MOTIVATION FACTORS INFLUENCING SCIENCE TEACHERS IN PUBLIC SECONDARY SCHOOLS: MIGORI DISTRICT- KENYA

By

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A Thesis Submitted in Partial Fulfilment of the Requirements for the Award of a Master of Education Degree in Educational Administration

KENYATTA UNIVERSITY
JUNE 2003
DECLARATION

This thesis is my original work and has not been presented for a degree in any other University

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From my father David Harrison Owuor, on to my son

Onyango D.C Ochieng', from one generation to another
ACKNOWLEDGEMENTS

It is always hard to know how many and which ones’ ideas one has stolen from whom, but I am sure that I must greatly owe my two university supervisors, Prof. Jotham Olembo and Dr. Adino Onyango. To them many thanks, for much stimulation and much tolerance.

All the lecturers in the Department of Educational Administration, Planning, and Curriculum Development have taken time at one moment or another to develop this work to where it is. Specifically, Dr. Malusu, Prof. Gravenir, Prof. Okech, Dr. Njeri, Dr. Muchira, Dr. Waweru, Dr. Gateru, Dr. Mse, Ms. Wanja, Mr. Ogeta and Wesonga among others have all done something to improve it. Credit to you all for the good work in upholding scholarly values.

My colleagues Asembo Ken, Okello Abonyo, Awuor Rose, Okoth Okaka, Odalo, JP, Nick, Nderitu, Njoka, Kinyua, Kande, Cherotich, Emong’ole, Kiprotich, Sang’, Okinyo, Shitubi and Ngure deserve mention for their relentless support during my studies. Maintain the spirit.

Embarking on my Masters Degree course couldn’t have been possible without the support of all my colleagues at Nyabigena Secondary. Specifically, the Principal Mr. Onsongo, Motari, Mogoa Keburush, Magare KK, Ondari, and Nyamao deserve mention. The backing from the entire Marion Schools community, especially Mrs. Betty Kimani, is equally cherished. Besides, the support of Mr. Obwanda, the late Odundo, Obenge, and Achilla are appreciated.

My family has always been a source of support in my education. I acknowledge the role played by my parents Mzee Owuor Nundu, Carren and Grace Owuor, my sisters Jane, Anne, and Betty, my brothers Samwel, Andrew, Lucas, the late Josiah, Henry, Ben and Gordon.

Finally, to my wife Asenath, son Onyango D.C. and daughter Sheila A. Ngere, thanks for your perseverance while I was away on studies and research. **GOD BLESS YOU ALL.**
ABSTRACT

Motivation is the degree to which an individual wants and chooses to engage in certain specified behaviour. Lack of motivation is expressed mainly in departure to pursue other careers more motivating, and low output in the enterprises’ concern. From the reviewed literatures, though motivation and job satisfaction of teachers in Kenya has been widely studied and proposals made, a gap still exists as regards motivating factors and how they are prioritized, especially by the teachers handling girls in science subjects.

The study was a descriptive survey, carried out in girls’ and mixed secondary schools in Migori District and the research utilized Vroom’s Expectancy Theory. A questionnaire based on the theory was modeled to suit the science teachers, and another questionnaire was used for the head teachers of the schools in the sample. The final work-motivation score for individual science teachers, and for the whole group was calculated by multiplying the valence, the expectancy, and the instrumentality. At $\alpha = 0.05$ the inferential statistics of t-test and ANOVA were used to test the statistical hypotheses ($H_{01} - H_{05}$).

The findings of this study reveal that the science teachers in public girls’ and mixed secondary schools are de-motivated. Specifically, 68 per cent of the teachers in the sample were de-motivated. No significant difference of the science teachers’ motivation based on the school categories, gender of the teacher, educational level, and years of teaching experience were noticed. However, based on main teaching subjects, a significant difference was noted between chemistry and physics teachers. Of the twelve factors under review, the head teachers classified all as motivating, while according to the science teachers, seven were motivating, while five were de-motivating. The best motivators were ‘work itself’, ‘appreciation of work done’, and ‘job security’, while the most de-motivating were ‘sympathetic help with personal problems’, ‘pay increase and bonuses’, and ‘participation in formulation of national education policies’. Majority of the teachers enjoyed teaching science to the girls, and this positively influenced the instrumentalities.

The study recommends that any attempt to motivate teachers must be made contingent to performing well. An open school climate is also recommended, and finally the study recommend that more research be carried out in the area of teacher motivation.
# TABLE OF CONTENTS

Title Page........................................................................................................... i  
Declaration........................................................................................................... ii  
Dedication........................................................................................................... iii  
Acknowledgements.............................................................................................. iv  
Abstract............................................................................................................... v  
Table of Contents.............................................................................................. vi  
List of Tables....................................................................................................... ix  
List of Figures...................................................................................................... xi  
Abbreviations and Acronyms Used................................................................. xii  

## CHAPTER ONE ........................................................................................................... 1  
**BACKGROUND TO THE STUDY**........................................................................ 1  
1.1 Background to the Problem............................................................................. 1  
1.2 Statement of the Problem............................................................................... 6  
1.3 Purpose and Objectives of the Study.............................................................. 7  
1.4 Research Questions......................................................................................... 7  
1.5 Hypotheses’..................................................................................................... 8  
1.6 Significance of the Study............................................................................... 9  
1.7 Assumptions of the Study.............................................................................. 9  
1.8 Scope and Limitations of the Study............................................................... 9  
1.9 Theoretical Framework................................................................................... 10  
1.10 Conceptual Framework................................................................................ 12  
1.11 Operational Definition of Significant Terms.............................................. 14  
1.12 Organization of the Rest of the Thesis......................................................... 15  
1.13 Summary...................................................................................................... 15  

## CHAPTER TWO ......................................................................................................... 16  
**LITERATURE REVIEW**...................................................................................... 16  
2.1 Introduction.................................................................................................... 16  
2.2 Motivation...................................................................................................... 16
2.2.1 Maslow's Needs Hierarchy Theory ............................................. 17
2.2.2 Herzberg's Two Factor Theory .............................................. 18
2.2.3 The E-R-G Theory .............................................................. 19
2.2.4 The Equity Theory ............................................................ 20
2.2.5 The Goal-Setting Theory ..................................................... 20
2.2.6 The Expectancy Theory ....................................................... 21

2.3 Studies on Motivation Using the Expectancy Theory .................. 21
   2.3.1 Motivation in General ..................................................... 21
   2.3.2 Expectancy Research on Teacher Motivation ...................... 22

2.4 Studies on Motivation of Teachers in Kenya ............................. 22

2.5 Summary .............................................................................. 23

CHAPTER THREE ........................................................................ 25

METHODOLOGY ........................................................................ 25
   3.1 Introduction ........................................................................ 25
   3.2 Research Design ................................................................. 25
   3.3 Locale ................................................................................. 25
   3.4 The Population ................................................................... 26
   3.5 Study Sample ...................................................................... 26
      3.5.1 Sampling Procedure .................................................... 27
   3.6 Research Instruments ........................................................... 28
      3.6.1 Piloting ....................................................................... 29
      3.6.2 Validity ........................................................................ 29
      3.6.3 Reliability ................................................................... 30
   3.7 Data Collection Procedures .................................................... 30
   3.8 Data Analysis and Presentation ............................................. 31

CHAPTER IV ............................................................................. 33

PRESENTATION AND ANALYSIS OF FINDINGS .......................... 33
   4.1 Introduction ........................................................................ 33
   4.2 Part I: Description of Schools and Respondents ................... 33
LIST OF TABLES

Table 4.1 School Type and Category ................................................................. 34
Table 4.2 School Gender Proportions ................................................................. 35
Table 4.3 Respondents’ Age Distribution ............................................................. 36
Table 4.4 Respondents’ Gender Distribution ......................................................... 37
Table 4.5 Academic Qualifications of the Respondents ....................................... 38
Table 4.6 Experiences of the Respondents ............................................................ 39
Table 4.7 Responsibilities .................................................................................... 41
Table 4.8 Mean Valences by the science teachers and the head teachers .............. 43
Table 4.9 Mean Expectancies by the science teachers and the head teachers ........ 45
Table 4.10 ‘Pay increase and bonuses’ valences by gender and schools .............. 47
Table 4.11 ‘Pay increase and bonuses’ expectancies by gender and schools .......... 48
Table 4.12 ‘Job security’ valences by experiences ............................................... 49
Table 4.13 ‘Job security’ expectancies by experience .......................................... 50
Table 4.14 ‘Work itself’ expectancies and valences, by educational levels .......... 52
Table 4.15 ‘Working conditions’ valences, by gender and school categories ........ 54
Table 4.16 ‘Working conditions’ expectancies, by gender and school categories ... 55
Table 4.17 ‘Working conditions’ expectancies and valences by head teachers .... 56
Table 4.18 Expectancies and valences of ‘promotion and professional growth’ by age 58
Table 4.19 Expectancies and valences of ‘sympathetic help’ by gender, according to the science teachers and head teachers .......................................................... 60
Table 4.20 Expectancies and valences of ‘tactful discipline’ by sex, school types and experiences in current station .......................................................... 61
Table 4.21 Mean Instrumentalities ....................................................................... 73
Table 4.22 Teaching Science to girls by sex, schools and main teaching subjects .... 74
Table 4.23 Reasons for enjoying teaching science to girls in Girls’ school ............ 75
Table 4.24 Reasons for enjoying teaching science to girls in mixed schools .......... 76
Table 4.25 Reasons for not enjoying teaching science to girls in girls’ schools ...... 77
Table 4.26 Reasons for not enjoying teaching science to girls in mixed schools .... 78
Table 4.27 Subject Preferred for girls by science teachers in girls’ schools .......... 79
Table 4.28 Subject preferences in mixed schools ............................................... 80
Table 4.29 Improving performance and participation of girls in science subjects
Table 4.30 Motivation Levels of the science teachers
Table 4.31 Motivation Levels by School Categories
Table 4.32 Comparison of differences in motivation by school categories
Table 4.33 Motivation Levels by Gender, According to Science Teachers
Table 4.34 Comparison of differences in motivation by gender of the teachers
Table 4.35 Motivation Levels by Levels of Education
Table 4.36 Comparison of differences in motivation by educational levels
Table 4.37 Motivation Levels by Teaching Experiences
Table 4.38 Motivation Levels by Teaching Experiences in Current Station
Table 4.39 Comparison of differences in motivation by teaching experience
Table 4.40 Motivation Levels by Main Teaching Subjects
Table 4.41 Comparison of differences in motivation by teaching subjects
**LIST OF FIGURES**

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>The Expectancy Theory Model</td>
<td>11</td>
</tr>
<tr>
<td>1.2</td>
<td>The Conceptual Framework Model</td>
<td>13</td>
</tr>
<tr>
<td>4.1</td>
<td>Job Security Expectancies and Valences by Teaching Experience</td>
<td>51</td>
</tr>
<tr>
<td>4.2</td>
<td>Promotion and Professional Growth</td>
<td>59</td>
</tr>
<tr>
<td>4.3</td>
<td>Expectancies and Valences of Clear Task Definition by Teaching</td>
<td>63</td>
</tr>
<tr>
<td>4.4</td>
<td>Local Circumstances Expectancies and Valences by Age</td>
<td>65</td>
</tr>
<tr>
<td>4.5</td>
<td>Expectancies for Formulation of National Education Policies</td>
<td>67</td>
</tr>
<tr>
<td>4.6</td>
<td>Expectancies and Valences of Appraisal by Head Teachers</td>
<td>70</td>
</tr>
<tr>
<td>4.7</td>
<td>Summary of Motivational Effects</td>
<td>71</td>
</tr>
</tbody>
</table>
ABBREVIATIONS AND ACRONYMS USED

B.Ed – Bachelor of Education Degree

B.Sc – Bachelor of Science Degree

B.Sc/ PGDE – Bachelor of Education and Postgraduate Diploma in Education

GB – Girls’ Boarding School

GDB – Girls’ Day/ Boarding School

KCSE – Kenya Certificate of Secondary Education

KESI – Kenya Education Staff Institute

MD – Mixed Day School

MDB – Mixed Day/ Boarding School

MEST – Ministry of Education Science and Technology

M.Sc – Master of Science Degree

NDP – National Development Plan

S1/Dip – S1 Certificate or Diploma in Education

SMT – Science, Mathematics and Technology

TSC – Teachers Service Commission

TSRC – Teachers Service Remuneration Committee

TTC – Teachers Training College

TTI – Technical Training Institute

UNDP – United Nations Development Program

UNESCO – United Nations Educational, Scientific, and Cultural Organization

VIE – Valence, Instrumentality, Expectancy
CHAPTER ONE

BACKGROUND TO THE STUDY

1.1 Background to the Problem

To achieve success in any organization, there is undisputed need to keep a highly productive and motivated work force, as productivity and motivation are closely linked. Motivation can be defined in two ways: first as a management strategy, which is either a management activity, or something that managers do to induce others to act in a way, producing results desired by the organization; Second, it is a psychological concept, which is the internal mental state of a person, relating to the initiation, direction, persistence, intensity, and termination of behaviour (Tosi & Carroll, 1982: 206-7). According to Steyn (1995), motivated employees are always looking for better ways of doing their jobs, are usually concerned about quality, and are more productive than lethargic ones.

