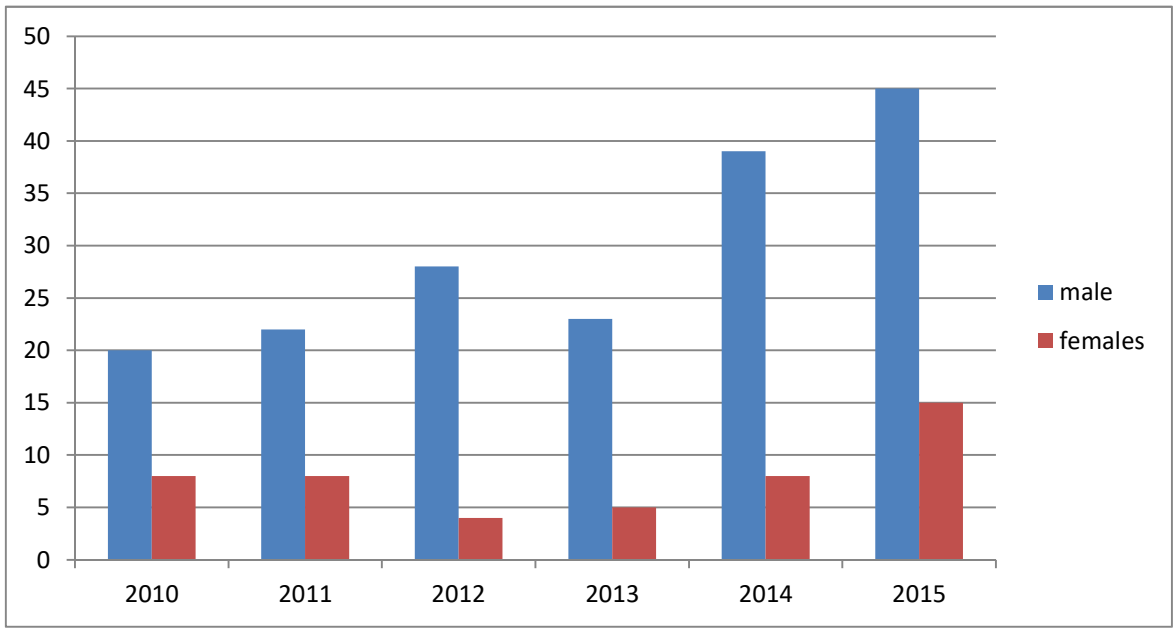


Figure1: Enrolment Trends

The data above indicate the enrolment trend over a period of six year indicate that female students are still underrepresented even though there is a slight improvement in 2015. The overall trend shows that male still dominate enrolment over a the 6 year period analysed.

