FACTORS INFLUENCING PARTICIPATION IN SCIENCE EDUCATION

BY GIRLS

IN TANZANIAN SECONDARY SCHOOLS

Project Financed by NORAD

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EXECUTIVE SUMMARY

The education system in Tanzania is based around a 2-7-4-2-3+ structure. In other words: 2 years of pre-primary school, 7 years of primary school, 4 years of ordinary secondary school (O-level), 2 years of advanced secondary school (A-level) and at least 3 years of higher education.

The problem

Statistics show that the number of female students in ordinary level secondary schools is almost equal to that of males (BEST-2016). However, the performance of girls at the national O-level examinations (Certificate of Secondary Education Examinations) is generally lower than that of boys. Therefore the number of girls joining advanced level secondary education is less than that of boys and much fewer join science subjects. Again the performance of girls at the national A-level examinations (Certificate of Secondary Education Examinations) is generally lower than that of boys and hence a narrow capture area for girls in science and engineering studies at higher education institutions.

Study area: The study covered 63 schools in 19 regions of both Tanzania mainland and Zanzibar.

Objectives

- To identify possible inequalities in the education sector that affect particularly girls intending to pursue science subjects.
- To create awareness on the bottlenecks that limits the chances of the girls in science
- To identify possible social factors that hinder the development of girls in secondary and higher education in general and in science subjects in particular
- To seek views on possible solutions/measures that could help redress the situation

Methodology

Survey tools were prepared for both teachers and students. The tools were validated on a pilot test conducted in Dar es Salaam. The target schools were identified and 30 student teachers were engaged to collect data from the schools. Each student teacher collected data from two different schools. The data were processed and analysis was done using Statistical package for Social Sciences (SPSS).

Results

The performance of girls at O-level in science subjects such as chemistry, biology and physics is actually better than in some of the arts subjects such as history and civics. However, the performance in mathematics is probably the worst of all.

The study shows that there are a lot of factors that create difficult environment for girls to pursue their studies effectively. Some of the factors are related to the school environment while some are home based.

The school based factors that impact negatively include: lack of library facilities, lack of ICT facilities, inadequate number of teachers, lack of hostels, and lack of water and electricity.

The home based factors include: numerous household chores, long distance between school and home coupled with poor transport, limited moral and material support from families.

Teachers have shown that funding for education needs is a serious matter affecting teaching and learning.

The decision to choose science subjects is influenced by a number of factors other than academic performance. Social factors seem to have the upper hand in the decision. Many girls are influenced by the general stereotyping, parents, relatives, and even teachers. Economic prospects also seem to influence the decision. The prospects are sometime out of perceptions of the community in general.

Conclusion

Social economic factors are probably more significant in affecting the choice by girls to study science subjects and take a carrier in science, engineering and technology. There are cultural pressures for girls to continue with the status quo and play the role the society has known them to play for ages. The general learning environment also contributes to the eventual career path that the girls find themselves in.

Recommendation

A lot needs to be done to change the traditions, attitudes, perceptions and expectations. The learning environment must be improved to be favourable to the girls to pursue science subjects. And carrier advice needs to be done very early in the secondary school.

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ACRONYMS AND ABBREVIATIONS

BEST	Basic Education Statistics
CSEE	Certificate of Secondary Education Examination
EnPe	Energy and Petroleum
ICT	Information and Communication Technologies
NORAD	Norwegian Agency for Development Cooperation
PCA	Principal Components Analysis
SoE	School of Education
SOP	Standard Operating Procedures
SPSS	Statistical Package for Social Scientists
TPDC	Tanzania Petroleum Development Corporation
UDSM	University of Dar es Salaam

1 INTRODUCTION

1.1 Background

In the last three decades, Tanzania has witnessed increased activity in the oil and gas sector. The number of exploration companies increased substantially from 3 in the 1990s to 18 in 2012. The Tanzania Petroleum Development Corporation (TPDC) had signed 26 production sharing agreements with various companies by 2013. More agreements are expected to be signed in the coming years. The foreign direct investment in the industry has increased from USD 280 million in the 90s to more than USD 500 million in 2012 and was estimated to reach USD 35 billion by 2030. In response to the changing landscape the training institutions reoriented themselves in the effort to train the requisite manpower for the upcoming industry. The prospective trainees in the areas of engineering and science are all required to have science background. Historically, relatively few females have been pursuing science subjects at secondary schools. At university level, the percentage of female students pursuing engineering programs is generally less than 15% and less than 30% in science subjects. These figures are unlikely to change in the near future. There have been multiple efforts to expand enrolment of girls in science subjects and eventually in science and engineering fields. The success of these efforts is not quite remarkable as the number of girls in these fields is not expanding as fast as many would wish. Considering the percentage of females in the population (slightly over 50%), it is highly desirable to ensure women are encouraged to pursue science subjects so that they can fully participate in the oil and gas economy through sciences, engineering and technology

Traditionally, there have been concerns about various obstacles that hinder women from pursuing science subjects. Some of these obstacles are inbuilt in the structures of the society and the general way of life of communities. Efforts are needed at all times to unearth these obstacles to be able to recommend solutions that will improve the participation of women in the science based professions, particularly in the oil and gas sector.

The Energy and Petroleum (EnPe) project has the overall objective to build capacity in the area of oil and gas. It has a strong emphasis on ensuring promotion of knowledge and skills through training and scholarship schemes for marginalized groups, including women.

1.2 Problem Statement

Since time immemorial, women have been left out in development issues and the society has more often than not subjected them to positions of insignificance. Statistics show that the number of female students in ordinary level secondary schools is almost equal to that of boys (BEST, 2016). However, the performance of girls in most subjects at the national certificate of secondary education examinations (CSEE) is distinctively lower than that of boys. Worse still, the performance of girls in science subjects in the same examinations is notably lower compared to that of boys. Consequently, the number of girls joining advanced level secondary education is drastically reduced creating an imbalance that is carried through to university level. Thus universities have a smaller pool of female applicants from which to select suitable candidates for joining their various university science based programmes. The reasons for continual thinning out of the number of girls as we climb the ladder of education are varied and complex in nature and need to be explored.

1.3 Area of study

The study was conducted in six geographical zones of Tanzania (mainland and Zanzibar). These are Northern zone (Arusha, Kilimanjaro, Manyara and Tanga regions); Eastern zone (Dar es Salaam, Pwani, and Morogoro regions); Southern zone (Ruvuma, Mbeya, Njombe, and Iringa regions); Western zone (Kigoma region); Central zone (Dodoma, Singida, and Shinyanga region); Lake zone (Kagera, and Simiyu regions); and Zanzibar (Zanzibar Urban West, and Pemba North regions). The study covered government, community and private owned secondary schools, with science streams. The focus was on girls secondary schools only, though a few co-schools (boys and girls schools) were included. A total of 63 schools in 19 regions were covered in the study.

1.4 Objectives

The specific objectives of this study were:

a) To identify possible inequalities in the education sector that affect particularly girls intending to pursue science subjects.

b) To create awareness on the bottlenecks that limits the chances of the girls in science.

c) To identify possible social factors that hinder the development of girls in secondary and higher education in general and in science subjects in particular.

d) To seek views on possible solutions/measures that could help redress the situation.

1.5 Research Questions

The answers to the following research questions will lead to achievement of the specific objectives.

a) Does the social status of girls reduce their chances to undertake science studies effectively?

b) Does lack of awareness and science subjects' difficulty syndrome influence the decisions of girls to study science subjects?

c) Does learning environment impact negatively the decision of girls to pursue science subjects?

1.6 Significance of the Study

Knowledge of science is indispensable as the engineering and science industries are vibrant elements of the economy of Tanzania in general. Data in the global perspective show that 75% of the fastest growing professions require science skills and knowledge (Becker and Park, 2011). Therefore, this study is of great importance in guiding the academia and sets as a benchmark for conducting further studies in the field of gender. This study will also bring in knowledge needed for higher institutions such as universities and colleges to avail strategies for increasing enrolment of female students in science in secondary schools.

2 LITERATURE REVIEW

2.1 Theoretical Review

It is evident that theories play a vital role in research progression as they are means in planning, data collection and interpretation of the evolving results. Whitworth (2007) affirms that, theories suggest and connect abstract variables, and convert them into physical data. Conversely, without a theory or model, researchers can hardly conduct top-quality research and repeatedly result into quandary (Neuman, 2006). Theories therefore are important in shaping the objectives of a particular study for appropriate conclusions. At least three theories were reviewed to shade light on this work.

2.1.1 Self-Efficacy Theory

Self-efficacy theory was established in 1981 by Hackett and Betz. The theory explicates the idea that the perception of efficacy (ability to produce intended result) within an individual is influenced by four factors namely: mastery experience, vicarious experience, verbal persuasion, and somatic and emotional state (Bandura, 1994).