Human motives are based on felt needs, whether consciously or sub-consciously. The needs vary in intensity and over time among different individuals. Hence one of the greatest problems that managers encounter is determining what employees really mean in relation to what they say and do. An individual brings into an organization certain needs that are translated into wants, which may include opportunities for growth and advancement, need for job security and good working conditions. The individuals involved in any enterprise differ in the needs and objectives that are especially important to them. The purpose of management is to help the workers see that they can satisfy their own needs and utilize their potentials, while at the same time contributing to the aims of an enterprise. Within this situation, the organization must try to provide a climate where the worker is motivated in a way that serves both her/him and the organization’s interests.
According to Weihrich & Koontz (1993), motivation is linked to satisfaction. Motivation is the drive and effort to satisfy a want, and satisfaction is the contentment experienced when a want is satisfied. It is possible for a person to have high job satisfaction but low level of motivation for the job, and the reverse may be true. Probably then, those with high motivation and low job satisfaction are destined to look for other positions. Likewise, people who find their positions rewarding but are not motivated will in all probability rummage around for other careers.

The Education sector is a ‘doing’ sector, at times referred to as the ‘problem’ sector, holding brief to seven million Kenyan youths in primary, secondary, and tertiary institutions. Further, the Kenya government spends approximately 40 per cent of its recurrent expenditure on Education (Republic of Kenya, 2000), underscoring the sector’s importance. The resources available within the education service fall into three categories: manpower, money and material. The human resource is the most important of these as the effective use of the others depend on the skills and performance of the individual within the education system. Maintaining a motivated work force in this sector is then paramount. Persistent shortage of teachers is thought of then as an expression of lack of motivation as teachers move over to other occupations more motivating to them, although a relatively qualified and highly motivated teaching force is a prerequisite for the promotion of high achievement among students.

The education provision in any country is one of the most expensive services provided by the government (Halliday, 1989). It therefore becomes important that teachers, the most significant cost element in the budget, are highly motivated as any distraction means the education of the pupils suffer, and the country as a whole does not receive value for the
money invested in the service. Yet in Kenyan secondary schools, the problem of teachers’ shortage has ultimately affected almost all subjects taken, being persistently acute in sciences. The government has over time noted a drastic shortage of specialists in sciences (Republic of Kenya, 1974, 1976, 1979); a fact attributed to lack of enough science teachers.

By 1994, the government planned to boost teacher training especially in sciences (Republic of Kenya, 1994). In 1995, there were 33,443 trained teachers in secondary schools, of which 18,132 were graduates. However, there still exists a chronic shortage of science and mathematics teachers (Republic of Kenya, 1997a).

The Kenyan government has continually laid great emphasis on science education, and knowledge in science is considered a momentous contrivance in the attainment of a Newly Industrialized Country (NIC) status by 2020 (Republic of Kenya, 1997b). By 1974, the government’s main concern was to increase the output of graduate Science and Mathematics teachers (Republic of Kenya, 1974). The fourth National Development Plan (NDP) planned to lay immense prominence on Science and Mathematics (Republic of Kenya, 1979), while the Mackay Report recommended the strengthening of science education (Republic of Kenya, 1981). Today, Kenya joins other African states to enhance capacity building in science and technology through the African Network of Scientific and Technological Institutions-ANSTI, (Republic of Kenya, 2001). The magnitude of the government’s stab to promote science education can thus not be overstated.

During the past decade, the Kenya government, through the Ministry of Education, Science and Technology (MEST) and the Teachers Service Commission (TSC) attempted several solutions to the problem of teacher-motivation to curb the shortage in science. Among others,
the TSC awarded a special salary to the teachers (TSC, 1997). Yet the MEST has since established that money is rarely the only motivator (Ministry of Education, Science and Technology, 2000). How much money for instance is needed to buy a teacher’s motivation in class? What if the Teachers Service Remuneration Committee (TSRC) in 1997 had recommended a salary increment to teachers of between 30 and 45 per cent or even 10-25 per cent or nothing at all, would all the teachers have been totally de-motivated?

It is true that teachers need decent pay to earn a decent living. Nonetheless, the chronic lack of motivation being mentioned if truly exists, could have been due also to other factors besides salary. According to Dell (1988), staff in today’s organizations is motivated in their jobs if they can among others measures, work for efficient managers, think freely, see the results of their effort, and are allocated interesting jobs. The personnel also need to be informed, listened to, respected, recognized for their efforts, be challenged and have opportunities for increased skill development.

Specifically in the teaching profession, Halliday (1995) and Steyn (1995) established Pay increase and bonuses, Job security, Work itself, Working conditions, Appreciation of work done, Promotion and professional growth, Sympathetic help with personal problems, Tactful discipline, Clear task definition, Consideration of local circumstances, Involvement in formulation of national education policy, and Appraisal of teaching abilities among others as key factors in motivating teachers. Retaining the science teachers recently employed by the TSC is then contingent to effectively motivating these teachers.

But there is a gender-related concern to this motivation. Specifically, science teachers who handle girls may need even more prudence when it comes to motivation. Girls bring different
problems to a science class and their teachers may be encountering motivation problems, which exceed anybody's expectations. However, these girls still need science education. This has been recognized in various forums.

In its Framework for Action, the World Conference on Science in Budapest in 1999 stressed that specific efforts should be made, "to ensure the full participation of women and girls in all aspects of science and technology", and to this affect "promote within the education system the access of girls and women to scientific education at all levels" (para. 90). The World Education Forum sitting in Dakar, Senegal, singled out "Science, Technology and Mathematics" as emerging issues in girls' education (The World Education Forum, 2000) in the Thematic Study prepared on this topic. Indeed, for girls to get full recognition and appreciation by the different employment sectors, they must be made to accept to do Science, Mathematics and Technology (SMT) subjects and perform well in them.

The performance and participation of secondary schoolgirls in science has negated any attempt at promoting equity in education, eleven years after the Education For All (EFA) Forum in Jomtien (Republic of Kenya, 2001). Yet it is apparent that motivation of the teacher forms a key variable in the effective performance and participation of secondary school pupils in science education. Although other factors have also been identified as liable for the continued poor performance and participation in sciences among secondary schoolgirls, the motivation of the science teacher is considered very significant.
1.2 Statement of the Problem

Motivation is fundamental to the successful operation of any institution. Noting the significance of science education in the drive to realize a Newly Industrialized Country (NIC) rank by 2020, the Kenyan government needs a pool of highly trained and suitably educated science personnel. But it appears that this may not be, since many students neglect science, whereas the few who study it perform poorer than in other subjects, a fact due in part to lack of motivation, expressed in high turnover and persistent lack of science teachers.

The Ministry of Education, Science and Technology, and TSC have applied diverse approaches to exact this situation, mainly based on monetary returns. But motivation cannot be perceived based purely on money. According to Halliday (1989), motivation cannot be prescribed by decree, nor can it be introduced by the threat of discipline or by cash rewards alone. The effect of a salary increase vis-à-vis teacher motivation is rather a tricky one, at least if the two are to be seen as synonymous. The motivation process is a complex process that cannot be pegged basically on the level of monetary returns.

It is not clear that the needs of science teachers have been properly identified and prioritised. Yet the key to effective management is the ability to encourage and motivate the staff (Ministry of Education, Science and Technology, 2000). But how else can the science teacher in public secondary schools, especially in girls’ and mixed schools be motivated, and how do various motivating factors influence their level of motivation? This study therefore set out to find what it takes to retain and keep the science teacher in his/her work place, thereby identifying some motivating factors and how they influence the science teacher in secondary schools.
1.3 Purpose and Objectives of the Study
The purpose of the study was to establish the influence of some motivational factors on the science teachers in public girls and mixed secondary schools. To achieve this, the study had the following specific objectives:

- To establish the overall level of work-motivation of the science teachers;
- To establish how the overall level of work-motivation of the science teachers is influenced by variables such as school type, gender of the teacher, educational level, experience and teaching subjects;
- To establish the extent to which some motivation factors influence the work-motivation of science teachers; and
- To establish the influence of teaching girls on the work-motivation of the science teachers.

1.4 Research Questions
In order to achieve the stated objectives, the research attempted to answer the following questions:

1. What influences do i) salary, ii) job security, iii) work itself, iv) working conditions, v) appreciation, vi) promotion and growth, vii) sympathetic help with personal problems, viii) tactful discipline, ix) job description, x) consideration of local circumstances, xi) formulation of national educational policies, and xii) appraisal of teaching capabilities, have on the overall level of work-motivation of the science teachers in public girls’ and mixed secondary schools?

2. What influences does the teaching of girls have on the motivation to teach science among teachers in public girls’ and mixed secondary schools?
3. What is the overall level of work-motivation of science teachers in public girls' and mixed secondary schools?

4. To what extent is the overall level of work-motivation of the science teachers in public girls' and mixed secondary schools influenced by:
   
   i) School category?
   
   ii) Gender of the science teacher?
   
   iii) Educational level of the science teacher?
   
   iv) Experience of the science teacher?
   
   v) Main science subject(s) taught by teachers?

1.5 Hypotheses

The following null hypotheses were tested at $p < .05$, so as to establish whether there existed any significant differences in the overall work-motivation of teachers in the public girls and mixed secondary schools:

- $H_{01}$: There is no significant difference in the overall work-motivation between science teachers in girls' schools and those in mixed secondary schools.

- $H_{02}$: There is no significant difference in the overall work-motivation between male science teachers and female science teachers.

- $H_{03}$: There is no significant difference in the overall work-motivation between Graduate science teachers and those who have not attained a university degree.

- $H_{04}$: There is no significant difference in the overall work-motivation between novice and experienced science teachers.

- $H_{05}$: There is no significant difference by main teaching subjects, in the overall work-motivation of science teachers.
1.6 Significance of the Study
This study is significant in the following ways:

1. The study attempted to establish the work-motivation level of science teachers in public girls’ and mixed secondary schools. Establishing this, even if only for a small group, will help administrators in their effort towards motivating the teaching staff.

2. The study provides information to relevant stakeholders on the influence of motivation factors on secondary school science teachers, especially of girls. Thereafter, administrators can control the teachers’ behaviour, thus they can have an impact on the teachers’ motivational force.

3. The findings of this study also contribute research knowledge on motivation of teachers in Kenya, and on the application of the expectancy theory of motivation.

1.7 Assumptions of the Study
The following assumptions were made:

i. All respondents replied honestly to the questionnaires;

ii. An individual’s motivation can be measured by means of a survey questionnaire;

iii. The science teachers in public girls’ and mixed secondary schools’ motivation process is a process of valence, expectancy and instrumentality;

1.8 Scope and Limitations of the Study
The study attempted to establish the influence of various motivational factors on the science teachers in public girls’ and mixed secondary schools, and establish their level of work-motivation. The study focused on all science teachers in public girls’ and mixed secondary schools in Migori district, Nyanza province, Kenya. The study was carried out under the following limitations:
The study limited itself to secondary schools' science teachers in public girls' and mixed secondary schools. Its results may therefore not be generalized to science teachers in private schools, humanities, languages and technical subjects teachers.

The locale was limited to only one administrative district in the country; Migori district. Hence the findings may not be generalized to include the whole of Nyanza province, leave alone the whole country.

1.9 Theoretical Framework

This study was guided by the Expectancy Theory formulated by Victor Vroom in 1964. The theory posits that motivation is a force or drive within a person and that this force varies according to three factors: Valence, Expectancy and Instrumentality. For an individual to be motivated to perform a certain task, s/he must expect that completion of the task will lead to the achievement of his or her goal. This can be expressed as:

\[ \text{Motivation} = \text{Valence} \times \text{Expectancy} \times \text{Instrumentality}; \]

The motivation process is therefore a complex process, which can best be understood by analyzing the possible outcomes, the valence of these outcomes, and their perceived instrumentality of producing the second level outcomes with high valence as shown in Figure 1.1 below.
**Figure 1.1: The Expectancy Theory**

**KEY:**
- **E→P Expectancy** – perceived probability of successful performance, given effort
- **P→O Expectancy** – perceived probability of receiving an outcome, given successful performance
- **Instrumentality** – perceived probability of a first level outcome leading to a second level outcome

**Main Constructs in the Expectancy Theory are:**

1. **Motivation** – force to perform an act or engage in action. It is the internal energy or arousal that has direction and intensity.
2. **Valence** – is the degree of perceived attractiveness or repulsiveness of an object. It is the extent to which objects are desired or rejected by individuals.
3. **Expectancy** – is a momentary belief concerning the probability that a particular outcome or sets of outcomes will follow a particular action. It ranges from the strength of certainty that the action will result in the outcome, to the action will not result in the outcome.
4. **Instrumentality** – is the expected utility or usefulness of a direct outcome for the attainment or avoidance of other outcomes. It is the perceived relation between direct outcomes and indirect outcomes.

Source: Hackman 1977
1.10 Conceptual Framework
All human behaviour can be regarded as a result of a state of arousal or internal tension that serves as an energy source or springboard for action. Motivation is the force to perform. It has a degree of intensity and direction. The theory proposes that the force to perform an action is a result of internal process of perception of an individual’s ability to perform an action (E→P Expectancy) and whether the outcome will lead to another outcome (P→O Expectancy) holding a higher value to him/her. This conceptual framework was developed into the model in figure 1.2 below.