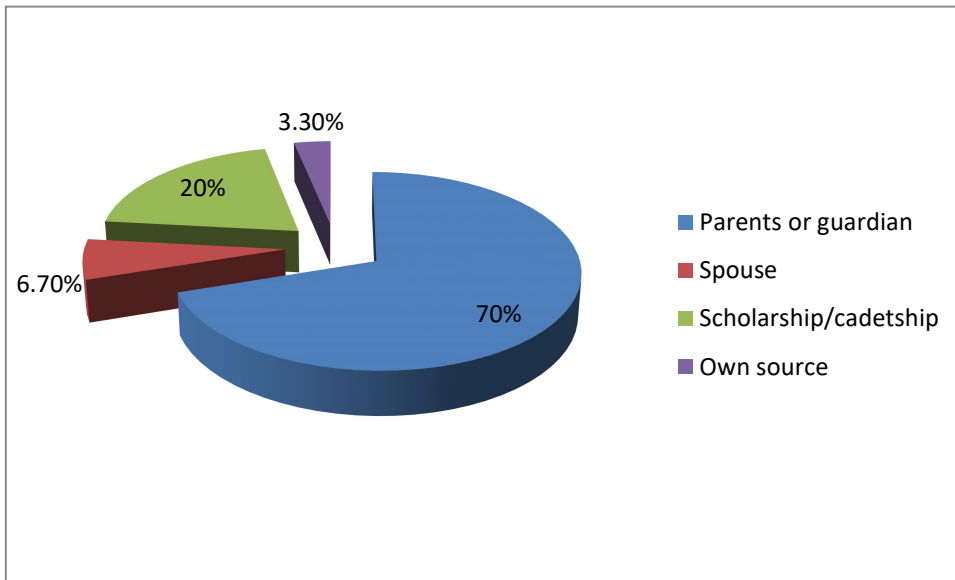


Figure 2: Source of College fees

From the above responses 60% of the respondents college fee is paid by parents , 25% indicated that their fees is paid by Government through cadetship ,10% indicated that their fees is paid by their spouses, and 10% indicated that they sponsor themselves. The findings indicate that parents play a pivotal role towards educating their children at Tertiary level. Parents are no longer discriminating the children by sex when sending them to higher education .In support of the above Oathman (2006) cited that parents' are concerned with educational need of their children and value education highly and have high expectations for their children.

Table 4: Students responses on reasons for choosing Civil Engineering

N=30

Reason	Male	Female	Total
Influenced by Parents or family members	3	2	5
Personal Interest	2	5	7
Career Guidance	2	2	4
Academic Competence	5	4	9
Peer pressure	2	2	4
Total	15	15	30

From the table above the results indicates that 9 students cited academic competence as the reason for choosing Civil Engineering , 7 cited personal interest , 5 indicated that they were mainly influenced by parents or family members to choose civil engineering .Career guidance as a reason was cited by 4 students while 4 students indicated that the decision to choose Civil Engineering was through peer pressure.

The above findings show that students chose Civil Engineering because they had academic qualifications to enroll in Civil Engineering and are intellectually competent to do Civil Engineering as their course. The findings are supported by a study by Aderemi et al (2013) which revealed that female students chose Civil Engineering to challenge the belief that girls cannot cope with courses as it involves mathematical computations .

The findings of the research also indicated that 5 out of 15 female respondents doing Civil Engineering enrolled for the course based on the genuine personal interest for the course. Four out of 15 female respondents indicated that they choose Civil Engineering course based on their academic abilities to do the course. Two out 15 female students responded that they were influenced by the family members and or parents . Peer pressure generally did not significantly influence female students as indicated by 2 out 15 female respondents. Careers guidance as cited by 2 out 15 female students and 2 out 15 male students was not a driving factor to choose Civil Engineering which implies that students lack effective career guidance at secondary education level.

Table 5: Lecturer’s responses on reasons for low female enrolment. N=5

Reasons for low female enrolment	Frequency	As a percentage
Complexity of the subject	4	80%
Lack of effective career guidance at Secondary Education level	3	60%
Socio- cultural beliefs	2	40%
Peer pressure	1	20%

Information in table 5 indicate that the complexity of Civil Engineering course was cited by all 4 lecturers as the major reason for low enrolment of female students in the department. They indicated that the course involves lot of mathematical computations and engineering drawings and female students have low self efficacy when it comes to Science, Mathematics and Technical drawing.

In support of the above sentiments the self efficacy and science self concept theory by Bandura (1994) state that self efficacy influence students choice of subjects career choice and it impacts on aspirations, persistence and motivation.

Sixty percent of the lecturers indicated that lack of careers guidance is also major cause of low enrolment of female students in Civil Engineering . Lecturers also indicated that lack of careers guidance at Secondary School level on the choice of subjects leading to different types of professions explains why . To reinforce the above point , Windnall (2006) cited that lack of encouragement by school counselors ,teachers, parents and other influential persons in the society discourage females from doing Civil Engineering as course at tertiary education level.Mary and Chubin (2003) stated that a few pre-college girls know what Civil Engineering is or the job description. Media was also cited partly to blame for giving little attention to prominent female engineers and it perpetuates gender stereotypes by representing women in traditional female occupations such as nursing and teaching.