The theory has direct applications to explain women's underrepresentation in male-dominated occupations and how beliefs about self can highly influence the carrier development of an individual with a view of gender issues. The theory asserts that gender socialization influences the cognitive processes particularly expectations of self-efficacy, which in turn influences career decision making process (Fitzgerald et al., 1995). Self-efficacy beliefs can lead to avoidance of or motivation toward career behaviours (Betz & Taylor, 2001). Low self-efficacy can cause people to procrastinate making career decisions, and may delay them from following through with a decision once it has been made (Betz, 1992).

Further, the theory relates to the study in the sense that, for a student to opt a science stream has to have a vigorous decision and therefore if the female students do not have that sense of deciding and fear to decide may abandon the stream even when they have talents and capable of doing and passing the science subjects. This theory therefore sets as a measure to explain how various environments can influence the learning process and in turn the career choices for girls in secondary schools.

2.1.2 Social Cognitive Career Theory

Social Cognitive Career Theory was developed by Lent et al. (1994). It was attempt to explain how carrier and academic interests develop, how career related choices are made and enacted, and how performance outcomes are achieved in terms of construct of personal agency. This theory was constructed on Bandura's general Social Cognitive theory (1986) which emphasizes triadic reciprocal causality and focuses on self-efficacy, expected outcomes and goal mechanism. The triadic reciprocity occurs between the external environment, overt behaviour and personal attributes (example feelings, attributes, gender and aptitude). Gibbons (2004) examines how school and career counsellors can assist prospective college students prior to college entrance through the use of Social Cognitive Career Theory.

In contributing to this theory, Gibbons (2004) found that individuals develop their sense of self-efficacy from personal performance, learning by example, social interactions, and how

they feel in a situation. Outcome expectations are formed through past experiences, either direct or vicarious, and the perceived results of these experiences. Behaviour is organized or sustained based on previous set goals.

De Bruin (1999) argues that, the social cognitive theory is a very useful model as it takes into account the social cultural context in which the career development takes place. However, Lent *et al.* (2002) insist that, even though the theory considers the influence of gender, ethnicity and social economic status on carrier development and choice, it needs to be clearer on these issues.

The theory on social cognitive career relates to this study in the sense that, it inculcates the influence of self-efficacy and expected outcomes in science subject selection. In other way, the doubts of whether one will fail or pass by opting science subjects, influences the choice of those subjects among the female students.

The theory also puts forward the role of the environment in directing the person to choose a career and therefore highlighting the need to use the environment in schools and homes to impart the love to science subjects to the female students and thus opting to science subjects in higher levels.

2.1.3 Occupational Preference

Gottfredson (1981) developed theory of circumscription and compromise which focuses on how occupational aspirations develop from childhood to adolescent stage. The theory is primarily on social class, gender and intelligence and secondarily on aspects like values, personality and plans for family and how they affect career choice. The theory is built on four major concepts of self-concept, images of occupation, cognitive map of occupations and occupational preferences.

The self-concept is the view that an individual hold about himself or herself or one understands of one's abilities, interests, personality, gender, values and place in society. Thus the occupational aspiration is the reflection of one's effort to implement one's self-concept. This mainly influences the female students' selection of the stream to be in and the occupation to choose in the future (Gottfredson, 1996).

Further, Henderson *et al.* (1988) conducted a study on occupational preferences which are narrowed by sex typing before being narrowed by social background. The result of this study revealed that the narrowing by sex type occurred at an earlier age than that proposed by Gottfredson (1981) and according to Taylor and Pryor (1985) the girls sex type was more flexible than boys. Stead and Watson (1999) concluded that the theory gives inadequate explanation on why some people broaden rather than narrow their options while others appear not to stereotype and choose occupations that are not sex typed. The theory is relevant as it deals with things that influence the career choices and therefore can help to explain the influences of career choices among the females in science related subjects.

3 METHODOLOGY

3.1 Preparation of Survey Tools

Two questionnaires, one for teachers and the other for students, on identification of the gender inequalities in the secondary sciences subjects were prepared. The questionnaires covered background information, basic current school information and opinions of teachers and girls secondary school students on learning environment, and influences in choosing to study sciences as shown in Appendix 1.

3.2 Pilot Testing of Survey Tools

The prepared questionnaires were tested for the reliability and validity of the possible responses from the questions as per the project objectives. Two pilot secondary schools *viz;* Zanaki Girls' Secondary School in Dar es Salaam and Baobab Secondary School in the Coast region were selected for testing the questionnaires. The former school is government owned while the latter is privately owned. The two schools were selected because of their proximity and readiness to participate in the project. The results from the two pilot secondary schools indicated that the questionnaires were reliable and valid for use in other secondary schools in the whole country.

3.3 Identification of Target Secondary Schools

The study targeted girls and co-secondary schools which teach both science and arts subjects at Ordinary and Advanced levels. The sixty three (63) secondary schools that formed part of the study are those which accepted undergraduate student-teachers from the University of Dar es Salaam for the teaching practice programme in the 2015/2016 academic year. Thirty (30) student-teachers were selected from the School of Education (SoE), Mlimani Campus of the University of Dar es Salaam to administer the questionnaires in the selected secondary schools.

3.4 Administering of Survey Tools

The project team members first made orientations to the selected student-teachers on how to ethically administer the questionnaires. Thereafter, each student-teacher was provided with the questionnaires for administering in two (2) of the selected secondary schools. The student teachers administered the questionnaires to both ordinary and advanced level girls' secondary school students studying science subjects. In addition, the questionnaires were also administered to teachers teaching science subjects and academic masters of each selected school. The students, science teachers and academic masters filled the questionnaires under the guidance of the respective student-teacher at each selected school. The filled questionnaires were collected by the student-teachers and brought back to the project team for data processing (compilation and systematization), analysis, interpretation and final report writing purposes.

3.5 Data Processing, Analysis and Interpretation

The obtained questionnaires were examined for correctness of each school responses and thereafter clarifications were made accordingly. Then questionnaires were coded and classified into more manageable data sets, so as to match the objectives of the study using Microsoft

Excel programme. Further, the coded data were analysed using Statistical Package for Social Scientists (SPSS) programme. The analysed data were finally interpreted using descriptive statistics such as frequency tables and multivariate statistics including cluster, correlation and factor analyses.

4 RESULTS AND DISCUSSIONS

The team of student teachers was spread across the country in the six selected zones to collect the required data. A total of 63 secondary schools participated in this study. The visited schools had enrolment of 48 to 1693 students, whereas the number of girls in the schools ranged from 7 to 730. The number of responses obtained was 122 from teachers, 792 from science students and 173 from arts students. Data from the schools were compiled, analyzed and discussed as shown in the subsequent subsections.

4.1 Frequency of Responses on Factors Influencing Learning Process

Following data analysis using SPSS, frequency tables and figures were spawned covering factors influencing the learning process. Valid percentages of responses indicating influences of the respective factors were generated as shown in Figures 1 and 2, being responses of female students and teachers.

4.1.1 Responses from Students

The frequency of responses of students on the question of factors influencing learning process of female science students in secondary schools are as shown in Figure 1.