From Figure 1.2 below, a science teacher motivated by the stated factors will choose Path A. A high E→P Expectancy combines with a high P→O Expectancy based on the stated factors. A high motivation of the science teacher creates high self-perception (motivation) among the students thereby increasing performance and participation. On the other hand, de-motivation due to the stated factors leads to Low E→P Expectancy, which combines with Low P→O Expectancy, to create low self-perception among the students and cause persistent poor performance and participation in science.
Figure 1. 2: The Conceptual Framework Model

**Motivated By:**
- Salary
- Job Security
- Work Itself
- Working Conditions
- Appreciation
- Promotion & Growth
- Sympathetic Help
- Tactful Discipline
- Job Description
- Consideration
- Policy Formulation
- Teaching Appraisal

**De-Motivated By:**
- Salary
- Job Security
- Work Itself
- Working Conditions
- Appreciation
- Promotion & Growth
- Sympathetic Help
- Tactful Discipline
- Job Description
- Consideration
- Policy Formulation
- Teaching Appraisal

**Path A**
- High
- \[ E \rightarrow P\ E \]
- High
- \[ P \rightarrow O\ E \]
- Good Performance
- Positive Role Perception and Opportunities for Schoolgirls
- Good Performance and Participation in Science for Girls

**Path B**
- Low
- \[ E \rightarrow P\ E \]
- Less Intense Effort
- Low
- \[ P \rightarrow O\ E \]
- Fair Performance
- Negative Role Perception and Opportunities for Schoolgirls
- Average Performance and Participation in Science for Girls

**KEY:**
- \[ E \rightarrow P\ E \] Effort \rightarrow Performance Expectancy
- \[ P \rightarrow O\ E \] Performance \rightarrow Outcome Expectancy
1.11 Operational Definition of Significant Terms

**Expectancy** – a momentary belief concerning the probability that a particular action will result in a particular outcome or outcomes.

**First level outcomes** – sometimes called direct outcomes, are the more immediate result of action; the results that actions are directed towards or intended to accomplish.

**Gender** – the sex of an individual – either male or female.

**Humanities** – a range of subjects offered at secondary schools, which include history, religious education and geography.

**Instrumentality** – is the expected utility or usefulness of a direct outcome for attainment or avoidance of other outcomes – the perceived link between direct and indirect outcomes.

**Languages** – subjects offered at secondary schools including the study of English and Kiswahili and their literatures.

**Mixed School** – a school where boys and girls are admitted, taught and examined together.

**Motivation** – is the force to perform an act – it is the drive towards attractive objects or away from repellant objects.

**Motivation Factor** – a factor that influences the motivation of an individual, positively or negatively; i.e. that can be motivating or de-motivating.

**Outcomes** – are the perceived results of actions or of other results.

**Science** – a range of subjects offered in secondary schools, which deal with study of objects and figures, including Mathematics, Chemistry, Biology, and Physics.

**Second level outcomes** – also called indirect outcomes, are the more remote consequences of actions – the perceived consequences of direct outcomes.

**Valence** – is the degree of perceived attractiveness or repulsiveness of an object – the extent to which objects are desired or rejected by an individual.
1.12 Organization of the Rest of the Thesis

This thesis is organized into five chapters. Chapter 1 has the background to the study, which contains the background to the problem, statement of the problem, purpose and objectives of the study, the research questions, and the hypotheses. It also has the significance of the study, the assumptions made, the scope and limitations of the study, the theoretical and conceptual frameworks, and the operational definition of key terms used.

Chapter 2 summarizes the literature reviewed, which forms the theoretical basis and philosophical justification for the study. Chapter 3 gives the methodology used in carrying out the study, which include the research design, the locale, the study population, the sample and sampling procedures, the research instruments, data collection procedures, and analysis and presentation of the data.

Chapter 4 presents and analyses the findings, while chapter 5 provided a discussion based on the analyses of the data and presents conclusions, policy recommendations, and suggestions for further research.

1.13 Summary

This chapter has given a general background to the study. It highlighted the background to the problem, statement of the problem, purpose and objectives of the study, research questions, the hypotheses, significance of the study, the limitations, the assumptions, the theoretical and conceptual frameworks, the definition of significant terms, and lastly the organization of the rest of the thesis.
CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction
The literature reviewed in this section captured three specific areas. Studies on motivation in general especially the motivation theories, general studies on motivation using the expectancy theory, and studies on teacher motivation using the expectancy theory are reviewed. The chapter also looks at studies on motivation of teachers in Kenya.

2.2 Motivation
Motivation has been described as the force to perform an act. Due to the complexity of motivation, there is no single answer to what motivates people to work well; hence several scholars have studied motivation, in terms of content and process theories.

The content theories view motivation as a more or less stable inborn characteristic. They are concerned with what motivates people at work and the needs and drives that people have plus how they are prioritized. Among the content theories are, the Needs Hierarchy Theory of Maslow, the ERG model of Alderfer, and the Two-Factor Theory of Herzberg. The process theories of motivation on the other hand are mainly concerned with the preceding cognitive factors, which go into motivation. Motivation is seen as a cognitive process and actions being the results of decisions individuals make about events. They include the Equity Theory, the Goal Setting Theory, and the Expectancy Theory. The subsequent section reviews some motivation theories.
2.2.1 Maslow's Needs Hierarchy Theory

Developed by Maslow (1943), the theory proposes a five-step hierarchy into which human needs arrange themselves, with the lower needs having more strength than the higher needs. The level of needs already satisfied ceases to motivate, as the next level becomes the motivator. They include:

i) **Basic or physiological needs** – including food, water, sleep, air and sex, they are unlearned basic biological functions of the human organism. They are the most common motivators.

ii) **Safety (security) needs** – they are mainly concerned with freedom from bodily threats, and become pre-potent once the basic needs are fairly well satisfied. The needs also include security at work and cease to motivate once the worker is assured of security.

iii) **Social (affiliation) needs** – the needs concern love, affection, and belonging, and emerge, as motivators once the security needs are fairly well gratified.

iv) **Esteem needs** – these are the needs for power, achievement, competence, and status. The needs become strong motivators once affiliation needs are gratified.

v) **Self-actualization** – once the esteem needs begin to be adequately satisfied, the self-actualization needs emerge as strong motivators. This is the desire for self-fulfillment and involves maximizing ones' potentials to become what one wants to become. According to Maslow, it is the highest level.

The first three are the lower order needs while the last two are the higher order needs. The theory has proved quite helpful to managers in motivating workers and is relevant to this study, as it identifies that motivation is influenced by various factors. Its major limitation is
that research has not supported the idea of a hierarchy (Luthans and Martinko, 1979). It has also been difficult to study its philosophical framework and has not actually received a great deal of empirical validation. This calls for utilization of a theory that has empirical validation, such as the expectancy theory.

2.2 Herzberg's Two Factor Theory

Herzberg et al. (1959) came up with the dual factor or motivation-hygiene theory. The theory is based on the assumption that dissatisfaction leads to avoidance of work, while satisfaction leads to attraction to work. Based on the analysis of 203 accountants and engineers from eleven industries in Pittsburgh, Pennsylvania, USA, Herzberg and his colleagues found that the factors related to the job itself (motivators) cause job satisfaction, while those factors related to the job environment (hygiene) tend to cause dissatisfaction.

The motivators included the job itself— intrinsic, job content, or psychological factors, achievement, professional growth, and recognition in the job, the work itself, responsibility, and advancement. They are equivalent to Maslow's higher order needs. The hygiene factors include- extrinsic job context, physical factors as company policy and administration, supervision, working conditions, interpersonal relations, salary, status and security. They are equivalent to Maslow's lower order needs and remove de-motivation, but do not motivate.

The theory has been used extensively to study motivation in the workplace. Equally, its relevance for this study is based on the fact that it views motivation as a construct, based on specified factors. Its limitations however are mainly that the investigating method tended to prejudice results, as people tend to attribute good results to their own effort while attributing bad ones to others, and the results can only be replicated using the Critical Incidence
Technique used by Herzberg et al, besides being based on a small sample (Luthans and Martinko, 1979). Therefore, a more realistic theory that avoids these simplistic features is necessary, and the expectancy theory was utilized in this study to evade any prejudice.

2.2.3 The E-R-G Theory

Alderfer (1972) modified Maslow’s theory based on its inability to hold to empirical validity, and he identified three needs – Existence, Relatedness, and Growth. The existence needs include all forms of material and physiological desires – food, water, pay, fringe benefits, and good working conditions. Relatedness needs involve relations with significant others – family, superiors, co-workers, subordinates, friends as well as enemies, and growth needs impel a person to make creative or productive efforts to himself or herself and the environment. The satisfaction of the growth needs enable a person to experience completeness as a human being.

The theory is seen by behavioral scientists as the most valid and researchable content theory of motivation. Unlike Maslow’s theory, in addition to the satisfaction progression, there is also a frustration regression process. Therefore all the three categories of needs can be active at a single moment. Like the first two, the theory becomes significant to the current study as it identifies motivation as a product of specific factors. Though elegant in its simplicity and appeal, the theory is not easy to translate into practice, as a particular need may be satisfied in many ways. The assumptions of the expectancy theory fit real life more logically and accurately (Baron and Paulus, 1991); hence this study utilized the expectancy theory.
2.2.4 The Equity Theory

J. S. Adams (1963) formulated this theory, suggesting that most people balance what they put into a situation (input) with what they get out (output), and they then compare with the results obtained by other people in a similar situation. The comparison either results in an overpayment inequity, underpayment inequity, or equitable payment. The employees are motivated to maintain fair or "equitable" relationships among themselves and to change those that are unfair or "inequitable".

Research has supported the theory as both overpaid and underpaid workers were found to be dissatisfied with their work than those equitably paid. The theory is relevant to our current study as it introduces the element of individual perception of the desired factors, into motivation as a concept. However the focal flaw has been how to deal with the concept of negative input and the point at which equity becomes inequity, and it is very difficult to choose a comparison other. Hence this study made use of the expectancy theory to avoid these limitations.

2.2.5 The Goal-Setting Theory

The theory formulated by Locke (1968) is based on a single premise: performance is caused by a persons' intention to perform. Goals are "what a person is trying to accomplish", and people will do what they are trying to do. For success, the goals should be relatively difficult and specific, and the workers must participate in their setting. The frequency, quality and validity of the feedback received by employees on how their performance is matching up to the planned goals also motivate the workers. The theory also recognizes the element of individual perception in motivation, hence its relevance to this study.
Though appears a neat, orderly approach to motivation and performance, the theory does not account for two important factors: individual difference and ability, and goal complexity. One of the great attractions of the expectancy theory is that it recognizes the importance of various individual needs and motivations, which made it relevant for this study.

2.2.6 The Expectancy Theory

Victor Vroom (1964) developed the theory as a challenge to the content theorists’ assertion that job satisfaction leads to increased productivity, the “contented cow approach” to motivation. He views motivation as a product of values one seeks, and one’s estimation of the probability that a certain action will lead to those values. Many behavioral scientists view this theory to represent the most comprehensive, valid, and useful approach to understanding motivation. It is the theory that guided this study.

2.3 Studies on Motivation Using the Expectancy Theory

2.3.1 Motivation in General

Many of the studies designed to test hypotheses derived from the theory have yielded some support for the theory (Silver, 1983). Goodman et al. (1970) found that the productivity of scientists and engineers was significantly related to the summed valences-times-instrumentalities of various work related behaviors. Hackman and Porter (1968) found that telephone service representatives’ performance was directly related to the summed valence-times-instrumentalities of “working hard”. Lawler and Porter (1967) found that efforts on the part of managers in five types of organizations was related to the summed valences-times-instrumentalities of six behaviors. These findings support Vroom’s theory. Additional supportive findings were realised with reference to nurses (Schneider & Olson, 1970; Sheridan et al., 1975), and operators in a manufacturing company (Galbraith & Cummings,
Vroom's theory therefore appears valid in studying motivation of employees in the workplace, hence it was utilised to guide this study.

2.3.2 Expectancy Research on Teacher Motivation

Some studies have been carried out with respect to teachers. Miskel et al. (1980) found that for the secondary school and college teachers in their sample, the valence of effective teaching, times the expectancy that effort will yield effective teaching, was related to the teachers' satisfaction and to supervisors' perception of the teachers' effectiveness. In a study indirectly related to the theory, Spuck (1974) found that the reward of community support/recognition and agreement with school goals and policies were inversely related to teachers' absenteeism. In schools characterized by pride in the workmanship, positive social interactions, poor physical environment and low influence on educational policies, the teachers' turnover rate was lowest. A study by Miskel et al. (1975) found that for teachers and educational administrators, the discrepancy between desired and available rewards was significantly related to job satisfaction.

Although the expectancy theory has not been tested extensively as a way to describe, explain, or predict teachers' motivation or performance, the reviewed literature show some evidence to indicate that the theory is relevant in schools system. Specifically, it has been used in explaining teachers' satisfaction and perceived effectiveness, as well as teachers' behavior in terms of absenteeism, turnover and innovativeness.

2.4 Studies on Motivation of Teachers in Kenya

Studies have been carried out in Kenya on teachers' job satisfaction, which is an element of motivation. Herzberg's two-factor theory has been used extensively in these studies. Karugu (1980), Smock (1980), Ngaroga (1985), Ngalyuka (1985), Immonje (1990) and
Ingolo (1991) are among these. The studies found that teachers were motivated to stay in the job if physical; social/ status, economic and security dimensions associated with conditions of work are satisfactory. To avert dissatisfaction among the teachers, they must be adequately provided with good salary, proper working conditions, good supervision, teaching materials, small classes, preparation periods and overtime payments. Mutie (1993) used the facet/overall satisfaction model to study secondary school teachers and administrators in Kitui district, Kenya. He found that the teachers were only marginally satisfied with their job. Muchira (1988) used the same model to study Teachers’ Training College (TTC) Tutors in Kenya. He found that tutors in Kenya’s TTCs were not satisfied with their jobs. Mumo (2000) used the same model to study Technical Training Institute (TTI) Tutors in TTIs within Nairobi province. He found that a majority (63%), expressed slight satisfaction with their overall job, and the tutors expressed satisfaction with slightly over a half (53%) of the facets.