Forty percent of the lecturers responded that, social and cultural factors contributed to the low enrolment of female students in the Civil Engineering . Reasons given were that female students hold traditional gender stereotypes which regard Civil Engineering as male domain and it involves largely physical labour not suitable and appropriate for females as they are regarded weaker. These belief are due to socialization . Literature supports that culture

prohibits female students from studying Civil Engineering as cited by Cunningham (2001) that girls are limited to certain roles and boys have unlimited roles and this is transmitted through children gender role assignment at homes by parents and societies.

Only 10% of the lecturers cited peer pressure as a cause for low enrolment and this indicates that this is not a major reason for low enrolment of female students studying Civil Engineering.

Table 6: Student responses on reasons for low enrolment

Reason from Students	Frequency	As a percentage (%)
Lack of proper mathematics , Technical Drawing and Science at High school	21	70
Lack of effective Career Guidance	15	50
Misconceptions or belief about Engineering not suitable for women	18	60
Peer Pressure	3	10

Lack of proper Science , Mathematics and Technical Drawing skills from Secondary Education level proved to be the main reason that explain why few female students opt for Civil Engineering as cited by 70% of the students responses. This concurs with responses from Lecturers who also gave the same reason of complexity of Civil Engineering involves Mathematical computations , Science and Engineering drawings, are also a prerequisite to enroll for the course. Most girls have low self efficacy in Mathematics and

Science due to gender stereotypes within Engineering domains, of Science and Mathematics which believe that boys perform better than girls in Mathematics and Science (Mwetulundila,2001).

Sixty percent of the students indicated that misconception or beliefs about engineering as unsuitable for women . Agapiou (2006) in his study postulates that masculinity surrounding the image of engineering over the years has remained very powerful and in turn reinforced the belief that the field is unsuitable for women and men.

Lack career guidance was cited by 50% of the students . This implies that careers guidance is crucial as it helps students to have insight on the choice of subjects and careers intend to do.

Ten percent of the students cited peer pressure as a reason for low enrolment This means that is not a major cause of low enrolment of female students studying Civil Engineering.