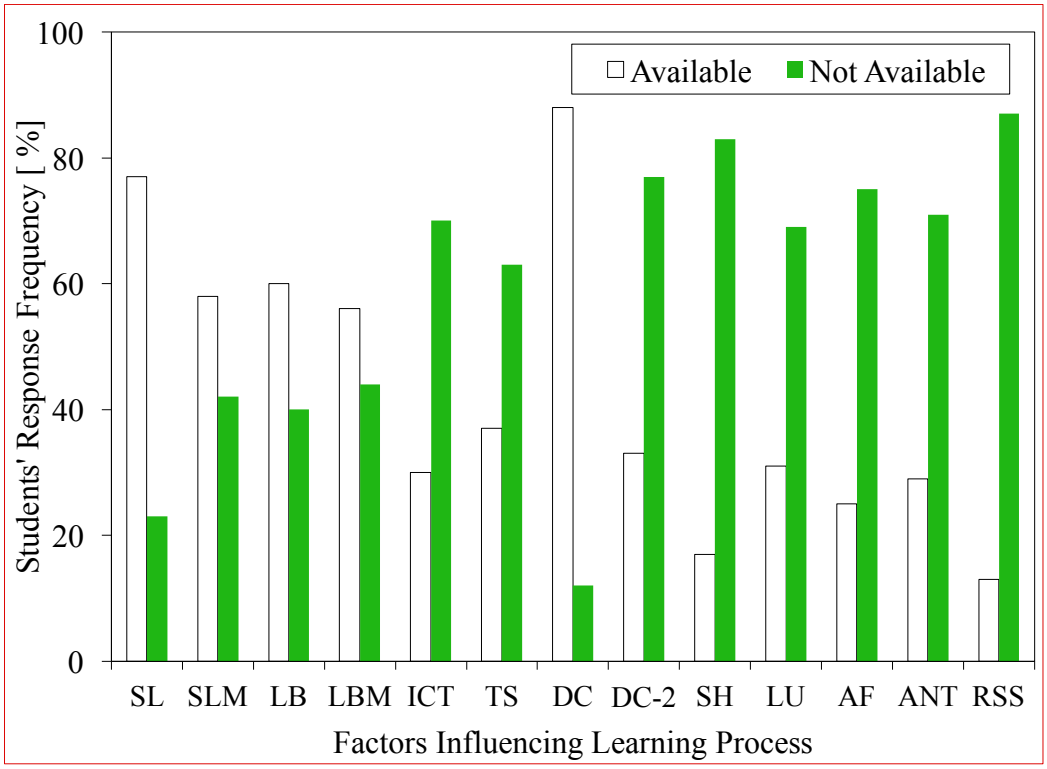

Figure 1: **Students' Responses on Factors Influencing Learning Process**

Key to Figure 1: SL=Science Laboratory; SLM=Science Laboratory Materials; LB=Library; LBM=Library Materials; ICT=Information and Communication Technology facilities; TS= Problem of Transport to and from School for day scholars; DC=Indoor Domestic Chores; DC-2=Outdoor Domestic Chores; SH=Sexual Harassment; LU=Problem of Utilities e.g. Water, Electricity, etc.; AF=Adequate Teaching & Learning Facilities; ANT=Adequate Number of Teachers; RSS=Rating Science Subjects Difficult.

Figure 1 shows that learning process is very much affected by domestic chores (88%). This problem is more pronounced for day scholars. Sexual harassment (83%) from teachers and society is also ranked high. This problem was also more prominent for day scholars. This

suggests that having boarding schools might alleviate these problems, hence attracting more females into sciences. However, poor facilities (75%) and inadequate number of teachers (71%) were also registered to have big influence on the performance. These are areas which the responsible school owners namely private and government through Ministry of Education, Science, Technology and Vocational Training and the Ministry of Local Government need to address urgently.

In the question asked as:

"What do you normally do at home after school hours?"

High percentage of students responded that they are normally given domestic chores such as washing utensils and cleaning houses and their surroundings.

For instance; one student from Jangwani Secondary Schools responded that:

"Every time when I come back home from school (in the evening) my mom ask me to wash the utensils that were used for breakfast and lunch"

4.1.2 Responses from School Teachers

The frequency of responses of teachers on the factors influencing learning process of female science students in secondary schools are as shown in Figure 2.

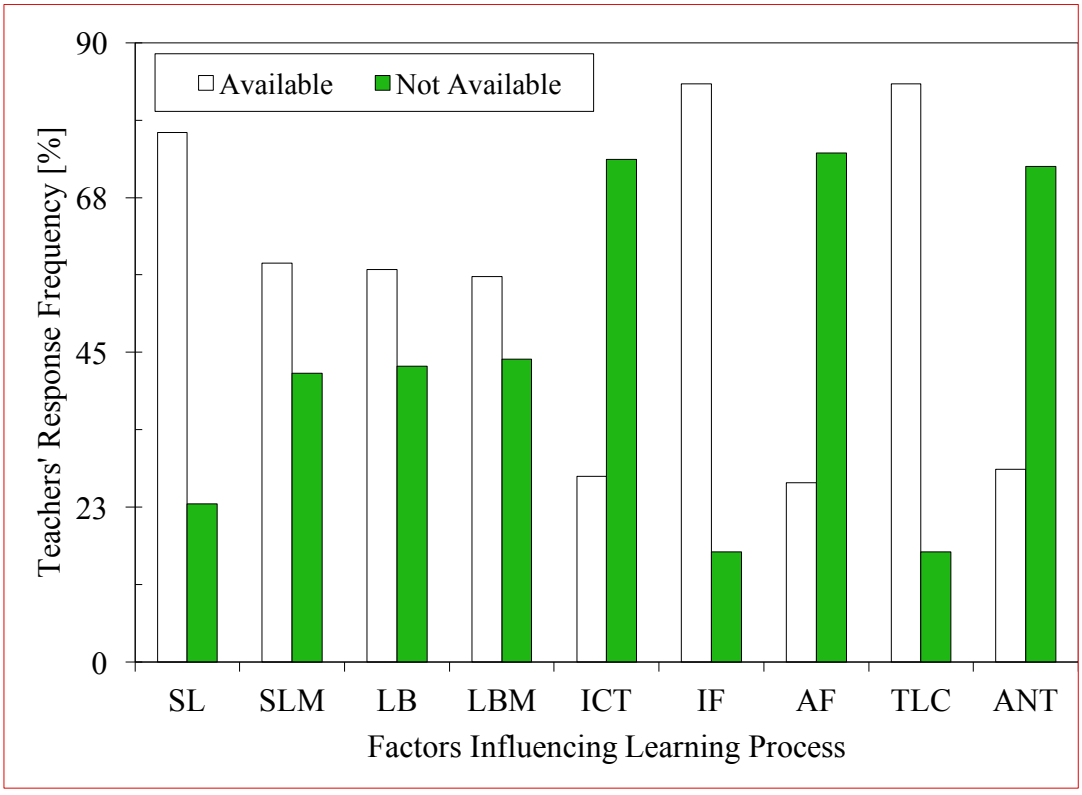

Figure 2: **Teachers' Responses on Factors Influencing Learning Process**

Key to Figure 2: SL=Science Laboratory; SLM=Science Laboratory Materials; LB=Library; LBM=Library Materials; ICT=Information and Communication Technology facilities; IF=Inadequate Funding; AF=Adequate Teaching and Learning facilities; TLC=Teaching and Learning Curriculum; ANT=Adequate Number of Teachers.

Results show that teachers in various sampled schools felt that the following factors could be undermining the learning process of girls in secondary schools: inadequate funding (81%), day school (79%), poor facilities (74%), inadequate number of teachers (72%) and library (57%).

The influence of poor facilities, inadequate number of teachers and day schooling on the learning process coincides with the students' opinion. Thus immediate action is required from the school owners including the government. Poor facilities are a result of inadequate funding which is seen as the major contributor. Inadequate funding also affects availability of qualified teachers. Thus school owners (private and government) have to find means of addressing this.

4.1.3 Frequency of Responses on Choice of Science Subjects by Students

The responses of students on the factors influencing choice of science subjects by female science students are as shown in Figure 3.

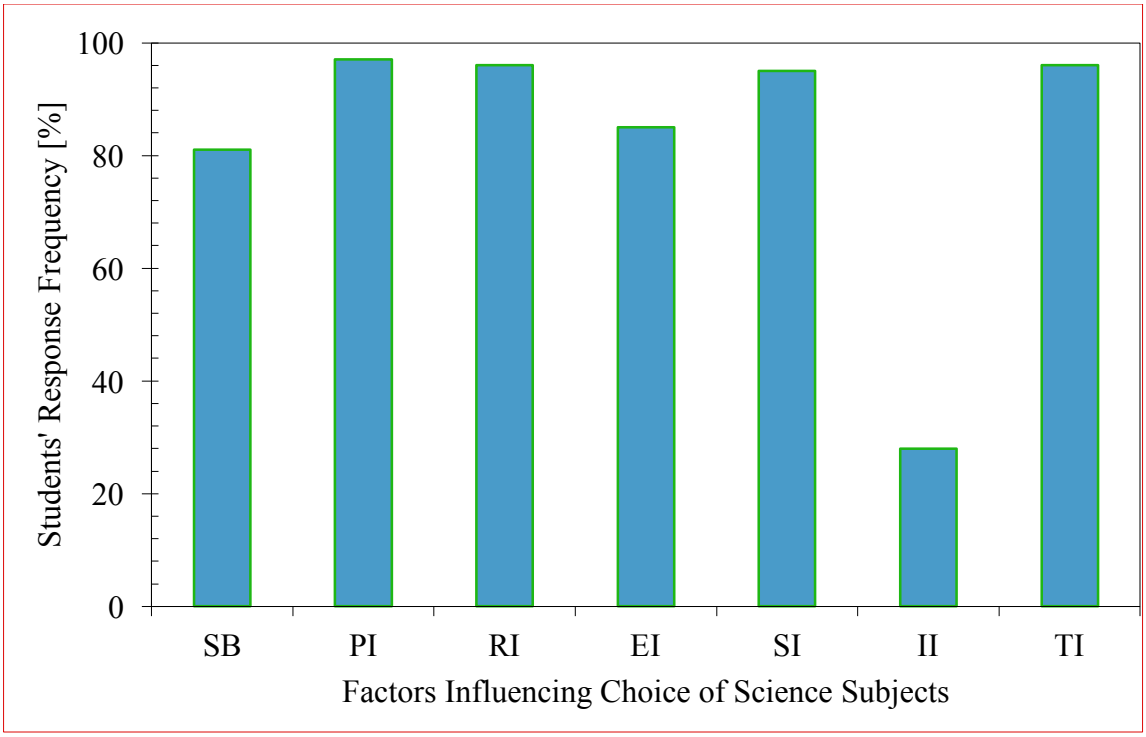

Figure 3: **Students' Responses on Factors Influencing Choice of Science Subjects**

Key to Figure 3: SB=Student Background; PI=Parents Influence; RI=Relatives Influence; EI=Economic Influence; SI=Social Influence; II=Individual Influence; TI=Teachers Influence

In attempting a question on factors influencing opting to study science subjects, students show that they were significantly influenced by: parents (97%), relatives (96%), teachers (96%), society (95%), economy (85%) and their academic background (81%). This leaves the students without their own choice. Most of the parents base their advice on unjustified socio-economic factors and in complete disregard of the student's academic ability.