In Kenya, motivation and job satisfaction of teachers has been studied, and recommendations made to enhance performance at the various sectors of our schools’ system. It is apparent that motivation can be effectively studied.

2.5 Summary
The literature reviewed showed that motivation has been extensively studied. Various content and process theories have been used to study motivation, and they have boundaries, with no one best theory of motivation. However, the expectancy theory stands out as a modern and efficient way to describe and study motivation. Still, the theory has been successfully used in studying motivation; hence it was utilized in this study.
The motivation of teachers has been researched widely in Kenya, but among the reviewed literature, the following gaps were still evident:

vi) majority of them focus on primary schools, and none has been conducted specifically in public girls' and mixed secondary schools,

vii) none focused on science teachers, and

viii) none focused on Migori district.

In an attempt to seal these gaps, the study looked at the motivation factors influencing the science teachers in public girls' and mixed secondary schools in Migori. Specifically, the study attempted to find the work-motivation score of the science teachers while exploring the extent to which some 12 factors related to the job affect their motivation. This will supplement other research findings done on motivation of teachers in different areas.
CHAPTER THREE

METHODOLOGY

3.1 Introduction
The chapter discusses the procedures and strategies used in the study. Research design, locale, target population, the sample and sampling procedures, data collection, data analysis and presentation are also discussed.

3.2 Research Design
The study was a descriptive survey, designed to investigate the current situation with regard to motivation among the science teachers in public girls' and mixed secondary schools. According to Lockesh (1984), descriptive research studies are designed to obtain pertinent and precise information concerning the current status of phenomena and whenever possible to draw valid general conclusions from the facts discovered, as with the motivation of teachers under review. Also, surveys aim at obtaining information, which can be analyzed, patterns extracted and comparisons made (Bell, 1993), hence its choice for this study. Verma and Beard (1981) assert that surveys provide information about population variables, for instance when data on pupils' or teachers' opinion (like the teachers' motivation) on a variety of educational issues are sought. The methods are non-experimental as they deal with relations among un-manipulated variables. Since the events or conditions have already occurred or exist, the researcher merely selected the relevant variables for an analysis of their relationships, as Best and Kahn (1993) indicated.

3.3 Locale
The study was conducted in public secondary schools within Migori District. Migori district is situated in Nyanza province, in the western region of Kenya. Kisii, and Homa Bay districts
border it to the north, to the east by Gucha district, to the west, Suba district and Lake Victoria, and to the south is Kuria district. By the time this study was conducted, the district had several educational institutions among them were 48 public secondary schools. Of these, 13 were boys’ schools, nine were girls’ schools, and the remaining 26 were mixed. The teacher/pupil ratio stood at 1:17 at the secondary school level (Republic of Kenya, 1997c).

The choice of the district for the study was influenced by the limitations in time, effort, and funds. Kerlinger (1973) observes that a researcher should be familiar with the research locale, a fact that also influenced the researcher’s choice of the District. The girls’ performance in KCSE in the district is much lower than the boys’. Finally, among its major priorities for secondary education in its development plan for the period 1997-2001, was the improvement of teaching and learning of science (Republic of Kenya, 1997c).

3.4 The Population
The study population comprised all the 192 science teachers, and all the head teachers in the 35 public girls’ and mixed secondary schools in Migori district. The said population was targeted since these are the schools with girls students, and of the 48 secondary schools in the area, the teachers handle the students with weaker performance compared to boys’ schools. The population was spread over the days’, and boarding, as well as provincial and district secondary schools. The head teachers were targeted to provide the immediate administrators’ view concerning motivation factors in their schools.

3.5 Study Sample
According to Gay (1992), a researcher selects a sample due to various limitations that may not allow researching the whole population. The sample of 31 per cent mixed schools and 44 per cent girls’ schools was randomly sampled resulting in eight mixed schools and four girls’
schools. This fell above the minimum acceptable sample for a survey of 10 % for a large population and 20 % for a small population (Roscoe 1975, Gay, 1992). Thirty one per cent of the science teachers were randomly selected through stratified random sampling resulting in 60 teachers. This took care of the various strata, especially of main teaching subjects and gender within the population in a representative proportion. All the 12 head teachers of the sampled schools were included in the study sample. In all, twelve schools, from which came 12 head-teachers, and 60 science teachers were included in the sample.

3.5.1 Sampling Procedure

Gay (1992) identifies probability sampling as the best form of sampling as it allows all members of the population to have an equal and unbiased chance of appearing in the sample. Random sampling, a form of probability sampling was used as follows:

a) Schools: A list of the schools was obtained from the District Education Officer’s office, Migori, after which the schools were divided into two strata: girls’ schools, and mixed schools. Four girls’ schools and eight mixed secondary schools were randomly selected, resulting in a total of 12 schools.

b) Teachers: Initial visits were made to the sampled schools to book appointments and to develop rapport with both the school administration and the science teachers. From each sampled school, stratified sampling was used to ensure that all subjects were represented. Four science teachers were required, one to represent each of the four science subjects under review that is Mathematics, Chemistry, Physics, and Biology. The first round of sampling ended with 48 science teachers, one for each of the four science subjects, from each of the 12 schools. At that moment, the gender ratio stood at 35:13 or 73 per cent males against 27 per
cent females. Since stratified sampling was equally meant to bridge the gender divide, the second round of sampling aimed at achieving this, hence more preferences given to female science teachers left out by the first sampling. The resultant gender ratio stood at 38:22, or 63 per cent males and 37 per cent females, which was much closer to the 61:39 ratio given by the Teachers Service Commission (TSC, 2001). In the end, this ensured that the gender proportions were adhered to, and the sample remained as representative as possible.

From the four girls schools came 10 female teachers and 10 male teachers, 20 teachers in all. The mixed schools produced 28 male and 12 female teachers, 40 teachers in all. The grand total becomes 60, including the 20 teachers from the girls’ schools and 40 teachers from mixed institutions. All the head-teachers of the 12 sampled schools were included in the study sample.

3.6 Research Instruments

The study utilized two sets of questionnaires. According to Gay (1992), a questionnaire can be effectively used to explore attitude issues.

a) Head-teacher’s Questionnaire: attached as Appendix 1B, this was administered to all the head-teachers included in the sample. It sought information on the head-teachers’ view concerning the extent to which the motivation factors influenced the science teachers in their respective schools.

b) Science Teachers’ Questionnaire: attached as Appendix 2B, this was administered to science teachers. It had three parts: part A sought the science teachers’ bio-data. Part B, a modified version of the Expectancy Motivation Questionnaire (Hackman, 1977:37-8), includes teachers-motivating factors recommended by Steyn (1995) and Halliday (1995).
Part C of this questionnaire included open-ended questions that further probed the science teachers on motivation factors influencing them as they teach the girls, and helps establish the influence of students' gender on motivation of the teachers.

3.6.1 Piloting

Piloting was conducted to determine the reliability and validity of the instrument. The piloting also helped to modify and remove any ambiguous items on the instrument. Blank spaces, inaccurate responses, or inconsistencies indicated weaknesses, which needed to be reviewed after the piloting (Mulusa, 1990). This helped in enhancing face and construct validity. Two secondary school head-teachers, a male and a female, were used in piloting the questionnaire for the head-teachers, while eight science teachers, two for each subject, 5 males and 3 females, were randomly selected for the piloting of the science teachers' questionnaire. Half of the instruments for both the head teachers and the science teachers were administered and taken away, while the other half were left and gathered on another day. Gay (1992) identified testing as a major threat to reliability. To avoid the threats of testing on reliability, the piloting groups was selected from public girls' and mixed secondary schools within Migori district not included in the sample.

3.6.2 Validity

Since the version of the questionnaire used was adopted, there was need to test it for its validity. Instrumentation is a major threat to internal validity of any research instrument (Gay, 1992). Face validity was established by removing questions that seemed ambiguous or too lengthy, while construct validity was done by reviewing questions that seemed repetitive, or whose answers seemed too obvious, following the piloting results.
3.6.3 Reliability

To establish reliability of the instruments to the specific situation the coefficient of internal consistency – the Split-Half reliability method was used. The questionnaire was administered to the pilot group, and then the scores were ranked. The scores were then divided into two equal sets, and each subjects’ score were computed. Dividing the questionnaire into two comparable halves, the Spearman-Brown Proficiency Formula ($r_{\text{Split-Half}}$) was used to correlate the two, and a Split-Half estimate of .913 was established. This did not vary depending on whether the instruments were amassed immediately, or left behind and collected later. Any instrument with a Split-Half estimate between .8 and 1 is acceptable as reliable enough according to Gay (1992). The instruments were then accepted and administered to the respondents.

3.7 Data Collection Procedures

The relevant legal documents were acquired (Appendices 3, 4 and 5). After the initial visit to the sampled schools, appropriate dates were preferred for the administration of the questionnaires. The researcher self-administered the questionnaire to each of the respondents, a fact that helped achieve a 100 per cent return ratio for both science teachers and the respective head teachers. This also gave the respondents time to seek clarification on any item that proved difficult to understand in the instruments. In three schools, the teachers were not able to respond to the questionnaire immediately, hence the instruments were left behind with each of the respondents, and collected later. The researcher was at ease with this arrangement since no significant difference was noted in the responses between the instruments left behind and those collected immediately, during piloting.
3.8 Data Analysis and Presentation

This study generated both qualitative and quantitative data, hence both descriptive and inferential statistics in the Statistical Package for Social Sciences (SPSS) were used to analyze the data obtained. As Onyango (2001) observes, the SPSS package is known for its ability to handle large amounts of data, and given its wide spectrum of statistical procedures purposefully designed for social sciences, it is also quite efficient.

The data from part A of the head-teachers’ questionnaire were coded, tabulated and analyzed using descriptive statistics such as frequencies and percentages. For part B, the items in Question 1 were multiplied by the related items in Question 2 to find the motivational effect of the twelve factors under review, according to the head teachers. These were then clustered into four groups, i.e. 1.00 – 3.99 Highly de-motivating; 4.00 – 15.99 Slightly de-motivating; 16.00 – 35.99 Slightly motivating; and 36.00 – 49.00 Highly motivating.

The data obtained from part A of the science teachers’ questionnaire was equally coded, tabulated and analyzed using descriptive statistics such as frequencies and percentages. The results for part B of the questionnaire was used to calculate the work-motivation score. Scores were calculated for individual teachers, and for the whole group in the sample. The procedure for calculating the work-motivation score was as below:

- a) Each possible positive outcome in Question 1 of the questionnaire was multiplied with the corresponding score on Question 2,

- b) All items 1 times 2 products were added together to get a total of all expectancies times valences,
c) The totals were divided by the number of pairs – in this case 12, to get the average expectancy-times-valence score,

d) The scores from Question 3 were added together and then divided by three to get the average effort-to-performance expectancy score, and finally,

e) In order to obtain the total work-motivation score, the researcher multiplied scores obtained in step c by the scores obtained in step d.

The final work-motivation score of the teachers consequently ranged from 343 to 1. The categorizations were based on squares of one to seven, times seven, as shown below:

\[
\begin{align*}
1^2 \times 7 - 2^2 \times 7 & \quad \quad 2^2 \times 7 - 4^2 \times 7 \\
4^2 \times 7 - 6^2 \times 7 & \quad \quad 6^2 \times 7 - 7^2 \times 7
\end{align*}
\]

The resultant motivation levels for the teachers were: 1-28- Highly de-motivated; 29-112- Slightly de-motivated; 113-252- Slightly motivated; 253-343- Highly motivated.

The inferential statistics of t-test was used to test the first four statistical hypotheses $H_{01} - H_{04}$ since they concern relations between two groups. To avoid Type I error, the hypotheses were tested at a level of significance $p < .05$. For the fifth Null hypothesis ($H_{05}$), the ANOVA was used to compute an $F$ ratio, since it involves four groups, based on the various subject areas. This was also tested for significance at $p < .05$.

The data from part C of the questionnaire were qualitatively analyzed, and thematically presented.
CHAPTER IV

PRESENTATION AND ANALYSIS OF FINDINGS

4.1 Introduction
The purpose of this study was to explore the influence of some motivation factors on the motivation to teach among science teachers in girls’ and mixed secondary schools. The study employed two main instruments, a questionnaire for head teachers and another for the science teachers in the sample. The respondents included 12 head teachers and 60 science teachers from the 12 sampled schools. Quantitative data obtained from the head teachers' questionnaire and part A and part B of the science teachers' questionnaire were analysed using both descriptive and inferential statistics in the Statistical Package for Social Sciences (SPSS). Qualitative data derived through part C of the science teachers' questionnaire are described thematically.

For systematic presentation and analysis of data, this chapter is organized into four main parts as indicated below:

Part I – Description of schools and respondents;

Part II – Motivation factors: the Valences and Expectancies;

Part III – Instrumentalities: Influence of students' gender; and

Part IV – Motivation levels.

PART I

4.2 DESCRIPTION OF SCHOOLS AND RESPONDENTS
This part of the chapter presents a description of the sampled schools and respondents, so as to provide a logical background for the study findings reported later in the chapter.
4.2.1 Description of Schools

The study region was Migori district, in Nyanza province of western Kenya. The study was conducted in 12 public secondary schools, selected through stratified random sampling. Four of the schools were girls' schools while eight were mixed schools. Table 4.1 presents the schools, by type and category.