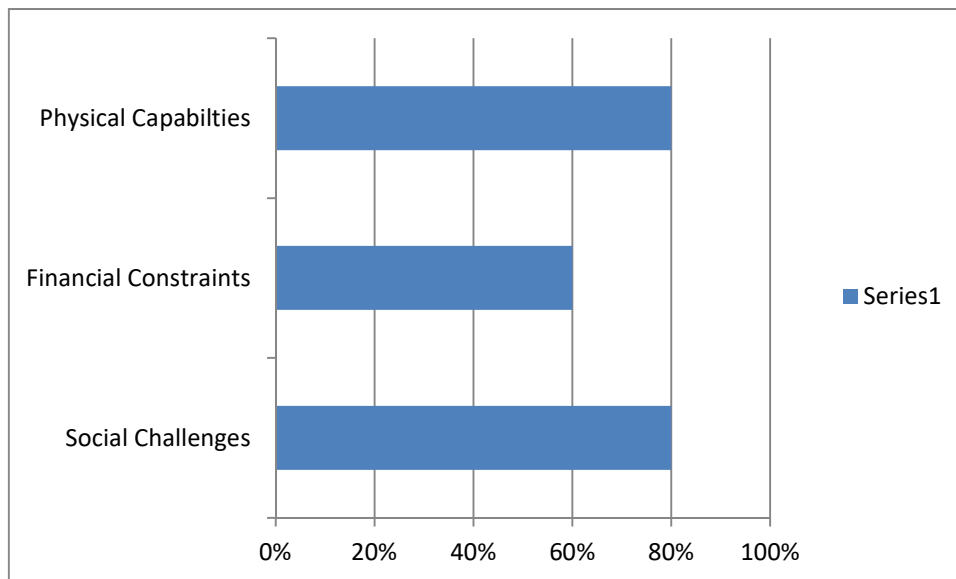


Figure 3: Lecturer responses on challenges faced by female students

The graph above indicates that 80% of the lecturers interviewed cited that social challenges disturbed female students. Married female students were the severely affected. They were affected by marital responsibilities which tend to negatively affect their studies. The lecturers also cited that female students who stay with their parents at home were to endure household chores after lectures and at times leave early for home. Furthermore they cited that Civil Engineering is a challenging and demanding course which require full concentration.

The physical capability of female students was also cited by the lecturers as hindrance to the studying of the course by female students. 80% of lecturers gave the similar views on this reason. They stated that female students cannot cope physical as compared to their male counterparts when undertaking manual tasks which are part of the course, of the field work, and however indicated that academically female students are as competent as their male counterparts, when it comes to the theory content of the course.

Sixty percent of the lectures responses gave that financial constraints was another challenge affecting the female students and some of them tend to drop out before completing the course since they cannot raise the required additional finances apart from the loan availed to the students by Government.

Table 7: Student responses on the challenges faced by female students studying Civil Engineering

Responses	Frequency	As a Percentage (%)
Equipment and furniture appropriateness, suitability and compatibility	26	70
Social challenges and multiple roles	15	50
Negative attitude from male counterparts	9	30
Financial constraints	6	20
Various forms of abuse	3	10

Findings from the research as illustrated by the table 7 above points out that 70% of the students cited equipment drawing room stools are a not compatible to females and heavy equipment used for fieldwork as major challenges which affects them . Female students face difficulties during field work which is strenuous and requires physical strength at times carrying field equipment.

Fifty percent of respondents indicated that female students especially those who are married are distracted by parental and marital responsibilities . Some female students cited that they have to leave early since they stay out of campus to attend to family issue thus missing out on discussions.

The findings of the study revealed that 30% of students mentioned attitude from their male counterparts as another challenge which negatively affect them.In support Gordon (2006)

pointed out that female students pursuing Engineering courses develop low self esteem and self confidence due to the fact that they are perceived as incompetent and do not value their contributions during discussions . However lecturers responses on the capability of female students dismissed the allegation when they indicated that female students are as intellectually competent as their male counterparts.

Financial constraints were cited by 20 % of the students as hindrance to female students studying and concur with lecturers responses that female students faced financial constraints. Only 10% of students cited emotional abuse, sexual harassment and verbal abuse as a challenge which include degrading remarks and bad language from the male counterparts.