In attempting the question asked as:

"How many hours do you spend in either laboratory session or science class?"

The response from students (Table 1) indicate that students spend less hours in learning science subjects (69%) in terms of laboratory sessions and normal science class sessions. This fact could be limiting the interest of female students from deciding to choose science subjects in advanced classes. The fact could probably also be contributing to failure of female students in exams and become short of the required credits for further science studies.

Table 1: **Hours Spent in Science Classes and Laboratory Sessions in a Week**

	Time	**Frequency**		**Valid Percent (%)**	**Cumulative Percent (%)**
	Hours	Number	(%)		
Valid	≤ 40	516	65.2	67.8	67.8
	Between 40< and 60	161	20.3	21.2	89.0
	≥ 60	84	10.6	11.0	100.0
	Total	761	96.1	100.0	
Missing	System	31	3.9		
Total		**792**	**100.0**		

4.2 Multivariate Statistics of the Responses from both Students and Teachers

The data from this study were subjected to the multivariate statistical analyses to investigate the existence of significant phenomena between the responses of both students and teachers. The statistical results are as shown by cluster dendrogram in Figure 4, correlations and factors as shown in Tables 2 & 3 and Table 7 & 8, respectively.

Table 2: Teachers' responses on factors influencing learning process

	Available	Not Available
Science Laboratory (SL)	77	23
Science Laboratory Materials (SLM)	58	42
Library (LB)	57	43
Library Materials (LBM)	56	44
Information and Communication Technology facilities (ICT)	27	73
Inadequate Funding (IF)	84	16
Adequate Teaching and Learning facilities (AF)	26	74
Teaching and Learning Curriculum (TLC)	84	16
Adequate Number of Teachers (ANT)	28	72

Table 3: Students' responses on factors influencing choice of science subjects

	Significant [%]
Student Background (SB)	81
Parents Influence (PI)	97
Relatives Influence (RI)	96
Economic Influence (EI)	85
Social Influence (SI)	95
Individual Influence (II)	28
Teachers Influence (TI)	96

4.2.1 Cluster Analysis

The cluster analysis fortified the existence of significant interactions between field observations. The levels of similarity at which observations are merged were determined and used to construct a dendrogram using Ward's method (Davis, 1986). The dendrogram in this study shows a significant variation among the variables from teachers' responses (Figure 4).

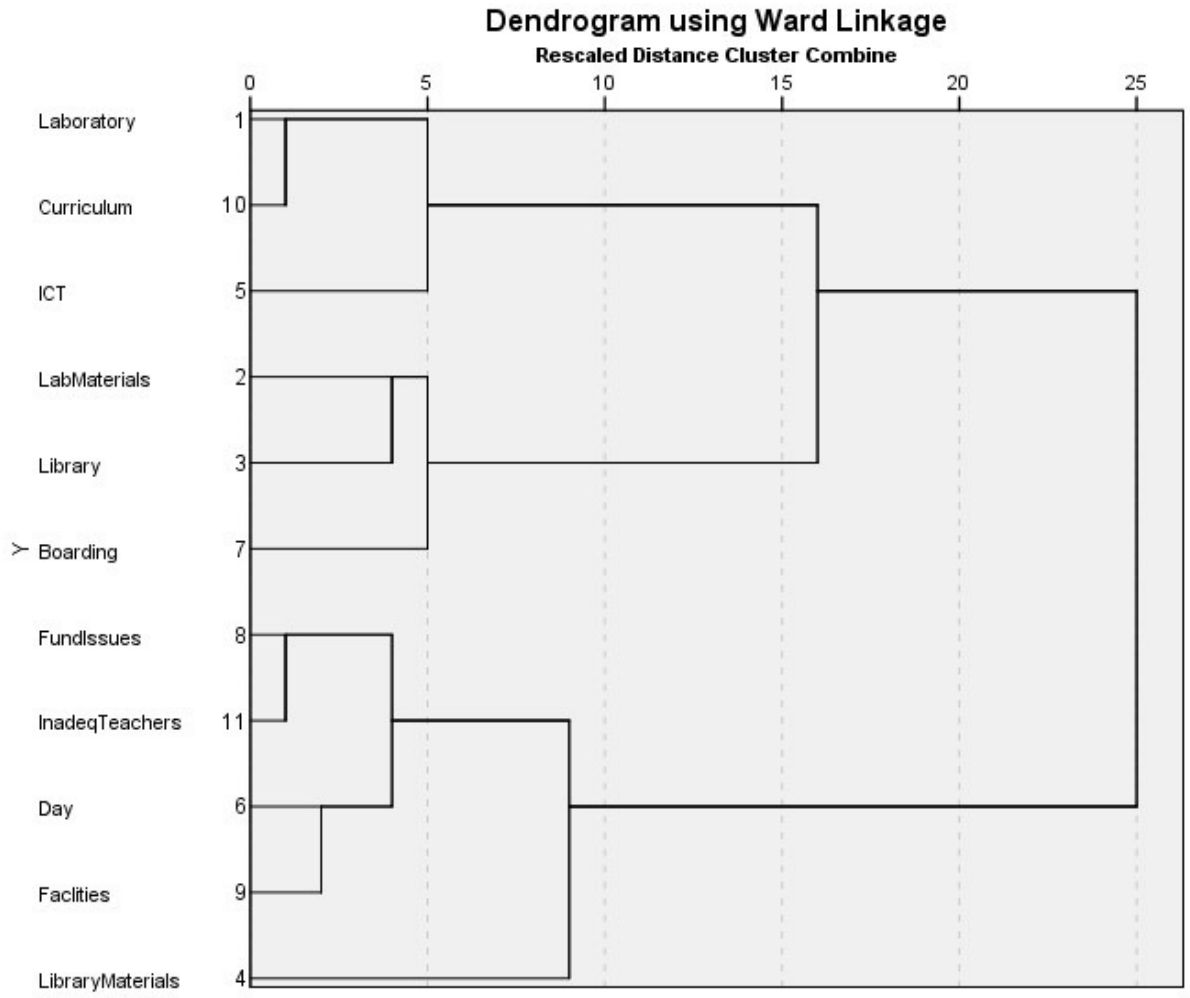

Figure 4: Dendrogram from Teachers' Responses

Cluster analysis as portrayed by the dendrogram in Figure 4 indicates two major clusters having three sub-clusters. The major cluster has factors that positively influence performance of science students. The second major cluster negatively influences performance and decisions to study science subjects.

Sub-cluster one in the first major cluster is characterized by availability of laboratory, curriculum and ICT attributes, implying that there are schools whose performance in science subjects are influenced by these factors.

Sub-cluster two is characterized by availability of laboratory materials, library and boarding facilities. This cluster indicates that performance of science students is influenced by availability of library where both students could have space to conduct private study and can easily acquire reading materials. In addition, presence of laboratory materials implies that students can undertake many science practical sessions, thus influencing their performance and vice versa. The boarding facility factor shows that with science students staying in boarding schools, they have more time to study than those who are in day schools. In addition, they can have time to conduct science practical assignments hence influencing their performance in the examinations.

Sub-cluster three in the second major cluster is characterized by poor funding issues, inadequate teachers, day schooling, inadequate facilities and library materials. This cluster indicates that lack of these attributes negatively affect the performance of science students and also influences heavily whether the girls students could decide to study science subjects.

4.2.2 Correlation Matrix Analysis

The correlation matrix analysis depicts the existence of associations among the responses from the field. In this study, the responses from both teachers and students show significant relationships as demonstrated in Tables 4 and 5.