Table 4.1: School Type and Category, n=12

<table>
<thead>
<tr>
<th>School type</th>
<th>School categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Provincial</td>
</tr>
<tr>
<td>No. of Schs (n)</td>
<td>5</td>
</tr>
<tr>
<td>Percentage</td>
<td>42</td>
</tr>
</tbody>
</table>

Key: GB - Girls Boarding
    Mdb - Mixed Day Boarding
    Gdb - Girls Day Boarding
    MD - Mixed Day Schools

As shown in Table 4.1, majority of the sampled schools (58 per cent) were district schools. This reflects well on the population, as the district has only provincial and district schools with no national schools.

Equally, a larger proportion of the schools (41 per cent) were mixed day schools. The mixed day schools as well form the largest group based on the categories in the district.

School Gender Proportions

The instruments also sought to establish the average gender proportions both for the science teachers and the pupils. The head teachers were to report on average, how the gender proportions for both the science teachers and the pupils, stood in their schools. Since girls' schools had only girls as students, the gender comparisons were not made. The gender average proportions are reported in Table 4.2 below.
Table 4.2 School Gender Proportions

Proportions of Science Teachers by Gender n=12

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>0</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>75</td>
<td>25</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>25</td>
<td>75</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>100</td>
<td>1</td>
<td>8</td>
</tr>
</tbody>
</table>

Total: 12 100

Proportions of Students in Mixed Schools by Gender n=8

<table>
<thead>
<tr>
<th>Male</th>
<th>Female</th>
<th>n</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>80</td>
<td>20</td>
<td>1</td>
<td>12</td>
</tr>
<tr>
<td>60</td>
<td>40</td>
<td>3</td>
<td>38</td>
</tr>
<tr>
<td>50</td>
<td>50</td>
<td>3</td>
<td>38</td>
</tr>
<tr>
<td>40</td>
<td>60</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>20</td>
<td>80</td>
<td>1</td>
<td>12</td>
</tr>
</tbody>
</table>

Total: 8 100

From Table 4.2 above, the most frequent average gender ratio among science teachers was 50:50, appearing in five schools representing 42 per cent. Generally, male science teachers outnumbered females, with only one school reportedly having no male science teachers. This mirrors the national figures, as the number of female science teachers is generally lower than males. For the pupils in the mixed schools, males outnumbered females, and in only one school did the female students outnumber boys (male: female ratio at 20:80). From these results, the male student in Migori district has a higher access to schooling than the female student, based on average students’ gender proportions in the mixed schools.
4.2.2 Respondents' Characteristics

The total sample of respondents was 72. Of these, 12 were head teachers, while 60 were science teachers. A return rate of 100 per cent from the head teachers and the science teachers, was attained because the questionnaires were self-administered to the respondents by the researcher. The head teachers were categorized according to their age, sex, educational qualifications, years of teaching experience, and years of administrative experience. The science teachers were also categorized according to age, sex, educational qualification, years of teaching experience, and years of teaching experience in their current station, responsibility, and the main teaching subject.

Respondents' Age Structure

Table 4.3 below shows the age distribution of the respondents.

<table>
<thead>
<tr>
<th>Age Bracket (Years)</th>
<th>Head Teachers (n=12)</th>
<th>Science Teachers (n = 60)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Percentage</td>
</tr>
<tr>
<td>25 – 29</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>30 – 34</td>
<td>1</td>
<td>9</td>
</tr>
<tr>
<td>35 – 39</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>40 – 44</td>
<td>4</td>
<td>33</td>
</tr>
<tr>
<td>45 – Over</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>

As shown in Table 4.3, majority of the head teachers fell between the age bracket of 35–39 and 40–44 years, both having a frequency of four (33 per cent). Conversely, for the science teachers, the highest number was registered in the 25–29 age bracket, with a total of 29 (48 per cent) teachers. Fourteen of the science teachers representing 23 per cent were aged
between 30 and 34 years. Hence, most of the head teachers in the sample were aged above thirty-five years, while majority of the science teachers were aged below 35 years. This may be because in Kenya, head teachers are promoted from classroom teaching after attaining some years of teaching experience making them older than the other teachers. Mobility of the science teachers on the other hand has caused concern, as explained elsewhere in this document. This may explain the tender age brackets in which many science teachers fall.

Gender of the Respondents

The distribution of the respondents by gender is expressed in Table 4.4 below.

<table>
<thead>
<tr>
<th>Table 4.4 Respondents’ Gender Distribution</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Female</td>
</tr>
<tr>
<td>Total</td>
</tr>
</tbody>
</table>

From Table 4.4, seven of the head teachers (58 per cent) were male, while five head teachers representing 42 per cent were female. All the girls’ schools had a female head teacher, while of the eight head teachers of the mixed schools, seven were males and one was female. Though it is common to have female head teachers in girls’ schools, the mixed schools appear more male dominated.

As stated elsewhere in this document, the male teachers were 38 (63 per cent). Ten of the male teachers, representing 26 per cent, were stationed in girls’ school, while the remaining 28, representing 74 per cent, taught in mixed schools. Female science teachers in the sample numbered 22, representing 37 per cent. Of these, 12 (55 per cent) were in mixed schools,
whereas 10 (45 per cent) were in girls' schools. This is a fair representation of the general picture, as the male science teachers generally outnumber females in Kenya.

**Academic Qualifications**

The instruments also sought to determine the academic credentials of the respondents. Table 4.5 below gives the distribution of the respondents according to their academic qualifications.

<table>
<thead>
<tr>
<th>Academic qualification</th>
<th>Head teachers ((n=12))</th>
<th>Science teachers ((n=60))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(n)</td>
<td>Percentage</td>
</tr>
<tr>
<td>S1/Diploma</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>B.Sc.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>B.Ed.</td>
<td>10</td>
<td>83</td>
</tr>
<tr>
<td>B.Sc. and P.G.D.E</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>M.Sc.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>

As indicated above, the most common academic qualification among the head teachers was Bachelor of Education (B.Ed.) degree, which 10 head teachers, representing 83 per cent, possessed. The other two head teachers, representing 17 per cent, had S1 or Diploma in Education training. While most head teachers in Kenya are graduates, others are professional teachers appointed to the position based on merit promotion or attendance of educational management courses such as those organized by Kenya Educational Staff Institute (KESI).

Among the science teachers, the highest academic qualification attained was a Master of Science (M.Sc.) degree, attained by one science teacher, representing 2 per cent. Twenty-seven (45 per cent) had B.Ed degrees, while 20, representing 33 per cent, had S1 or Diploma.
in Education. These figures indicate that most of the science teachers were professionally trained, with only six (10 per cent) science teachers in the sample being untrained graduates with Bachelor of Science (B.Sc.) degrees. It is expected that these will probably also become professionally qualified teachers by attaining Post Graduate Diplomas in Education (PGDE).

Experience

The instruments further sought to establish both the teaching and or administrative experiences of the head teachers and the science teachers. Tabular representations of the findings are as in Table 4.6 below.

Table 4.6 Experiences of the Respondents

<table>
<thead>
<tr>
<th>Head Teachers (n =12)</th>
<th>Teaching</th>
<th>Administrative</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Percentage</td>
</tr>
<tr>
<td>1 - 5</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6 - 10</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>11 - 15</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>16 - 20</td>
<td>5</td>
<td>42</td>
</tr>
<tr>
<td>21 - Over</td>
<td>3</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>100</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Science Teachers (n =60)</th>
<th>Teaching Experience</th>
<th>Experience in Current Stat.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Percentage</td>
</tr>
<tr>
<td>1 - 5</td>
<td>23</td>
<td>38</td>
</tr>
<tr>
<td>6 - 10</td>
<td>15</td>
<td>25</td>
</tr>
<tr>
<td>11 - 15</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>16 - 20</td>
<td>7</td>
<td>12</td>
</tr>
<tr>
<td>21 - Over</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>
Among the twelve head teachers in the sample, five, representing 42 per cent, had teaching experiences of between 16 and 20 years and three (25 per cent) head teachers had taught for more than 20 years. Since the position of headship is promotional, the head teachers are teachers who have attained vast experience, explaining why the majority of them have experience of over sixteen years. Seven head teachers, representing 58 per cent, had practiced secondary school administration for between 6 and 10 years, while two (17 per cent) head teachers had administrative experiences of between 11 – 15 years, with a similar number having administered for one up to five years. The differences in years of experience and administration were probably taken in classroom teaching before being assigned administrative duties.

Of the 60 science teachers, 23 representing 38 per cent had taught for between one and five years, 15 (25 per cent) had teaching experience of between 6 – 10 years while eleven (18 per cent) had taught for 11 –15 years. This implies that as opposed to the head teachers, majority of the science teachers had teaching experiences of below fifteen years, a fact that may be attributed to high mobility of the science teacher causing the persistent shortage mentioned elsewhere in this document. The more experienced science teachers may as well have been promoted to either headship or other administrative offices outside the classroom.

Responsibility

The science teachers’ questionnaire also sought to establish other added responsibilities that the respondents held in their schools. These could be locally appointed (by the head teacher and School Board of Governors) or by the Teachers Service Commission. The findings are tabulated in Table 4.7 below.
Majority (34) of the science teachers, representing 56 per cent included in the sample were assistant teachers, with no added responsibility while twenty-one, representing 35 per cent, were heads of department. Since the responsibilities are also promotional, it is understandable that majority of the teachers being young and with relatively less teaching experiences had no added responsibilities. It is worth noting that the sampled science teachers represented all the four categories of responsibilities.

### PART II

### 4.3 MOTIVATION FACTORS: THE VALENCEs AND THE EXPECTANCIES

This section presents the findings from the instruments concerning the motivation factors, and provides answer to the first research question. Since the motivation levels were derived from analyses of the valences and the expectancies of the twelve factors under review, times the instrumentalities, this section discusses the overall valences and expectancies of the twelve factors. The motivational effect of each of the twelve factors is also discussed.

In this study, a science teacher’s overall work-motivation score, which is used to determine the motivation level, was determined by multiplying the valences, the expectancies, and the instrumentalities as reported in the instruments. According to the theoretical framework upon
which this study was based, the work-motivation scores are determined by multiplying the valences, expectancies and instrumentalities. Vroom's (1964) theory, often referred to as the VIE theory posits that motivation is established by the valences (values attached to the outcomes), expectancies (perceived probabilities of attaining an outcome following performance) and the instrumentalities (the link between targets and outcomes).

4.3.1 The Valences

Operationally, valence is the degree of perceived attractiveness or repulsiveness of an object. According to the VIE theory, the value attached to the factor (valence) influence the motivational effect of such a factor. The Motivation Questionnaire sought to establish the valences of the stated factors. Specifically, the question asked was:

\[
\text{Different science teachers want different things from their work. Here is a list of things a science teacher could have from her/his job. How important is each of the following things to you?}
\]

A seven point Likert scale (where 1 represents less important, and 7 is extremely important) guided the responses, concerning the valences of each of the 12 factors. The overall valences mean scores for all the factors were 5.58 by the science teachers and 5.70 by the head teachers, included in the sample to provide the immediate administrators’ view. Table 4.8 below highlights the means and standard deviations of the valences for the 12 factors, as reported by both the science teachers and their respective head teachers.
Table 4.8 Mean Valences by the science teachers and the head teachers

<table>
<thead>
<tr>
<th>Motivation Factors</th>
<th>Science teachers</th>
<th>Head teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>Pay increase and bonuses</td>
<td>6.18</td>
<td>1.19</td>
</tr>
<tr>
<td>Job security</td>
<td>6.47</td>
<td>.85</td>
</tr>
<tr>
<td>Work itself</td>
<td>6.27</td>
<td>1.02</td>
</tr>
<tr>
<td>Working conditions</td>
<td>6.35</td>
<td>1.05</td>
</tr>
<tr>
<td>Appreciation of work done</td>
<td>5.87</td>
<td>1.40</td>
</tr>
<tr>
<td>Promotion and professional growth</td>
<td>6.08</td>
<td>1.27</td>
</tr>
<tr>
<td>Sympathetic help with personal problems</td>
<td>3.52</td>
<td>1.94</td>
</tr>
<tr>
<td>Tactful discipline</td>
<td>5.12</td>
<td>1.70</td>
</tr>
<tr>
<td>Clear definition of tasks</td>
<td>5.70</td>
<td>1.61</td>
</tr>
<tr>
<td>Consideration of local circumstances</td>
<td>4.58</td>
<td>2.13</td>
</tr>
<tr>
<td>Participation in national educ. policy formulation</td>
<td>5.02</td>
<td>1.69</td>
</tr>
<tr>
<td>Teaching abilities’ appraisal</td>
<td>5.77</td>
<td>1.47</td>
</tr>
<tr>
<td>Overall mean valences</td>
<td>5.58</td>
<td>1.44</td>
</tr>
</tbody>
</table>

Average mean valences = 4.00

As Table 4.8 shows, the mean valences of the 12 factors appear to be relatively high as indicated by both the science teachers and the head teachers in the sample. From the science teachers’ responses, ‘job security’ as a motivation factor received the highest mean valence of 6.47 and a standard deviation of .85, while ‘sympathetic help with personal problems’ received the lowest mean valence score of 3.52, and a standard deviation of 1.94. On the other hand, the head teachers identified ‘appreciation of work done’ as the motivating factor most valued by their science teachers, with a mean valence of 6.42 and a standard deviation of .79. ‘Consideration of local circumstances in reaching decisions’ as a motivation factor received the least mean valence (5.08) and a standard deviation of 1.51 by the head teachers.
From these results, it appears that the science teachers highly value most of the identified motivation factors; a fact confirmed by their head teachers based on the valence results. The subsequent section presents results for the expectancies.