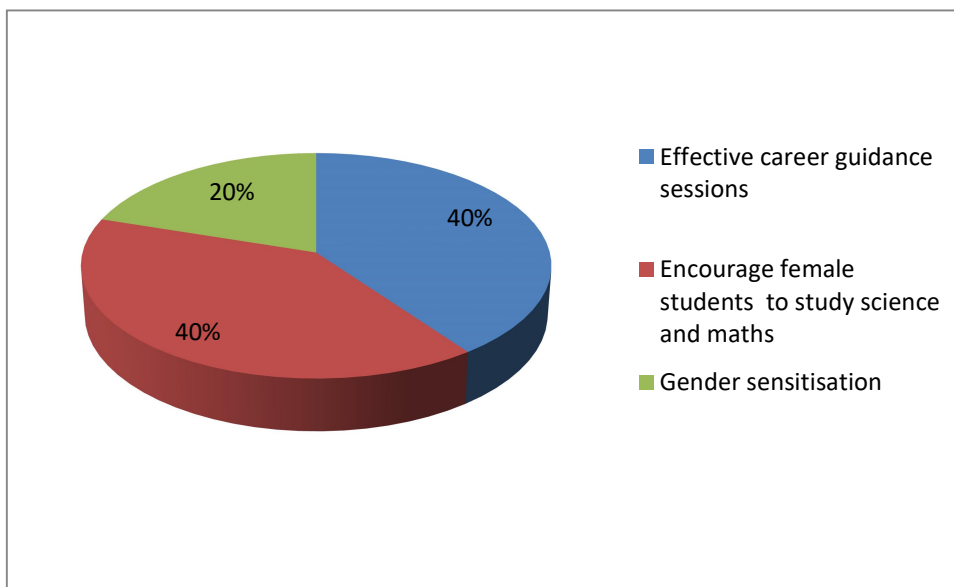


Figure 4: Lecturer responses on the intervention strategies to increase female enrolment

Figure 4 above indicates that forty percent of the lecturers suggested effective careers guidance as an intervention strategy to increase the enrolment of female students .Forty percent of lecturers cited encouragement of female pupils at secondary education level to study Science, Mathematics and Technical Drawing . The findings of the study imply that effective career guidance is very important so as to increase the enrolment of female student .

To reinforce the above point, Kapungu (2007) suggested that there should be a move to promote and develop career guidance programmes in schools so as to equip students with reliable information on possible career prospects . Such programmes should emphasize the link between secondary education and higher level of education.

Female students need encouragement to study Mathematics , Science and Technical drawings subjects so as to enhance their chances of enrolment in Civil Engineering as cited by forty percent of lecturers. They suggested that reforms in education should provide educational programmes that empower women and promote girls in Science and Mathematics.

Last but not the least, gender sensitization was cited by twenty percent of the lecturers so as to increase the enrolment of female students . They indicated that it should aim to change people's beliefs and attitudes about women capabilities into taking courses like Civil Engineering which are male dominated . It was further suggested that gender sensitization programmes can be implemented through seminars, workshops, conferences and awareness campaigns.

Table 8: Students responses on Intervention strategies to increase female enrolment in Civil Engineering.

Common suggestions indicated by male students	Frequency	Common suggestions indicated by female students	Frequency
Effective gender sensitisation and awareness programmes	6	Effective gender sensitisation and awareness programmes	3
Provide financial incentives to females	2	Provide financial incentives to females doing civil engineering	7
Improve career guidance at secondary schools	3	Improve career guidance at secondary schools	2
Encourage female students to participate in Mathematics , Technical drawing and science at secondary	3	Encourage female students to participate in Mathematics and Science at secondary education stage	2
No suggestions/blank responses	2	Lower the entry qualifications programmes at Civil Engineering Department	1
Totals	15	Total	15

The above table 8 indicate the suggestions obtained from both male and female students during the data gathering process. Six males who constituted the majority of similar responses indicated that effective gender awareness campaigns should be done to educate the society on gender stereotyping engineering courses. Two male students indicated that giving incentives which are more lucrative than other courses to females can be strategy. While 3 males students indicated similar responses which were citing that effective . Three male students also gave similar responses suggesting that girls should be encouraged to do

Mathematics, Science and Technical drawing subjects at secondary school level. Only 2 male students left the section blank and never gave suggestion.

Seven female students indicated that giving extra financial incentive to female students doing civil engineering courses should be considered by the Government. Three out of 15 female students respondents also indicated that provision of effective gender awareness programmes at communities should be considered. Two out 15 female students indicated that effective career guidance at secondary level is necessary to equip females with knowledge on the civil engineering courses. Again , 2 out of 15 female responses indicated that equipping the girls with mathematics , engineering drawing and science skills and knowledge at secondary school level is very important as it will form the fundamental skill in the civil engineering course. Only 1 out 15 female respondents indicated that another strategy can be to lower the entry qualifications for the course at include students with at least a ‘D ‘ grade at Ordinary level in Mathematics .