Table 4: **Correlation Matrix from Teachers' Reponses**

	SL	**SLM**	**LB**	**LBM**	**ICT**	**AF**	**TLF**	**TLC**	**ANT**
SL	1								
SLM	.10	1							
LB	-.27	.31	1						
LBM	-.06	-.34	***-.49***	1					
ICT	.08	.27	.21	-.13	1				
AF	.17	-.08	-.19	.09	.16	1			
TLF	.10	-.13	-.28	.28	.13	***.46***	1		
TLC	.37	.06	-.08	-.07	-.03	.12	.25	1	
ANT	.23	-.12	-.14	.06	.06	***.49***	.27	.15	1

Key: SL=Science Laboratory, SLM=Science Laboratory Materials, LB=Library, LBM=Library Materials, ICT=Information and Communication Technology, IF= Inadequate Funding, TLF=Teaching and Learning Facilities, TLC=Teaching and Learning Curriculum and ANT=Adequate Number of Teachers.

The correlation matrix for teachers as per Table 4 shows that the presence of library and inadequate number of teachers in schools seem to influence girls from pursing science subjects. The matrix further shows that science laboratory conform to the teaching-learning curriculum for appropriate learning and finally proper performance. Again, science laboratory materials correlate positively with the presence of library implying that schools must have books for standard operating procedures (SOP), handouts and practical reference books. Fourthly, library negatively correlates with library materials showing that libraries in schools must be equipped with different subject books to reinforce the proper teaching-learning process. Lastly, inadequate funding correlates positively with poor facilities and inadequate number of teachers implying that, schools need to be funded so as to buy various facilities and also teachers need to be paid well to sustain them in schools.

Table 5: Correlation Matrix from Students' Responses

	SL	SLM	LB	LBM	ICT	DS	BS	TS	DC	DC-2	SH	LU	AF	TLC	ANT	SAB	PI	RI	EI	SI	II	TI
SL	1																					
SLM	-.08	1																				
LB	-.05	.18	1																			
LBM	-.17	-.33	***-.46***	1																		
ICT	.24	.20	.20	-.17	1																	
DS	.15	-.32	-.33	.30	-.16	1																
BS	-.15	.32	.33	-.30	.16	-1.00	1															
TS	.16	-.27	-.20	.25	-.19	***.60***	***-.60***	1														
DC	-.13	.01	.10	-.01	-.05	.07	-.07	-.02	1													
DC-2	.17	-.04	-.04	.05	.00	.09	-.09	.10	-.06	1												
SH	-.12	-.04	-.03	.09	-.08	-.01	.01	-.04	-.07	-.20	1											
LU	.00	-.01	.03	.11	.01	.12	-.12	.19	.05	-.01	.00	1										
AF	.10	-.14	-.16	.09	.08	.22	-.22	.13	.04	.15	-.06	.03	1									
TLC	.15	-.11	.13	-.24	.20	-.01	.01	-.05	.13	.10	-.12	-.07	.13	1								
ANT	.13	-.08	-.05	.02	.06	.17	-.17	.13	-.10	.18	-.08	-.05	.33	-.07	1							
SAB	-.12	.04	.23	-.09	-.06	-.04	.04	-.11	.09	-.01	-.04	.19	.06	.06	-.08	1						
PI	-.03	.10	.00	-.07	-.07	-.02	.02	.02	.02	.01	.08	-.02	-.07	-.11	-.05	-.07	1					
RI	.01	.09	.05	-.12	-.07	-.17	.17	-.08	.06	-.02	-.05	-.06	-.04	.04	-.04	.12	.11	1				
EI	-.04	-.12	.02	.04	-.17	.09	-.09	.08	.08	-.01	-.06	.02	-.09	-.10	.05	-.02	-.06	-.07	1			
SI	.02	.00	.06	-.03	-.01	-.08	.08	-.05	-.08	-.07	.02	.00	-.02	-.06	.04	-.04	.06	-.02	.12	1		
II	.01	.04	-.02	.02	.16	.06	-.06	-.02	-.06	.02	.03	.02	.09	.09	-.04	.01	-.28	-.34	***-.67***	-.35	1	
TI	-.02	-.08	-.13	.10	-.10	-.06	.06	.03	.04	.05	.04	.02	.11	-.16	.11	-.07	.00	-.05	-.09	-.02	-.07	1

Key: SL=Science Laboratory, SLM=Science Laboratory Materials, LB=Library, LBM=Library Materials, ICT=Information and Communication Technology facilities, DS=Day School, BS=Boarding School, TS=Problem of Transport to and from School for Day Scholars, DC=Domestic Chores (Indoors), DC-2=Domestic Chores (Outdoors), SH=Sexual Harassment, LU=Problem of Utilities e.g. Water, Electricity etc., AF=Adequate Teaching and Learning Facilities, TLC=Teaching and Learning Curriculum, ANT=Adequate Number of Teachers, SAB=Student Academic Background, PI=Parents Influence, RI=Relatives Influence, EI=Economic Influence, SI=Social Influence, II=Individual Influence and TI=Teachers Influence.

The correlation matrix from the students' responses (Table 5) indicates that performance number of female students' increases where the school has boarding facilities as well as fully equipped library and is vice versa in day schools.

Secondly, library and library materials are negatively correlated implying that not necessary that presence of library materials means presence of library building thus may negatively affect performance of science students.

Thirdly, availability of means of transport to and from home positively affects performance of students in day schools and not in boarding schools. This is because boarding students do not need transport to go school on daily basis hence are not affected by the availability of the means of transport.

Fourthly, individual influence strongly correlates negatively with economic influence showing that students from economically well to do families more often than not; do not decide to study science subjects. The situation is vice versa to students who originate from economically not well to do families. In addition, the correlation shows that social influences weakly affect individual decisions to study science subjects.

4.2.3 Factor Analysis

Factor analysis presents the underlying variance structure of a set of correlation coefficients. It is useful for exploring and verifying **patterns** in a set of correlation coefficients (Kothari, 2004; Brown, 2001). The data from this study were extracted for factors underpinning the objectives using *Principal Components Analysis (PCA)* which accounts for all of the variance including that found in the correlation coefficients and error variance. The obtained values were rotated by Varimax method with Kaiser Normalization for interpretation implying that loadings in excess of 0.71 are rated as excellent, 0.63 as very good, 0.45 fair, 0.32 poor and 0.30 uninterpretable. Four factors were extracted as per the responses from teachers (Table 6) and eight factors as extracted from students' responses (Table 7).

Table 6: **Rotated Component Matrix from Teachers' Responses**

	Component			
	1	**2**	**3**	**4**
Science Laboratory (SL)	.168	-.015	-.027	**.803**
Science Laboratory Material (SLM)	-.078	**.649**	-.279	.186
Library (LB)	-.210	**.677**	-.237	-.251
Library Material (LBM)	.256	**-.676**	.129	-.229
Information and Communication Technology (ICT)	.387	**.681**	.221	-.162
Day School (DS)	.102	-.302	**.772**	.011
Boarding School/ Hostel (BS)	.105	.051	**-.852**	-.177
Inadequate Funding (IF)	**.826**	-.022	-.055	.093

	Component			
	1	2	3	4
Adequate Teaching and Learning facilities (AF)	**.705**	-.113	.331	.048
Teaching and Learning/ Curriculum (TLC)	.095	.074	.213	**.754**
Adequate Number of Teachers (ANT)	**.685**	-.131	-.200	.234

Factor 1 is highly positively loaded with inadequate funding, poor facilities and inadequate number of teachers. This factor is generally referred to as *facilities factor* (funds, equipment, human resource).

Factor 2 is positively loaded with science laboratory material, library, information and communication technology and negatively loaded with library materials. This factor is generalized as *materials factor* (apparatus, consumables, books, computers, software).

Factor 3 is positively loaded with day school and highly negatively loaded with boarding school/hostel. This factor is generally *nature of school factor* (day, boarding, hostels).

Factor 4 is mainly positively loaded with science laboratory and teaching and learning curriculum. This factor is generalized as *infrastructure factor* (labs, syllabus and manuals).