4.3.2 The Expectancies

The expectancy is the momentary belief that a particular action will result in a particular outcome or outcomes. The Motivation Questionnaire also dealt with the teachers’ expectancies that the stated factors were likely to occur in their school, if they taught science well. Specifically, the question stated:

*Here are some things that could happen to teachers if they do their jobs especially well. How likely is it that each of these things would happen if you perform your job especially well?*

The science teachers responded to the twelve items on a seven point Likert scale, ranging from 1 (not at all likely) to 7 (extremely likely). The head teachers also responded to the same 12 items, based on the seven point Likert scale. The overall mean expectancies scores were 3.25 by the science teachers and 4.86 by their respective head teachers.

Table 4.9 below reports the means and standard deviations of the expectancies for each of the 12 factors, as reported by both the science teachers and their respective head teachers.
### Table 4.9 Mean Expectancies by the science teachers and the head teachers

<table>
<thead>
<tr>
<th>Motivation Factors</th>
<th>Science teachers</th>
<th>Head teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Means</td>
<td>S.D</td>
</tr>
<tr>
<td>Pay increase and bonuses</td>
<td>1.70</td>
<td>1.20</td>
</tr>
<tr>
<td>Job security</td>
<td>3.92</td>
<td>2.08</td>
</tr>
<tr>
<td>Work itself</td>
<td>5.52</td>
<td>1.67</td>
</tr>
<tr>
<td>Working conditions</td>
<td>3.17</td>
<td>1.92</td>
</tr>
<tr>
<td>Appreciation of work done</td>
<td>4.50</td>
<td>1.77</td>
</tr>
<tr>
<td>Promotion and professional growth</td>
<td>3.22</td>
<td>1.84</td>
</tr>
<tr>
<td>Sympathetic help with personal problems</td>
<td>1.87</td>
<td>1.57</td>
</tr>
<tr>
<td>Handling disciplinary cases tactfully</td>
<td>2.47</td>
<td>1.70</td>
</tr>
<tr>
<td>Clear definition of tasks</td>
<td>3.65</td>
<td>2.17</td>
</tr>
<tr>
<td>Consideration of local circumstances</td>
<td>2.82</td>
<td>1.66</td>
</tr>
<tr>
<td>Participation in national educ. policy formulation</td>
<td>2.32</td>
<td>1.76</td>
</tr>
<tr>
<td>Appraisal of teaching abilities</td>
<td>3.90</td>
<td>1.97</td>
</tr>
</tbody>
</table>

| Overall mean expectancies                      | 3.25  | 1.78 | 4.86  | 1.66 |

Average mean expectancy = 4.00

From Table 4.9 above, of the twelve factors, 'work itself' as a motivation factor received the highest mean expectancy score of 5.52 and a standard deviation of 1.67, with reference to the science teachers. The head teachers on the other hand perceived 'appreciation of work done' as the motivation factor with the highest mean expectancy, averaging 5.58 and a standard deviation of 1.16. Similarly, the least scored motivation factor by the science teachers was 'salary and bonuses' with a mean expectancy of 1.70 and a standard deviation of 1.20. However, according to the head teachers in the sampled schools, the motivation factor with the least mean expectancy was 'participation in national educational policy formulation', having a mean score of 3.67 and a standard deviation of 2.19.
Whereas the head teachers scored above average mean expectancies for ten of the 12 stated motivation factors (with a range of 3.67-5.58), the reverse was true for the science teachers as they scored below average mean expectancies for ten of the twelve factors, with a range of 1.70-5.52. This may perhaps be attributed to the fact that as school administrators, the head teachers could assume that some factors are likely to occur to a science teacher if they taught well, while the science teachers felt differently. For instance while the head teachers scored a mean expectancy value of 5.33 for 'sympathetic help with personal problems', as a motivation factor, the science teachers scored a mean of 1.87 for the same. The mean expectancies are notably low among the science teachers. However, if it is true that the said factors are likely, as perceived by the head teachers, then the link between teaching well and achieving these factors is lacking, in the secondary schools.

The first research question enquired about the influence of each of the twelve factors under review on the motivation level of science teachers. Specifically, the question asked:

- What influences do i) salary, ii) job security, iii) work itself, iv) working conditions, v) appreciation, vi) promotion and growth, vii) sympathetic help with personal problems, viii) tactful discipline, ix) job description, x) consideration of local circumstances, xi) formulation of national educational policies, and xii) appraisal of teaching capabilities, have on the overall level of work-motivation of the science teachers in public girls' and mixed secondary schools?

Since these were the twelve factors utilized to establish the overall work-motivation scores, it is significant that each is analyzed, to give clear grounds for the findings. The subsequent section reports the findings for each of the 12 motivation factors, derived from the respondents. The expectancies and valences of each of the factors are further explored, as they form the starting point for the resultant motivation levels. The mean expectancies (ranging from 1- not at all likely, to 7 – extremely likely) and mean valence (ranging from 1-
less important, to 7- extremely important) form the basis upon which the factors were analyzed. Further, the motivational effect of each factor was established by multiplying the mean expectancy and mean valence scores for each factor, resulting in scores ranging from 1 (extremely de-motivating) to 49 (extremely motivating). The head teachers’ responses are also analyzed on this basis.

4.3.3 Pay Increase and Bonuses

The instruments employed in this study set out to explore the influence of ‘pay increase and bonuses’ as a motivation factor, on the motivation of the science teachers.

The mean valence score of ‘pay increase and bonuses’ by both the science teachers and the head teachers was fourth highest among the twelve factors. According to the science teachers, the mean valence score stood at 6.18, while the mean valence for the head teachers was 6.17. This implies that science teachers attached high value on ‘pay increase and bonuses’, especially when it is directly associated with teaching science well, a fact supported by their respective head teachers. Table 4.10 below gives a presentation of the responses, based on the gender of the science teachers and the various school categories.

<table>
<thead>
<tr>
<th>Table 4.10 ‘Pay increase and bonuses’ valences by gender and schools</th>
<th>n=60</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gender of science teacher</strong></td>
<td><strong>School category</strong></td>
</tr>
<tr>
<td>Male n=38</td>
<td>Female n=22</td>
</tr>
<tr>
<td>Mean</td>
<td>6.11</td>
</tr>
<tr>
<td>S.D</td>
<td>1.20</td>
</tr>
</tbody>
</table>

Key: GB – Girls Boarding  
Gdb – Girls Day Boarding  
Mdb – Mixed Day Boarding  
MD – Mixed Day Schools

As shown in Table 4.10 above, there is no great variations based on the various school categories, and between both male and female science teachers, on the mean valence of ‘pay
increase and bonuses’ as a motivation factor, as the valences remain high. This implies that the high value attached to pay increase and bonuses arising because of teaching well do not vary based on the sex of the science teacher, or the teaching station.

Table 4.11 below reports the mean expectancy scores by the science teachers based on gender and school category.

<table>
<thead>
<tr>
<th>Gender of science teacher</th>
<th>School category</th>
<th>Pay increase and bonuses’ expectancies by gender and schools n=60</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male n=38</td>
<td>GB n=16</td>
<td>Mean 1.76 S.D 1.28</td>
</tr>
<tr>
<td>Female n=22</td>
<td>Gdb n=4</td>
<td>1.56 1.05</td>
</tr>
<tr>
<td></td>
<td>Mdb n=28</td>
<td>1.25 1.09</td>
</tr>
<tr>
<td></td>
<td>MD n=12</td>
<td>1.86 1.27</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1.67 1.30</td>
</tr>
<tr>
<td>Key:</td>
<td></td>
<td>GB – Girls Boarding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mdb – Mixed Day Boarding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Gdb – Girls Day Boarding</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MD – Mixed Day Schools</td>
</tr>
</tbody>
</table>

As Table 4.11 indicates, the expectancy scores for this factor were quite low. A science teachers’ expectation of attaining a pay increase or bonus because of teaching science well is quite minimal, for both male and female teachers, and in all the categories of schools. Overall, the science teachers reported this factor as having the least mean expectancy score, of 1.70, while the head teachers rated a mean expectancy of 3.75, appearing second least among the twelve factors. This implies that both the science teachers and their respective head teachers saw very little relationship between teaching well, and getting an increase in the amount of pay and/or bonuses.

Despite having high mean valence scores (6.18 by science teachers and 6.17 by the head teachers), the mean expectancy that ‘pay increase and bonuses’ directly results from teaching well, is much low (1.70 by science teachers and 3.75 by the head teachers). The resultant motivational effect of ‘pay increase and bonuses’ as a motivation factor, (on the scale of 1-
were 10.51 by the science teachers, and 23.13 by the head teachers. It is apparent from these figures that this factor is a major de-motivator among the science teachers.

### 4.3.4 Job Security

The second factor identified for analysis in this study was 'job security'. The factor received the highest mean valence score of 6.47, according to the science teachers, while the head teachers scored 6.17 placing the factor third among the twelve. Table 4.12 below gives the mean valence scores based on teaching experiences.

<table>
<thead>
<tr>
<th>Teaching experience</th>
<th>Experience in current station</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5 n=23</td>
<td>1-5 n=33</td>
</tr>
<tr>
<td>6-10 n=15</td>
<td>6-10 n=24</td>
</tr>
<tr>
<td>11-15 n=11</td>
<td>11-15 n=3</td>
</tr>
<tr>
<td>Mean</td>
<td>6.43 6.40 5.91 6.55</td>
</tr>
<tr>
<td>S.D</td>
<td>1.34 .74 .94 .82</td>
</tr>
</tbody>
</table>

As shown in Table 4.12 above, in all cases, the science teachers highly valued security in their job and this did not vary based on the teaching experiences and the experiences in the current teaching station. Still, analyses based on gender of the teachers show that male teachers scored a mean valence of 6.47, while female teachers' mean valence score was 6.45. The value attached to job security by the science teachers can thus not be overstated.

According to the science teachers, the expectancy that teaching well results in job security was third highest, with a mean of 3.92. The head teachers on the other hand had a mean expectancy of 5.33, slightly higher than the science teachers', which was fifth among the twelve factors. Table 4.13 below gives the responses based on the teaching experience and experiences in current teaching stations, by the science teachers.
Table 4.13 ‘Job security’ expectancies by experience

<table>
<thead>
<tr>
<th>Teaching experience</th>
<th>Experience in current station</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-5</td>
<td>6-10</td>
</tr>
<tr>
<td>n=23</td>
<td>n=15</td>
</tr>
<tr>
<td>Mean</td>
<td>4.65</td>
</tr>
<tr>
<td>S.D</td>
<td>1.97</td>
</tr>
</tbody>
</table>

Table 4.13 above indicates that the mean expectancy scores are average for job security. Notably, the expectancy that teaching well will lead to job security is higher for teachers with shorter teaching experiences, but as the years increase, the mean expectancy scores seem to decline. This implies that as the teachers start on their career (1-5 years teaching experience), the expectation that if they teach well, they will be relatively secure in their job is slightly above average. However, after the fifth year, the expectancy score falls below average. Similarly, the trend is observable based on teaching experience in current teaching station. Teachers who have stayed in their current teaching stations for between 1-5 years reported the highest average expectancy scores, after which the figures went down for experiences of 6-10 years, and further for above 10 years. Since the sampled schools were public schools where teachers are employed by the TSC and enjoy relative permanence, it is not clear why as the teachers continued to stay in their job, the expectancy for this factor went down. Perhaps the interpretation that a freshly employed teacher gives to job security is different from how the factor is interpreted as the teacher continues to stay on the job.

Figure 4.1 below expresses the relationship between the mean expectancies and the mean valences by the science teachers based on years of teaching experience diagrammatically.
Figure 4.1 below expresses the relationship between the mean expectancies and the mean valences by the science teachers based on years of teaching experience diagrammatically.

As shown in Figure 4.1, overall, the mean valence scores remain high, while the mean expectancies are average. The mean expectancies point toward a diminishing trend based on years of teaching experience, while the mean valences indicate no noticeable trends.

The resultant motivational effect of job security was 25.36 by the science teachers and 32.89 by the head teachers. The science teachers' score indicate that the factor is slightly motivating to the science teachers. This could be because in public secondary schools,
majority of the teachers are employed by the TSC, whose terms appear to be more permanent and predictable, hence relatively secure.

4.3.5 Work Itself

Besides 'salary and bonuses' and 'job security', the third factor analyzed for its motivational effect on the science teacher was 'work itself'. The valence of 'work itself' according to the science teachers ranked third, with a mean score of 6.27, while the head teachers ranked it fifth with a mean of 5.58. Overall, this factor received the highest mean expectancy score from the science teachers, (5.52), while the head teachers ranked it fourth, with a mean expectancy of 5.33.

Interestingly, this is the only factor in which the head teachers' perception of both expectancy and valence is lower than that of the teachers themselves. This may have been due to the fact that both the expectancies and the valences of this factor involve the teachers' personal competence with no administrative influence. Table 4.14 below further brings to light the mean expectancies and valences for this factor, based on various educational levels.