In supporting the above reasons on gender campaign as strategy to increase the enrolment of female students at civil engineering course, Grace Bunyi (2006) in her study echoed that the government and other stakeholders should develop policies that discard gender stereotypes of the course ,that are perceived appropriate for gender. This will ensure the society perceives both male and female students equally in choosing technical courses and change their negative attitude and beliefs toward female students pursuing courses that are considered unsuitable for their sex.

4.2 Data gathered through observation schedule

The interaction of the female students with the male colleagues, lecturers and the suitability of resources used were obtained through direct observation.

The findings showed that male and female students interacted very well during the lectures. They were mixed up during group tasks and females were contributing to the tasks. Participation of females students and their male counterparts was almost the same . However there was challenge when it comes to the drawing room stools which were observed to be high and are not compatible and comfortable for females during the drawing sessions . Field equipment were observed to be challenging for female students were the surveying equipment like theodolite tripod stands which are heavy and females need assistance from males in carrying the machines as they are used for long distances in the field transferring from one point to another .The findings reinforced the sentiments from lecturers which indicated that females students have challenges in coping physical and strenuous field works tasks as compared to male students.

4.3 Summary

This chapter presented, analysed and discussed data obtained through questionnaires, interviews and observations . The analysis focused on the factors influencing the enrolment of female students studying Civil Engineering which included personal factors, challenges faced by females students studying Civil Engineering and intervention strategies to increase the enrolment of female students.

The research findings were that academic competence and personal interest are the major factors that influenced female students to enroll in Civil Engineering . The reasons cited by students for low enrolments were lack of proper Science , Technical Drawing and Mathematics subjects background at secondary education level. Other reasons cited were misconceptions about Civil Engineering not suitable for females. Lecturers indicated that the complexity of the course , lack of career guidance , socio cultural factors and lack of female

role models in the society .Challenges faced by female students included social challenges, physical capabilities and financial challenges were indicated as the main challenges from the lecturers interview . While students gave additional challenges such as equipment and furniture problem and abuse from their male counterparts .

Interventions strategies proposed were effective careers guidance at secondary level, encouragement of females to partake in doing Mathematics , Science and Technical drawing subjects at secondary education stage, introducing of incentives such as extra loan disbursed to females doing Civil Engineering course.

The next chapter will make a summary , present conclusions and recommendations to the research.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

This Chapter presents the summary of research findings, draws conclusions from data that has been collected and presented in the previous chapters and further presents recommendations on the alternative strategies that can be implemented to increase the enrolment of female students studying Civil Engineering.

5.1 Summary

The research was conducted at Bulawayo Polytechnic College, Civil Engineering Department on the factors influencing the enrolment of female students studying Civil Engineering (Mary and Chubin 2003). The researcher was prompted by the low number of female students studying Civil Engineering course at the Tertiary institutions to carry out the research to find the factors that influence the enrolment which include personal factors socio-cultural and socio economic challenges faced by female students studying Civil Engineering and intervention strategies to increase the enrolment.

Chapter 1 presented the introduction which gave a summary of subheadings which were discussed in this chapter. The background highlighted the rationale and justification for carrying the research project. It highlighted the factors that prompted the researcher to carry out the research which included societal perceptions which perceive certain subjects and courses not suitable for females and these preconceived notions influence students career choices and how they influence the enrolment (Cunningham, 2001). Enrolment trends of female students of female students studying Civil Engineering were also highlighted (Mary

and Chubin 2003). The study was carried out at Bulawayo Polytechnic where the problem of low enrolment was identified. The research supplements existing literature in the field of Technical education and it is a step building up knowledge on Technical education and also helped the researcher to gain in-depth knowledge on conducting academic research..It is hoped that the research would help the Ministry of Higher and Tertiary education to put in place policies that encourage female students to enroll in courses which are male dominated such as Civil Engineering

Administrative policies restricted the researcher to access all the information which was needed and also attitude of some researchers to a lesser extent influenced their responses. Assumptions of the study were stated and definition of terms were given.