Table 7: **Rotated Component Matrix from Students' Responses**

	Component							
	1	2	3	4	5	6	7	8
Science Laboratory	.244	.016	**.634**	.083	.098	-.168	-.118	.090
Science Laboratory Material	-.402	-.168	.245	-.184	-.338	.141	-.153	.182
Library	-.391	.124	.288	-.223	.134	**.459**	-.090	-.025
Library Material	.373	-.037	**-.494**	.189	-.178	-.169	.151	-.200
Information and Communication Technology	-.203	-.138	**.620**	.054	.101	.026	-.002	-.206
Day School	**.935**	-.018	-.020	.037	.034	.012	-.074	-.068
Boarding School/ Hostel	**-.935**	.018	.020	-.037	-.034	-.012	.074	.068
Transport to and fro school	**.763**	.033	.021	.038	-.082	.035	-.038	.062
Domestic Chores (washing and sweeping)	.035	.046	-.344	.031	.455	.190	-.161	.029
Domestic Chores (faming, cattle herding, business, fishing, mining, hunting)	.093	-.086	.138	.278	.019	-.088	-.470	.116
Sexual Harassment	.018	-.043	-.100	.009	-.080	-.029	.704	.033

	Component							
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Learning Environment (electricity, water etc.)	.243	.001	.032	.069	-.194	**.647**	.171	-.060
Poor Facilities	.199	-.085	.104	**.691**	.224	.125	-.072	-.056
Teaching and Learning/ Curriculum	-.011	-.082	.260	-.037	**.797**	-.016	-.061	-.030
Inadequate Number of Teachers	.126	.147	.244	**.585**	-.171	-.034	-.264	-.099
Rating of Science Subject	-.006	.000	-.065	-.015	.035	.102	-.118	.001
Hours in Teaching and Laboratory Sessions	-.303	-.060	.182	-.049	.393	.017	**.459**	.133
Student Academic Background	-.093	-.055	-.159	-.013	.133	**.759**	-.077	.065
Parents Influence	.070	.058	.082	-.011	-.136	-.072	.218	**.714**
Relatives Influence	-.159	.047	-.117	-.039	.129	.077	-.190	**.696**
Economic Influence	.098	**.826**	-.160	-.141	.018	-.024	-.167	-.145
Social Influence	-.089	**.568**	.218	.109	-.124	.040	.288	-.011
Individual Influence	.029	**-.851**	.112	-.025	.008	.026	.052	-.394
Teachers Influence	-.124	-.034	-.259	**.639**	-.125	-.102	.087	.054

Factor 1 is positively loaded with day school and transport to and from school and negatively loaded with boarding school. This factor is generally referred to as *nature of school factor* (day, boarding, hostels).

Factor 2 is positively loaded with economic and social influence and negatively loaded with individual influence. This factor generalized as *finance factor* (salary, good life, determination).

Factor 3 is highly loaded with science laboratory, ICT and negatively partially loaded with library materials. The factor can be referred to as *materials factor* (apparatus, consumables, computers, books).

Factor 4 is loaded with poor facilities, inadequate number of teachers and teachers influence. This factor is generalized as *facilities factor* (teaching aids, funds, teachers' morale, readiness).

Factor 5 is loaded highly with teaching and learning or school curriculum. The factor can be referred to as *infrastructure factor* (syllabus, manuals).

Factor 6 is loaded with library, learning environment and student academic background. This factor is referred to as *tools factor* (computers, internet, electricity, water, science knowledge).

Factor 7 is only loaded with weekly number of hours spent in teaching and conducting laboratory sessions. This factor can be referred to as *practice factor* (exercises, tests, exams, practical).

Factor 8 is loaded with parent and relative influence and it can be referred to as *family factor* (father, mother, sister, brother, uncle aunt).

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 Conclusions

The findings of the this study conclude that;

(i) There exist technical and policy inequalities in the education sector that significantly affect girls pursuing science subjects in secondary schools and in turn impairing the admission trends of girls in higher levels.

(ii) Female students face numerous factors in the course of studying science subject including nature of schools, infrastructure, finance, materials, tools, facilities, practice and family. These factors affect the teaching and learning environment of female students and could possibly contribute to poor performance of female students in science subjects national examinations.

(iii) Female students, to a large extent, when they want to opt for science streams in higher education levels are influenced significantly by internal factors (parents, relatives, poor background and individual) and external factors (economic and social).

5.2 Recommendations

Since Tanzania is emphasizing on the industrialization as a backbone for economic development, science education for females in all levels should be given a special attention in terms of proper infrastructures, human resources and funding. There should also be appropriate measures that address the sustainability efforts to female students in secondary schools so as to have scientists in higher levels and finally render skills to our nation. However, the academic achievement of female students in science subjects primarily depends on several factors including the student herself, teachers and teaching materials. In this way, female students should put more efforts on academics. Again, teachers should properly resume on their responsibilities to provide female students with the requisite knowledge. Finally, parents and relatives should support female students to perform their homework by providing them with moral and social support.

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APPENDICES

Appendix 1: Questionnaire for Secondary School Teachers

UNIVERSITY OF DAR-ES-SALAAM

GENDER CENTRE

Teachers Questionnaire on Identification of Gender Inequalities in the Sciences

SECTION A

INTRODUCTION Background information

The number of girls in higher learning institutions in the country taking science subjects has been rather low for a long time now. There are indications that this is a result of multiple factors that the society needs to address.

Objectives

This project is designed to achieve the following objectives:

- To identify possible inequalities in the education sector that affect particularly girls intending to pursue science subjects.
- To create awareness on the bottlenecks that limits the chances of the girls in science
- To identify possible social factors that hinder the development of girls in secondary and higher education in general and in science subjects in particular
- To seek views on possible solutions/measures that could help redress the situation

Target group

School Administration and Science teachers

Declaration

The information provided by the interviewee will be treated in confidence and their identity shall not be revealed in case the information is to be published in a report. The provided information shall be treated solely for the purpose of this project.

Corresponding name and address:

Gender Centre,
University of Dar es Salaam,
P.O. Box 35091,
Dar es Salaam
Email: gdpc@uccmail.co.tz;
Phone: 022 2410637 ext 2178
Mobile: 0737173199; 0715335023

SECTION B

Table 1: Basic current school information

1.	Name of school	
2.	Date of establishment	
3.	Level of education offered (O-level only, A-level only, both)	
4.	Available science subject combinations (O-level and A-level)	
5.	Total number of female students	
6.	Total number of male students	
7.	Student accommodation (boarding, day or both)	
8.	School location (District, Region)	
9.	School address (Postal address, Phone number, email)	
10.	Interviewee position and contact details	

Table 2: Available teaching resources (human and material)

	Detail	**Quantity**
1.	Female teachers	
2.	Male teachers	
3.	Total science subject teachers	
4.	Female science subject teachers	
5.	Classrooms	
6.	Science based laboratories (Physics, Chemistry, Biology, Mathematics, Geography etc.)	
7.	Staff offices	
8.	Head teacher office	

9.	Library	
10.	Available science literature	
	Detail	**Quantity**
11.	Available ICT facilities (software and hardware)	
12.	Female dormitories	
13.	Male dormitories	
14.	Science clubs	
15.	Mathematics club	
16.	Domestic science club	
17.	Any other information	

Table 3: Science students enrolled in Forms IV and VI.

Calendar year	**2010**			**2011**			**2012**			**2013**			**2014**		
	T	**TF**	**TFP**	**T**	**TF**	**TFP**	**T**	**TF**	**TFP**	**T**	**TF**	**TFP**	**T**	**TF**	**TFP**
Form IV Number of students															
Form VI Number of students															

T=Total number of science student in class; TF=Total female students in class; TFP=Female students who qualified for admission to the next level.

Table 4: Number of female science students enrolled in 2015

	Form III	**Form IV**	**Form V**	**Form VI**
Number of females				

Table 5: Number of A – Level combination

	PCM	**PCB**	**PGM**	**CBG**	**CBN**			
Number of females								
Number of males								
Total								

Table 6: Number of science teachers at the school

	Subject	**Total staff**			**Education Level of existing teachers**					
		Existing		**Required**	**Diploma**		**BSc**		**MSc**	
		F	**M**		**F**	**M**	**F**	**M**	**F**	**M**
1	Chemistry									
2	Physics									
3	Biology									
4	Mathematics									
5	Nutrition									
6	Geography									
7	ICT									

1. Is the female science students' performance satisfactory? Y/N ……..

   Give reasons for the performance

2. Are there any plans to expand intake of female science students? Y/N …….. Explain

3. In your opinion what are the difficulties facing female science students

   Suggest ways to minimize the difficulties

4. What challenges are you facing in science combinations, in terms of human resource, physical resource and material resources (i.e. books, chemicals, field trips etc.)

5. Is the school management facing any financial challenges? Explain

6. How much funds are allocated to support science subjects?

7. Please provide any additional information that you consider relevant

Appendix 2: Questionnaire for Secondary School Students

UNIVERSITY OF DAR-ES-SALAAM

GENDER CENTRE

Student Questionnaire on Identification of Gender Inequalities in the Sciences

SECTION A

INTRODUCTION

Background information

The number of girls in higher learning institutions in the country taking science subjects has been rather low for a long time now. There are indications that this is a result of multiple factors that the society needs to address.

Objectives

This project is designed to achieve the following objectives:

- To identify possible inequalities in the education sector that affect particularly girls intending to pursue science subjects.
- To create awareness on the bottlenecks that limits the chances of the girls in science
- To identify possible social factors that hinder the development of girls in secondary and higher education in general and in science subjects in particular
- To seek views on possible solutions/measures that could help redress the situation

Target group

Students taking science subjects

Declaration

The information provided by the interviewee will be treated in confidence and their identity shall not be revealed in case the information is to be published in a report. The provided information shall be treated solely for the purpose of this project.