Table 4.14 Work itself expectancies and valences, by educational levels n=60

<table>
<thead>
<tr>
<th>Educational level</th>
<th>n</th>
<th>Expectancies</th>
<th>Valences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Master of Science (M.Sc)</td>
<td>1</td>
<td>6.00</td>
<td>7.00</td>
</tr>
<tr>
<td>Bachelor of Education (B.Ed)</td>
<td>27</td>
<td>5.93</td>
<td>6.41</td>
</tr>
<tr>
<td>Bachelor of Science and PGDE</td>
<td>6</td>
<td>5.83</td>
<td>6.33</td>
</tr>
<tr>
<td>Bachelor of Science (B.Sc)</td>
<td>6</td>
<td>4.33</td>
<td>6.67</td>
</tr>
<tr>
<td>SI/Diploma in Education</td>
<td>20</td>
<td>5.20</td>
<td>5.90</td>
</tr>
</tbody>
</table>
From Table 4.14 above, the valences were extremely high for this factor. The M.Sc. holder reported a valence score of 7.00 for the stated factor, while the S1/Diploma in Education teachers realized the least mean valence scores of 5.90. The science teachers’ expectancies that teaching well leads to motivation by teaching itself were high in all the cases. Whereas the solitary teacher with a Master of Science degree registered a high expectancy score (6.00), the least mean expectancy score was registered by the B.Sc holders, attaining a mean expectancy score of 4.33.

One would expect the expectancy scores for such a factor to vary based on educational levels. However, it is noticed from these findings that the factor tend to vary based on professional training, as the B.Sc teachers who scored the least expectancy scores are not professional educators. These findings indicate that though the art of teaching is motivating to all the cadres of teachers, the degree varies slightly for untrained (B.Sc) teachers, and for those who have not attained a university degree (S1/Diploma in Education). The level of confidence and competence among these teachers may be the cause for the above.

Overall, the motivational effect of work itself (on the scale of 1-49) was 34.61 by the science teachers and 29.74 by the head teachers. Apparently, in the sampled secondary schools, the best motivator for the science teacher is the work he/she does. Interestingly, of all the motivational factors identified for this study, this is the only factor in which the head teachers reported a motivational effect lower than the science teachers’. Though this study chose to take the science teachers’ words, caution must be taken since due to prejudice, people tend to attribute good results to their own effort and bad ones to others.
4.3.6 Working Conditions

This study, further probed the effects of 'working conditions' on the motivation of the science teachers. The mean valence scores for this factor according to the head teachers were directly opposite the science teachers' perception of value for the same. Whereas the science teachers placed the factor second most valued item in the series (mean valence of 6.35), their respective head teachers perceived the factor as second least important (mean valence of 5.25). Hence according to the head teachers in the sampled schools, though the teachers in their schools valued the working conditions, this was not extremely high. The science teachers themselves had extremely high value attached to their working conditions.

Table 4.15 below gives further analyses of the science teachers' valences for this factor based on gender and school categories.

Table 4.15 Valences of working conditions, by gender and school categories n=60

<table>
<thead>
<tr>
<th>Teachers' gender</th>
<th>School categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male n=38</td>
<td>Female n=22</td>
</tr>
<tr>
<td>GB n=16</td>
<td>Gdb n=4</td>
</tr>
<tr>
<td>Mdb n=28</td>
<td>MD n=12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mean</th>
<th>6.21</th>
<th>6.57</th>
<th>6.38</th>
<th>6.50</th>
<th>6.18</th>
<th>6.67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard Deviation (S.D)</td>
<td>1.21</td>
<td>.66</td>
<td>.81</td>
<td>1.00</td>
<td>1.31</td>
<td>.65</td>
</tr>
</tbody>
</table>

Female science teachers valued good working conditions more than males, while the highest mean valence score, based on school categories occurred in mixed day schools (mean = 6.67) as shown in Table 4.15 above. Otherwise, the science teachers did not report serious differences in levels of values for this factor by gender and school categories. Comparing these mean valence scores with those reported by the head teachers, there was great discrepancy, as the head teachers in mixed day schools ironically reported the least mean valence scores (4.80) contrary to their science teachers.
under review, the science teachers rated this factor seventh while the head teachers placed it
ninth. Table 4.16 gives the average expectancies classified according to the teachers' gender
and the school categories.

Table 4.16 Expectancies of working conditions, by gender and school categories n=60

<table>
<thead>
<tr>
<th>Teachers' gender</th>
<th>School categories</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male n=38</td>
</tr>
<tr>
<td>Mean</td>
<td>3.11</td>
</tr>
<tr>
<td>S.D</td>
<td>1.70</td>
</tr>
</tbody>
</table>

Key: GB – Girls Boarding
     Mdb – Mixed Day Boarding
     Gdb – Girls Day Boarding
     MD – Mixed Day Schools

As can be noted in Table 4.16, the mean expectancies for the female teachers, for the
occurrence of this factor were slightly higher (3.27) than those of male teachers (3.11). The
mixed day/boarding schools reported the highest mean expectancy scores (3.71), while the
mixed day schools reported the least mean expectancy scores of 2.25. In all cases, the mean
expectancies were below average. However, the responses of both female teachers, and
teachers in girls' boarding schools registered the greatest variations for this factor (standard
deviation of 2.29 and 2.07 respectively). Therefore the expectancy that this factor will occur
could be influenced by individual perception (for female teachers), and school conditions.

These school variations prompted in-depth analyses of how the head teachers perceived this
factor. The synopsis is give by Table 4.17 below.
Table 4.17 Working conditions expectancies and valences by head teachers n=12

<table>
<thead>
<tr>
<th></th>
<th>Expectancies</th>
<th>Valences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GB  n=2</td>
<td>Gdb n=2</td>
</tr>
<tr>
<td>Mean</td>
<td>6.00</td>
<td>5.50</td>
</tr>
<tr>
<td>S.D</td>
<td>1.41</td>
<td>.71</td>
</tr>
</tbody>
</table>

Key: GB – Girls Boarding  
Gdb – Girls Day Boarding  
Mdb – Mixed Day Boarding  
MD – Mixed Day Schools

The findings above indicate that expectancies for this factor according to the perception of the head teachers varies based on the various school categories, with the girls’ boarding schools registering the highest mean expectancy scores (6.00) and the mixed day schools, the least mean expectancy scores (3.80). As with the other factors, the head teachers tend to report higher mean expectancies than the science teachers. This may be because as they directly influence the working conditions of the teachers in their schools, they may associate good performance with good working conditions, a fact not evident to the science teachers.

Overall, the motivational effect of working conditions as a motivation factor (on the scale 1-49) was 20.13 for the science teachers and 25.36 for the head teachers. The analyses indicate that the mean expectancy scores that a science teacher, who performs his/her work well, will receive good working conditions did not vary significantly according to schools, or gender. Still, no major variations exist based on the valences and the factor proves to be slightly motivating to both male and female science teachers, and in all school categories.

4.3.7 Appreciation of Work Done

The fifth factor identified for analysis of its effect on motivation of the science teachers was ‘appreciation of work done’. It involves recognition of achievements that may be either verbally, or in other ways. The valence scores for this factor were relatively high, according to both the science teachers and their head teachers. The science teachers reported a mean
valence score of 5.87, which was sixth highest among the twelve factors reviewed. The head teachers thought it was the most valued item by their science teachers (mean valence = 6.42). The male science teachers scored slightly higher mean valence (6.03) than their female counterparts, who registered a mean valence score of 5.59.

The expectancy that this factor will occur, following teaching well was second highest, according to the science teachers with an overall mean expectancy score of 4.50, while the head teachers placed the factor most expected (mean = 5.58). The male teachers scored slightly higher expectancies (mean = 4.71) for this factor than the scores for the female science teachers (mean = 4.12). These are above average figures for both cases, indicating that in most situation, the work done by the science teachers was somewhat appreciated.

The analyses show that from the perception of the head teachers, the science teacher greatly value appreciation of his/her teaching abilities (mean valence-5.87), and that the head teachers are trying their best to appreciate the work done (mean expectancy-4.71). However, among the twelve factors identified, the science teacher second most expected this factor to occur following teaching well, while the value they attached to the same ranked sixth.

Finally, the motivational effect of this factor (on the scale of 1-49) was 26.42 by the science teachers and 35.82 by the head teachers. In essence, the head teachers’ efforts to appreciate the hard work of the science teacher is bearing fruits, as the factor falls above the average motivation level, hence slightly motivating.

4.3.8 Promotion and Professional Growth

The need to grow professionally, through either personal academic achievements or promotions based on work performance was the sixth factor analyzed. The valences for this
factor were remarkably high, noting that the science teachers scored the factor fifth (mean = 6.08), while the head teachers ranked it second (mean = 6.33). It is then apparent that a science teacher highly values 'promotion and professional growth', a fact noted even by their head teachers. This further did not vary significantly based on the other variables, as both male teachers and their female colleagues scored highly for the factor (means of 6.07 for males and 6.09 for females).

The expectancy that a science teacher who performs his/ her work well will receive 'promotion and grow professionally' ranked sixth, with a mean score of 3.22. The head teachers on their part graded the factor eighth (mean = 4.83). In both cases, the average expectancy that teaching well will earn a science teacher a promotion, and enable him/ her grow professionally was average.

Based on the various age brackets, Table 4.18 gives a rundown of the responses for both the valences and the expectancies.

Table 4.18 Expectancies and valences of promotion and professional growth by age n=60

<table>
<thead>
<tr>
<th>Respondents’ age brackets</th>
<th>n</th>
<th>Expectancies</th>
<th>Valences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Mean</td>
<td>S.D</td>
</tr>
<tr>
<td>25 – 29</td>
<td>29</td>
<td>3.62</td>
<td>1.68</td>
</tr>
<tr>
<td>30 – 34</td>
<td>14</td>
<td>2.71</td>
<td>1.90</td>
</tr>
<tr>
<td>35 – 39</td>
<td>7</td>
<td>2.14</td>
<td>1.57</td>
</tr>
<tr>
<td>40 – over</td>
<td>10</td>
<td>3.50</td>
<td>2.17</td>
</tr>
</tbody>
</table>

Table 4.18 indicates that between age 25 and 39 years, the age brackets are inversely related to the mean expectancies. Figure 4.2 below expresses the above trends graphically.
It is striking to note that as the age brackets enlarge, the average expectancies diminish up to the age bracket 40 and above, as indicated in Figure 4.2. Notably, a science teacher expects to receive promotion and to grow professionally at his/her first posting (mean = 3.62), but this ebbs as they continue to stay on the job to means of 2.71 and further to 2.14.

Despite the high valence scores, ‘promotion and professional growth’ registered relatively low expectancy values, more evident within the age brackets of 30-34 years and 35-39 years. Overall, the motivational effect of this factor on the sampled secondary school teachers was 19.58 and 30.57 by the science teachers and the head teachers respectively, implying that the factor was slightly motivating.
4.3.9 Sympathetic help with personal problems

The instruments further sought to establish from the science teachers whether if they teach well they would receive ‘sympathetic help with their personal problems’. The science teachers scored relatively low valences and expectancies for this factor, contrary to their head teachers’ perception. The science teachers’ average valence score ranked last with a mean of 3.52, while the head teachers placed the factor eighth with a mean of 5.42. While the former ranked the expectancy for this factor second last, (mean = 1.87), the placement by the latter was third most expected (mean = 5.33).

Indeed, these responses indicate that the factor does not matter so much to the science teachers, while their head teachers think it does. A comparative analysis of the responses for this factor based on gender given by both the head teachers and the science teachers are in Table 4.19 below.

<table>
<thead>
<tr>
<th></th>
<th>Science teachers</th>
<th></th>
<th>Head teachers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male n=38</td>
<td>Female n=22</td>
<td>Male n=7</td>
<td>Female n=5</td>
</tr>
<tr>
<td>Expectancies</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>2.00</td>
<td>1.64</td>
<td>4.82</td>
<td>5.22</td>
</tr>
<tr>
<td>S.D</td>
<td>1.57</td>
<td>1.56</td>
<td>1.72</td>
<td>1.99</td>
</tr>
<tr>
<td>Valences</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean</td>
<td>3.58</td>
<td>3.41</td>
<td>4.64</td>
<td>5.78</td>
</tr>
<tr>
<td>S.D</td>
<td>1.93</td>
<td>2.00</td>
<td>1.69</td>
<td>1.99</td>
</tr>
</tbody>
</table>

From the above findings, though the male teachers hold relatively high expectancies compared to female teachers, their respective head teachers think otherwise. This might cause persistent de-motivation, especially among female science teachers specifically when the head teachers concentrate in solving their personal problems ‘sympathetically’, while on
her part they might consider that as meddling with their private lives. The overall motivational effect of this factor was rated least according to the science teachers (6.56), while the head teachers scored 28.89. The factor is slightly de-motivating.

4.10 Tactful Discipline

The TSC Code of Conduct specifies the proper procedure to be followed in cases where disciplinary actions are to be meted against an arrant teacher. The instruments also sought to establish the motivational effect of this procedure, dubbed ‘tactful discipline’ on the motivation of science teachers.

The average valence of the factor according to the science teachers was reasonably high (5.12), though it ranked fourth last among the twelve factors under review. The head teachers placed the factor seventh (mean = 5.58). Other mean valences are reported in Table 4.20, yet they do not vary much based on the different variables, and fall slightly above average.