In order to come up with worthwhile work the researcher was able to consult widely on the topic .Literature was reviewed from various authors and studies on issues similar to the research. The issues included socio –cultural beliefs acquired through socialisation that Civil Engineering is male dominated domain and the preconceived notions that female students are not capable in Mathematics and Science which are linked to Engineering explains why few female students enroll for Civil Engineering (Cunningham, 2001). The educational background of the parents was also cited as the major influence of female students' career aspirations. Educated parents and family members value education for their female children and have high expectations which inspire them to occupations such Engineering (Mary and Chubin 2003). Personal factors like low self efficacy in subjects such as Mathematics , Science and Technical Drawing influences their decision on choosing courses and they avoid courses which require Mathematics , Science or Technical Drawing. Challenges faced by the female students during the courses of the study were identified included factors such as

attitude of female students and viewed them as incapable. Social problems were also cited as a barrier, married female student had other marital responsibilities which tend impact negatively on their college work. Physical needs of the Civil Engineering courses such fieldwork was noted as a barrier as female students have difficulties with field work (Mary and Chubin 2003).

Intervention strategies were also suggested which included career guidance, educational reforms which advocates for female encouragement to like Mathematics, Technical Drawing and Science, gender mainstreaming and strengthening life skills as to increase the enrolment of female students.

The researcher used a descriptive case study research design because it enabled the researcher to gather in-depth data. The population of the study comprised of eighty students of twenty five are females and fifty five are males studying their National Diploma in Civil Engineering at Bulawayo Polytechnic College and five lecturers in the department.

Stratified random sampling was used to select fifteen male students and fifteen female students as respondents. Five lecturers were selected using purposive sampling. The researcher used questionnaire, interview guide and an observation schedule to collect information from recipients. The research instruments were chosen after consideration of their advantages and disadvantages was done. The descriptive statistics were used to data analysis, tables graphs and pie chart were used to present data collected.

The findings were analyzed and revealed factors influencing the enrolment of female students which included personal interests, academic competence. The findings also cited reasons for low female enrolment in Civil Engineering department as lack of aptitude and

proper Science, Mathematics and Technical Drawing background , misconception by the society that Civil Engineering is unsuitable for females , lack of effective career guidance at Secondary education level. Challenges faced by female students during their study included physical capabilities to do carry heavy field equipment, social challenges such family responsibilities. Intervention strategies to increase the enrolment of females studying Civil Engineering were cited as , effective career guidance programmes at Secondary Education level , encourage females at secondary education level to study Mathematics, Science and Technical Drawing subjects, government consider giving additional financial incentives to females doing Civil Engineering . A thorough discussion of findings was done . Conclusion were drawn from the findings and recommendations were made

5.2 Conclusion

The study revealed that the number of female students studying Civil Engineering courses at Tertiary institutions in Zimbabwe is low compared to male students. The situation is due to lack of careers guidance at secondary schools , lack of appreciation and understanding of Mathematics, Science and Technical Drawing subjects at secondary schools by female students, criticism and discouragement of females wishing to study Civil Engineering by the people in the society.

The findings of the study have revealed that parents and family members play significant roles towards education of their children , as indicated by most students during the study . It was further noted that most students in particular choose Civil Engineering because of their academic competence and out of personal interest and parents were cited by a few female students that they influenced their enrolment into the Civil Engineering course. This implies that parents and society at large still hold preconceived notions about Engineering as a male

domain and do not encourage their female students to enroll for Civil Engineering . Literature concurs with conclusion as Kassim et al(2011) in their study indicated that lack of interest in some technical courses were based on their parents opinion about the field of study.