Corresponding name and address:

Gender Centre,
University of Dar es Salaam,
P.O. Box 35091,
Dar es Salaam
Email: gdpc@uccmail.co.tz;
Phone: 022 2410637 ext 2178
Mobile: 0737173199; 0715335023

SECTION B

Table 7: Basic current school information (*to be filled by the students*)

1.	Name of school	
2.	In which class are you studying	
3.	Mention the Subjects you are studying	
4.	State your type of accommodation (boarding or day)	
5.	School location (District, Region)	
6.	School address (Postal address, Phone number, e-mail)	
7.	Interviewee position (e.g. Student leader) and contact details (Optional)	

1. In your opinion what are the difficulties facing you as a female science student

2. Suggest ways to minimize these difficulties

3. Have you had any opportunity to participate in field/industrial trips? Y/N If yes, how useful were they to your studies?

4. Which domestic responsibilities do you undertake after school/during holidays?

5. Have you encountered any sexual harassment at school or outside the school? Y/N If yes explain

6. What prompted/made you choose science subjects?

7. How many science teachers are available at school?

8. Are science learning facilities (textbooks, laboratories, library, ICT) available at school?

9. Are the science facilities adequate?

10. How do you rate the science subjects – difficult, moderate, easy?

11. What sports and recreational opportunities/facilities are available at your school?

12. What do you normally do at home after school hours?

13. What do you normally do during school holidays?

14. How many hours do you spend in the class (teaching and laboratory sessions) during the week?

15. How do you rate the overall learning environment (availability of water, electricity, food, medical services, accommodation etc.) at school (excellent, good, fair, poor)?

16. What is your professional aspiration (being an engineer, a doctor, a politician etc.)?

17. What should be done to encourage more girls to take science subjects?

18. For day scholars

    (i) How far (in km) is your home from school? ……

    (ii) What is your means of transport to and from school; …….

    (iii) Where do you normally take your lunch? .....

    (iv) How much fees do you pay? .....

19. Please provide any additional information that you consider to be relevant

Appendix 3: Selected Responses from Teachers and Students

Appendix 3.1: Teachers' Responses

	School	Total number of students	Number of female science students	Total number of teachers	Total number of science teachers	Total number of science female teachers	Science laboratory	Science laboratory material	Library	Library material	Information and communications technology	Science subject teachers	Science diploma teachers	Science bachelor teachers	Science masters teachers	Transport to and fro school	Domestic chores (washing & sweeping)	Sexual harassment	Learning environment (contributions, electricity, water)	Inadequate funding	Inadequate (Poor) facilities	Teaching and learning/ Curriculum	Inadequate number of teachers
		TNS	NFSS	TNT	TNST	TNSFT	SL	SLM	LIB	LIBM	ICT	SST	SDT	SBT	SMT	TTS	DC1	SH	LE	IF	AF	TLC	INT
1.	Mamba Day	250	47	19	4	2	0	0	1	1	0	4	1	3	0	1	0	0	0	1	0	0	1
2.	Somsom Day	463	48	21	5	2	1	1	0	1	3	5	4	1	0	1	0	0	0	1	0	0	1
3.	Mawelewele Day	728	65	53	10	5	1	1	0	0	37	10	4	6	0	1	0	0	0	1	1	1	1
4.	Endabash Day	338	65	20	4	0	1	1	0	1	0	4	1	3	0	1	0	0	0	1	1	1	1
5.	Ngarenaro	1513	123	47	11	5	3	1	0	0	7	11	5	6	0	1	0					1	24
6.	Nkoanrua	864	57	67	5	1	3	1	1	1	1	5	2	2	1	1	0						26
7.	Ashira	497	232	38	10	5	2	1	1	1	1	10	3	7	0	0	1	0	0	0	0	1	28
8.	Kirima	411	89	25	4	2	0	0	1	1	0	4	0	4	0	1	0	0	0	0	0	1	30
9.	Utaani	818	159	32	9	6	3	1	1	1	19	9	5	3	1	1	1	0	0	0	0	1	32
10	Luiche	423	47	16	2	0	0	0	0	0	0	2	1	1	0	1	0	1	1		1		41

Appendix 3.2: Students' Responses

	School	Total number of students	Number of female science students	Total number of teachers	Total number of science teachers	Total number of science female teachers	Number of Science laboratory	Science laboratory material	Library	Library material	Information and communications technology	Science teachers	Problem of Transport to and fro school	Domestic chores (washing & sweeping)	Domestic chores (faming, cattle hearding, etc)	Sexual harassment	Poor Learning environment (contributions, electricity,	Inadequate funding	Inadequate (Poor) facilities	Teaching and learning/ Curriculum	Inadequate number of teachers	Rating Science Subjects Difficult	Weekly hrs in teaching & lab. sessions	Student academic background
		TNS	NFSS	TNT	TNST	TNSFT	SL	SLM	LIB	LIBM	ICT	ST	TTS	DC1	DC2	SH	LE	IF	AF	TLC	INT	RSS	WH	SAB
1.	Mamba Day	250	47	19	4	2	0	0	1	1	0	4	0	1	1	0	0		1	0	1	0	35	0
2.	Somsom Day	463	48	21	5	2	2	1	0	1	3	5	1	1	1	0	1		1	1	1	0	35	0
3.	Somsom Day Secondary School	463	48	21	5	2	2	1	0	1	3	5	1	1	1	0	0		1	0	1	0	35	0
4.	Mawelewele Day	728	65	53	10	5	3	1	0	0	37	10	1	1	0	0	0		1	0	1	0	30	0
5.	Kabwoba Boarding	129	35	11	5	0	2	1	1	1	1	5	0	0	0	0	0		0	0	1	0	72	0
6.	Mwembetogwa	890	65	28	8	2	3	1	0	0	3	8	0	1	1	0	0		0	1	1	0	45	0
7.	Arusha Day	1135	99	41	14	4	3	1	0	1	1	14	0	1	0	0	0		0	0	1	0	7	0
8.	Ifunda Girls	730	730	26	7	2	3	1	1	1	0	7		1	0	1	0		1	0	1	0	30	0
9.	Mpitimbi	489	67	27	3	0	3	1	0	0	0	3	1	1	1	0	1		1	0	1	0	40	0
10.	Ngarenaro	1513	123	47	11	5	3	1	0	0	7	11	0	1	0	0	0		1	0	0	0	11	0

Appendix 4: List of Interviewed Schools

The performance shown was for Certificate of Secondary Education Examination (CSEE) in 201, where the rank is out is out of 4632 Schools in the country.

S/N	Name of School	Reg. No.	Region	District	Ward	Ownership	40+ Students	Performance		
								Pass (%)	GPA	Rank
1	Akeri	S0986	Arusha	Meru	Akeri	Community	Yes	50	4.405	3236
2	Arusha Day	S0781	Arusha	Arusha (M)	Themi	Community	Yes	80	3.7406	799
3	Ashira	S0201	Kilimanjaro	Moshi	Marangu	Government				
4	Baobab	S1599	Pwani	Bagamoyo	Mapinga	Private	Yes	100	2.4607	152
5	Ben Bella	S0383	Unguja	Mjini Unguja		Government	Yes	100	3.1354	390
6	Canossa	S2325	Dar Es Salaam	Kinondoni	Kunduchi	Private	Yes	100	1.5566	6
7	Chasasa	S5150	Pemba	Wete		Private	Yes	86	3.9528	1123
8	Sarwatt	S0533	Manyara	Mbulu		Community	Yes	68	4.136	1683
9	Dr Salmin Amour	S0921	Singida	Singida (M)	Majengo	Community	Yes	80	4.0092	1241
10	Educare	S1200	Morogoro	Morogoro (M)	Kihonda	Private	Yes	97	3.4217	544
11	Endabash	S2814	Arusha	Karatu	Endabash	Government	Yes	56	4.364	2996
12	Glenrons Girl's	S0275	Dar Es Salaam	Kinondoni	Kibamba	Private	Yes	96	3.7808	855
13	Ifunda Girls	S0276	Iringa			Government				
14	J.J.Mungai	S0449	Iringa	Mufindi	Boma	Private	Yes	78	4.042	1341
15	Kabwoba	S4764	Kagera	Missenyi		Community	No	97	3.1965	422

S/N	Name of School	Reg. No.	Region	District	Ward	Ownership	40+ Students	Performance		
								Pass (%)	GPA	Rank
16	Kidegembye	S1730	Njombe	Njombe (V)	Kidegembye	Government	Yes	67	4.227	2132
17	Kilakala	S0206	Morogoro	Morogoro (M)	Kilakala	Government	Yes	100	2.403	135
18	Kilangalanga	S0870	Pwani	Kibaha (V)	Kilangalanga	Community	Yes	60	4.3039	2592
19	Kinyerezi	S2766	Dar Es Salaam	Ilala	Kinyerezi	Community	Yes	58	4.2546	2295
20	Kirima	S3672	Kilimanjaro	Moshi (V)	Kirima	Seminary	Yes	45	4.5459	4040
21	Kirumbiu	S0724	Kilimanjaro	Hai	Masama Kati	Private	Yes	96	3.7685	830
22	Kisarawe Lutheran Junior Seminary	S0181	Pwani	Kisarawe		Seminary	Yes	99	3.3046	474
23	Korogwe Girls	S0209	Tanga	Korogwe (M)		Government	Yes	85	3.637	715
24	Lemira Day	S2246	Kilimanjaro	Hai	Masama Kati	Community	Yes	50	4.434	3432
25	Loyola	S0800	Dar Es Salaam	Kinondoni	Mabibo	Private	Yes	100	2.3463	122
26	Lugoba	S0549	Pwani	Bagamoyo	Lugoba	Community	Yes	46	4.4683	3650
27	Luiche	S1786	Kigoma	Kigoma (V)	Mungonya	Private	Yes	64	4.4209	3348
28	Lyandembela	S2547	Iringa	Iringa (V)	Ifunda	Private	Yes	65	4.3459	2879
29	Magamba	S2944	Tanga	Lushoto	Lushoto	Government	Yes	47	4.5086	3863
30	Majani Ya Chai	S2379	Dar Es Salaam	Ilala	Kipawa	Community	Yes	75	3.9808	1178
31	Mamba Day	S2123	Kilimanjaro	Moshi (V)	Mamba Kusini	Community	Yes	49	4.5656	4137
32	Manyunyu	S0271	Njombe	Njombe (V)	Matembwe	Private	Yes	81	3.8732	975
33	Masaki	S2866	Pwani	Kisarawe	Masaki	Community	No	68	4.2981	2560

S/N	Name of School	Reg. No.	Region	District	Ward	Ownership	40+ Students	Performance		
								Pass (%)	GPA	Rank
34	Mawelewele	S1161	Iringa	Iringa (M)	Mwangata	Private	Yes	76	3.9459	1106
35	Medomafinga	S3814	Iringa	Mufindi	Boma	Community	Yes	67	4.2106	2061
36	Migombani	S2765	Dar Es Salaam	Ilala	Segerea	Community	Yes	72	4.0655	1421
37	Mlole	S0967	Kigoma	Kigoma (M)	Gungu	Community	Yes	79	3.8412	929
38	Moreto	S4285	Pwani	Bagamoyo		Community	Yes	41	4.6434	4380
39	Morogoro	S0332	Morogoro	Morogoro (M)	Boma	Government	Yes	78	3.78	853
40	Mpitimbi	S0720	Ruvuma	Songea (V)	Mpitimbi	Community	Yes	79	4.1932	1957
41	Msimbu	S2690	Pwani	Kisarawe	Msimbu	Community	Yes	55	4.3998	3197
42	Mughanga	S3702	Singida	Singida (M)	Mughanga	Community	Yes	72	4.1127	1591
43	Mwalimu J K Nyerere	S1344	Mbeya	Momba		Community	Yes	74	4.0464	1357
44	Mwandoya	S0935	Simiyu	Meatu	Mwandoya	Private	Yes	93	3.7438	802
45	Mwembetogwa	S0445	Iringa	Iringa (M)	Ilala / Makorongoni	Private	Yes	76	4.0762	1467
46	Ngarenaro	S4090	Arusha	Arusha (M)	Ngarenaro	Community	Yes	66	4.1394	1704
47	Nkoanrua	S1265	Arusha	Meru	Nkoanrua	Community	Yes	50	4.3272	2762
48	Nsunga	S3616	Kagera	Missenyi	Nsunga	Community	Yes	52	4.4753	3689
49	Qaru	S3903	Arusha	Karatu	Endabash	Private	No	53	4.3223	2725
50	Sakasaka	S2099	Simiyu	Meatu	Tindambuligi	Community	Yes	72	4.3685	3029
51	Shambalai	S0548	Tanga	Lushoto	Lushoto	Community	Yes	56	4.3709	3042

S/N	Name of School	Reg. No.	Region	District	Ward	Ownership	40+ Students	Performance		
								Pass (%)	GPA	Rank
52	Somsom	S1513	Kilimanjaro	Moshi (V)	Kibosho Magh.	Private	Yes	46	4.5328	3984
53	Songea Girls	S0219				Government				
54	Tanga Technical	S0156	Tanga	Tanga (M)	Mzingani	Government	Yes	84	3.6097	690
55	Tunduma	S0696	Mbeya	Momba	Tunduma		Yes	54	4.4342	3434
56	Ubiri	S1282	Tanga	Lushoto	Ubiri	Community	Yes	40	4.6056	4278
57	Uhuru	S0605	Shinyanga	Shinyanga (M)	Mjini	Community	Yes	66	4.0578	1390
58	Ujiji	S0385	Kigoma	Kigoma (M)	Gungu	Private	Yes	90	3.7799	852
59	Usagara	S0345	Tanga	Tanga (M)	Usagara	Private	Yes	67	4.0925	1525
60	Utaani	S0381	Pemba	Wete		Government	Yes	72	3.9146	1035
61	Uwanja Wa Taifa	S4573	Morogoro	Morogoro (M)	Uwanja Wa Taifa	Private	Yes	59	4.2976	2557
62	Vikokotoni	S0392	Unguja	Mjini Unguja		Government	Yes	99	3.5077	611
63	Zanaki	S0222	Dar Es Salaam	Ilala	Upanga Magharibi	Government	Yes	84	3.5588	648

Appendix 5: Certificate of Secondary Education Examination (CSEE) Performance for 2014 and 2015

		All Students			Passed					
Subject	**Year**	**F**	**T**	**% F**	**M**	**%**	**F**	**%**	**T**	**% of T**
Civics	2014	110,523	**240,233**	**46.0**	53,060	**40.9**	37,508	**33.9**	90,568	**37.7**
	2015	195,313	**384,055**	**50.9**	104,901	**55.6**	89,296	**45.7**	194,197	**50.6**
Kiswahili	2014	110,536	**240,254**	**46.0**	87,479	**67.4**	79,886	**72.3**	167,365	**69.7**
	2015	195,303	**384,014**	**50.9**	142,835	**75.7**	155,270	**79.5**	298,105	**77.6**
English	2014	110,522	**240,236**	**46.0**	73,861	**75.7**	58,517	**52.9**	132,378	**55.1**
	2015	195,318	**384,082**	**50.9**	113,314	**56.9**	102,486	**52.5**	215,800	**56.2**
History	2014	107,339	**233,652**	**45.9**	57,384	**60.0**	30,019	**28.0**	87,403	**37.4**
	2015	192,372	**377,436**	**51.0**	104,855	**45.4**	74,807	**38.9**	179,662	**47.6**
Biology	2014	109,693	**238,562**	**46.0**	69,234	**56.7**	45,993	**41.9**	115,227	**48.3**
	2015	194,516	**382,356**	**50.9**	111,964	**59.6**	93,520	**48.1**	205,484	**53.7**
Geography	2014	110,388	**239,532**	**46.1**	57,112	**44.2**	33,826	**30.6**	90,938	**38.0**
	2015	195,117	**383,055**	**50.9**	105,746	**56.3**	80,804	**41.4**	186,550	**48.7**
Basic Math	2014	110,485	**240,079**	**46.0**	30,369	**23.4**	16,632	**15.1**	47,001	**19.6**
	2015	195,247	**383,795**	**50.9**	39,420	**20.9**	24,912	**12.8**	64,332	**16.8**
Physics	2014	44,900	**108,692**	**41.3**	34,195	**53.6**	16,580	**36.9**	50,775	**46.7**
	2015	57,919	**129,812**	**44.6**	37,528	**52.2**	19,977	**34.5**	57,505	**44.3**
Chemistry	2014	59,733	**137,472**	**43.5**	48,403	**62.3**	29,586	**49.5**	77,989	**56.7**
	2015	80,791	**171,835**	**47.0**	61,218	**67.2**	42,078	**52.1**	103,296	**60.1**

Note:

1. Pass rates by subject in CSEE was highest in Kiswahili (69.7%) in year 2014 and 77.6% in year 2015
2. Basic Mathematics had lowest Pass rate of 19.6% and 16.8% in 2014 and 2015, respectively
3. The performance of boys is higher than that of girls in all subjects except in Kiswahili
4. Performance in Chemistry and Biology for both girls and boys is better than performance in Civics, History and Geography.
5. Performance of girls in Physics was higher than that of Civics, History and Geography in 2014