It was also noted that the major reason for low enrolment of female students into Civil Engineering was lack of Mathematical, Science and Technical Drawing background and foundations , which are fundamental to the study of and entry into Civil Engineering . Without proper Mathematics, Science and Technical drawing background , Civil Engineering is a complex course which involve Mathematical computation and Engineering drawings, thus a fear for female students who do not possess such skills. Lack of careers guidance is also a the major cause of low enrolment as it equips pupils with possible career prospects and provides a link between Secondary Education level and Tertiary Education stage. It came during the study that career guidance is lacking in secondary schools and this impacts negatively on the choice of courses when students go to Tertiary Institutions. Misconception about Civil Engineering as not suitable for female students was cited by students and lecturers , due to lack of knowledge about Civil Engineering.

The study concluded that student aspirations and choices range from gender socialized roles and perception of careers considered appropriate for males and females. Gender roles coupled with lecturer /teacher attitude , parents expectation and choice of subjects have an impact on career choice.

5.3Recommendations

- Effective career guidance programmes should be strengthened at secondary schools and should be an integral part of the school curriculum to inform female students

options available to them at Tertiary Institutions and should be taught gender equality in terms career prospects.

- The school curriculum should be designed in such a way that gender stereotyping in subjects and careers is discouraged from Primary to Secondary Education levels and society must be educated through media , workshops, awareness campaigns on that no careers is a preservative for female or males in the society and the role the female play towards the development of the nation.
- Girls at Secondary education level should be encouraged to partake in Mathematics, Science and Technical drawing subjects and this can be achieved through the introduction of Mathematics and Science clubs in schools of which female students should be encouraged to take part to identify their potential and develop interest.
- Successful female engineers should be exposed through media in order to make the society get rid of the notion that engineering is suitable for males only. Successful female engineers can used as role models in the society.
- The government should consider giving additional incentives to female students doing Civil Engineering at Tertiary Institutions , such as increased payout instead of loan facility, affluent hostel accommodations . This will motivate female student at secondary education to be interested in doing Civil Engineering at Tertiary institutions.
- The Tertiary Institutions should consider introducing a bridging courses for students with low qualifications in area of Technical Drawing, Mathematics , Science and Computers to assist the students pass the required subjects at Secondary Education

level whilst undertaking Civil Engineering , this should be particularly aimed to female students wishing to enroll for Civil Engineering .

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APPENDICES

Appendix 1

Interview Guide for Lecturer

I am a bachelor of Education in Fashion and textiles student at Midlands State University, I am carrying out a research on the factors influencing the enrollment of female student studying Civil Engineering at Tertiary Institutions. The information that you will give only be used for the purpose of this study and will be treated with confidentiality.

1. How many years have you been a lecturer at this institution?
2. How many females and student are studying civil engineering (possible by level)?
3. What are the causes of low enrolment of female students in your department?
4. How is the interaction between female and male students during the course of their studies?
5. What challenges do females students encounter through out the course?
6. Do you have any female dropouts and what are the causes?
7. What can be done to increase the enrolment of the female students?

Appendix 2

Questionnaires for Student

I am a Bachelor of Education in Fashion and Textiles student at Midlands State University . I am carrying a research on the Factors Influencing the enrolment of female students studying Civil Engineering at Tertiary Institutions . The information that you give will only be used for the purpose of this study and will be treated with confidentiality.

Instructions

Do not write your name on the questionnaire.

Show response by ticking the respective answer box or completing in space provided.

1. Gender

Male

Female

2. Who pays your college fees?

.....
.....
.....
.....

3. What are your reasons for choosing Civil Engineering ?

.....
.....
.....
.....

4. What do you think are the causes of low enrolment of females studying Civil Engineering ?

.....

5. What challenges do you encounter in studying Civil Engineering?

6. How is your interaction with female/male students during lectures?

7. What do you think should be done to increase the enrolment of female students?

Thank You for your cooperation!

Appendix 3

Observation Schedule

The Student will observe and look at the following

1. Sitting arrangement
2. Resources which are used in the department such as the Drawing Room facilities, field equipment, lecture room facilities
3. Lecturer – Student interaction and the interaction of male and female students.