Table 4.20 Expectancies and valences of tactful discipline by sex, school types and experiences in current station n=60

<table>
<thead>
<tr>
<th>Sex</th>
<th>School type</th>
<th>Experiences</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male (n=38)</td>
<td>Female (n=22)</td>
</tr>
<tr>
<td>Expectancies</td>
<td>Mean: 2.82</td>
<td>1.86</td>
</tr>
<tr>
<td></td>
<td>S.D: 1.77</td>
<td>1.42</td>
</tr>
<tr>
<td>Valences</td>
<td>Mean: 5.15</td>
<td>5.04</td>
</tr>
<tr>
<td></td>
<td>S.D: 1.05</td>
<td>1.31</td>
</tr>
</tbody>
</table>

The expectancy that a science teacher who performs his/ her work well will have his/ her discipline cases handled tactfully, averaged fourth least (mean = 2.47) according to the science teachers. The head teachers ranked it second, with a mean score of 5.42. The
disparity in perception may be attributed to the fact that the factor involves the head teachers' own self-judgment. Other results of analyses based on sex, school type and experiences in current stations are reported in Table 4.20 above.

With the expectancies, slight variations were noticed when the expectancies were rated according to the gender of the science teacher, the school type, and the experiences in current teaching stations. Male teachers recorded slightly higher expectancies (mean = 2.82), compared to the female teachers, whose mean expectancy was 1.86. The provincial schools recorded slightly higher expectancy average than the district schools. With the experiences, there tended to be a declining trend, implying that as a teacher stays in one teaching station longer, the perception that teaching well will lead to tactful discipline declined. No direct justification can be fronted for this, and further research can expose the reality.

Despite the fact that the head teachers perceive their handling of disciplinary cases concerning the science teachers to be good, the teachers themselves did not perceive this, causing the low expectancies. Nevertheless, the factor is significant to the science teachers, based on the high valence levels reported. Overall, the motivational effect of this factor was 12.65 and 30.24 by the science teachers and the head teachers respectively. This factor then is slightly de-motivating to the science teachers.

4.3.11 Clear task definition

The other factor up for analysis is ‘clear task definition’ or job description. For the valences, no great disparities were observed, as the science teachers rated the factor seventh (mean = 5.70), while the head teachers ranked it third last (mean = 5.25). The female teachers scored higher than the male teachers in this factor, registering a valence mean of 6.05 against 5.50
for male teachers. The teachers in the girls' day/boarding schools registered the highest mean valences of 6.00, followed by mixed day/boarding, with 5.79, girls' boarding, 5.63 and mixed day schools 5.50, based on school categories.

The science teachers were required to report how likely it was in their jobs, that if they perform their work well, they will be told clearly what is expected of them. The mean expectancies for the above factor ranked eighth (mean = 3.65) by the science teachers and seventh by the head teachers (mean = 5.25) among the twelve factors. There were no big variations based on gender, and school categories, as the male teachers reported a mean expectancy value of 3.78, while that of female teachers' was 3.41. The girls' boarding schools reported the highest expectancy mean of 4.06, and the girls' day/boarding schools scored the least (mean = 2.00). Figure 4.3 below gives other analyses based on years of teaching experiences.

![Graph showing mean expectancies and mean valences by teaching experience](image-url)

_Fig. 4.3 Expectancies and valences of clear task definition by teaching experience_
With the teaching experiences, Figure 4.3 above expresses lucidly how the valences and the expectancies relate. There tend to be regression in the expectancy values up to the fifteenth year. This is also slightly applicable to the valences.

By gender, the factor negatively affects male teachers more than females. By school categories, the science teachers in girls’ day/boarding schools are more negatively affected by this factor than the other categories, closely followed by mixed day schools. By years of teaching experience, the factor negatively affects teachers with experiences of 11-15 years most, then 6-10 years experience bracket. Overall, the motivational effect was 20.81 by the science teachers and 27.56 by the head teachers. Based on this, clear task definition is a slightly motivating factor.

4.3.12 Consideration of local circumstances in reaching decisions

The respondents were further asked to report how likely it was that ‘local circumstances will be considered in reaching decisions concerning them’, if they taught science well. Testing the motivational influence of this factor was necessitated by the diverse settings that teachers are exposed to in pursuit of their calling.

The mean valence score by the head teachers was 5.08, rating the factor least, while the science teachers rated it second last (mean = 4.58). While the male science teachers’ average valence score was 4.61, females scored the factor 4.55. Considering the various school categories, teachers in girls’ day and boarding schools scored the highest value (6.25) while mixed day school teachers least valued this factor (mean = 3.83), among the schools.

Are the conditions under which science teacher works really considered when deciding matters pertaining to the teacher? With mean expectancies of 2.82, the science teachers
ranked the factor fifth, while their head teachers rated it third last (mean = 4.08). The male teachers reported a slightly high mean expectancy (3.24) than the females (2.09). By school categories, the girls’ day/boarding schools reported the lowest mean expectancy (2.00), and the mixed day boarding schools, the highest (3.29).

Figure 4.4 below reports the mean expectancies and valences for this factor based on age.

As Figure 4.4 above shows, there were no major variations on the mean expectancies based on the respondents’ age structure. However, there tend to be some relationship between the valence scores for this factor, and the age of the respondents. Hence as the teacher become older, the value attached to the local circumstances in which he/she works increases.
Despite the fact that this factor holds averagely low valence compared to other factors, the extremely low expectancies cause the factor to de-motivate. This is slightly higher for females than males and for the teachers in mixed day and girls’ day/boarding, than the teachers in other categories of schools. Equally, the de-motivation force is higher for older than for younger teachers. Overall, the motivational effect of this factor was 12.92 by the science teachers and 20.73 by the head teachers; hence it is a slightly de-motivating factor.

4.3.13 Involvement in national education policy formulation

The instruments further sought to establish both the valences and expectancies for ‘involvement in national education policy formulation’. Curriculum development is an ongoing process, same to other policy changes. How then does the science teacher in girls’ and mixed schools feel motivated or de-motivated by this factor?

The valences of this factor did not have any significant variations, based on all the categories of respondents. The science teachers ranked the factor tenth (mean-5.02), and the head teachers ranked it ninth (mean-5.33). The mean valence scores for male teachers was 5.08 while for the female was 4.91. These figures fall above average, indicating that the science teachers value this factor.

The science teachers reported how likely it was, in their jobs that if they perform their work well; they and their colleagues would be involved in formulation of national education policies. The mean expectancy score for this factor, by the science teachers was 2.32, and the factor ranked tenth. The head teachers placed it least expected by their science teachers, with mean expectancy of 3.67. It then comes out clear that both the sampled science teachers and their respective head teachers have quite low expectation that teaching well will enable the
teachers to participate in formulating national education policies. The mean expectancy for female teachers was slightly lower (1.59) than that of male teachers (2.74). By school categories, the least mean expectancy was observed in girls’ day/boarding schools (1.00), while girls’ boarding schools registered the highest mean (2.56). Figure 4.5 compares the expectancies for the same factor by the head teachers and the teachers in the various schools.

Figure 4.5 above indicates that though the expectancies by the head teachers and the science teachers varied, they seem to concur as to which schools are most unfavoured while formulating national education policies. Regardless of the notable trends in mean expectancies based on school categories, the average valence did not indicate any consistency. Whereas the girls’ boarding schools topped the chart for expectancies, their head teachers scored the least mean valences (3.50), compared to the girls’ day/boarding (4.00), mixed day/boarding (6.00) and mixed day (6.20). The science teachers in mixed day/
boarding schools reported the highest mean valence score (5.29), then 5.00 for girls' day/boarding schools, 4.80 for girls’ boarding and 4.67 by teachers in mixed day schools.

From the foregoing, the factor negatively affects the teachers; more so in mixed day schools and girls’ day/boarding schools. The situation might be due to the pessimistic perception the teachers in such schools can have about themselves, against the well established schools where the latter two belong. Most of the schools in the latter categories are considered ‘young’. Not often do they get an opportunity to participate in national educational issues such as symposia, curriculum and textbook reviews, as well as setting and marking of examinations, both at district and national levels.

Overall, the motivational effect of this factor was 11.65 and 19.56 implying that the factor is slightly de-motivating. Coincidentally, the head teachers scored least for this factor, compared to the other twelve.

4.3.14 Appraisal of Teaching Abilities

Instructional supervision (appraisal) was the twelfth factor identified in an attempt to determine its motivational effect. Appraisal involves observation and judgment based on the observation made, with an aim of giving feedback to improve the quality of teaching in the school, otherwise referred to as instructional supervision. Appraisal, in an open school culture should start with colleagues (collegiate), the school administration (the head teacher), and the external appraisers who include the schools inspectors. Because the immediate appraiser is the head teacher, analyses of this factor dwells around their perceptions vis-à-vis those of the teachers.
The male teachers had an average valence score of 5.87, against female teachers (5.59). By school categories, the girls’ day/boarding schools that apparently registered the least valence for this factor (mean valence of 6.50). The mean valences for the girls’ boarding schools, mixed day/boarding schools and mixed day schools were 6.25, 5.79 and 4.83 respectively. The valences appeared not to vary based on the other categories of responses.

The expectancy that a science teacher who performs his/her work well will have his/her teaching abilities appraised ranked fourth, and recorded a mean of 3.90, while the head teachers ranked the same seventh, with a mean of 4.92. The male science teachers’ mean expectancy for this factor was 4.26, while the females’ score was 3.27. By school categories, the least expectancies that teaching well will lead to appraisal of teaching capabilities, appeared in girls’ day/boarding schools (mean = 1.25), while the highest was mixed day/boarding schools (4.28). By teaching experiences, the experience brackets 11-15 years registered least expectancies (mean = 2.81) and up to five years the highest (4.48). No major differences exist based on the other categories.

Figure 4.6 below shows the valences and expectancies for this factor by the head teachers based on their administrative experiences.
Concerning this factor, the most significant results were received based on the head teachers' administrative experiences. As Figure 4.6 above indicates, as the number of years a head teachers practices school administration increases, both the perception that science teacher value this factor, and the expectancy that teaching well will lead to appraisal significantly increases. Apparently then, head teachers become better appraisers with experience.

Overall, the motivational effect of this factor was 22.50 by the science teachers and 28.58 by the head teachers, implying that the factor was a slight motivator. However the parallel between administrative experience and both expectancy and valence of teaching appraisal by head teachers may be subjected to further research, since it is beyond the scope of our study.
Summary of the Motivational Effects

Figure 4.7 below highlights the findings for the motivational effects of the twelve factors, as perceived by both the science teachers and the head teachers.

From Figure 4.7, given a score of 16 as average, the head teachers observed all the factors as motivating, while the science teachers observed five as de-motivating, and seven as motivating. It is only for "work itself" that the science teachers scored higher than the heads.
PART III

4.4 INSTRUMENTALITIES: THE INFLUENCE OF STUDENTS’ GENDER

According to Majasan (1995), much of the teachers' job goes beyond teaching. It includes molding young lives, guiding youths, motivating students, and general character training. The teachers' efforts are mainly expressed in the performance of students. According to the Vroom's theory guiding this study, an individual's motivation is determined by his/her perception of effort. Hence the science teacher’s motivation to teach the girls is influenced by his/her perception that efforts would lead to the attainment of the desired motivation factors, the instrumentality. The section gives answer to the second research question.

4.4.1 The Instrumentalities

A science teachers' perception that a factor is likely to occur (the expectancy) is further influenced by his/her perception that the effort he/she puts would lead to acquisition of the factor (instrumentality), and the value attached to the factor (valence). The Motivation Questionnaire equally sought to establish the instrumentalities. Specifically, it sought to determine answers to these questions:

- Is a hard working teacher always a good teacher?
- Does a good teacher always produce good KCSE results?
- Moreover, does a good teacher always positively influence girls’ science study?

On the seven point Likert scale, the science teachers rated the instrumentalities, and the findings are reported in Table 4.21 below.
Table 4.21 Mean Instrumentalities

<table>
<thead>
<tr>
<th>Instrumentality that ...</th>
<th>Mean</th>
<th>S.D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching well</td>
<td>5.30</td>
<td>1.62</td>
</tr>
<tr>
<td>Positive influence of girls’ science study</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching well</td>
<td>4.92</td>
<td>1.68</td>
</tr>
<tr>
<td>Good students’ score in KCSE</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working hard</td>
<td>4.57</td>
<td>1.84</td>
</tr>
<tr>
<td>Teaching well</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall mean instrumentalities</td>
<td>4.93</td>
<td>1.71</td>
</tr>
</tbody>
</table>

Average mean instrumentality = 4.00

As Table 4.21 indicates, ranging from 1(never) to 7(almost always), the overall mean instrumentalities for the three cases fell above the average, standing at 4.93. This implies that the science teachers’ perception of their own efforts were above average. Hypothetically, if all the factors could be attainable and valued by the science teachers, based on their own efforts (the instrumentalities), they would be all motivated.

Gender and Motivation

The science teachers in the study sample reported relatively high mean instrumentality with mean score of 5.30, that teaching well would lead to positive influence of girls’ science study. The study further sought to establish the influence of the students’ gender on the motivation to teach science to the schoolgirls, since this directly impact on the instrumentalities. Specifically, the second research question asked:

- What influences do the teaching of girls have on the motivation to teach science among teachers in public girls' and mixed secondary schools?

The following section provides answers to the above research question.

Part C of the science teachers’ questionnaire sought to establish whether the science teachers enjoyed teaching science to the secondary school girls, and for what reasons. Further, the
science teachers were asked to indicate the science subject they most preferred that the secondary schoolgirls be compelled to study, and the justification for the same. Lastly, the science teachers were asked to give suggestions for improving performance and participation of the secondary school girls in the sciences.

The subsequent part is divided into three sections, dealing with teaching science to the girls; science subject(s) preferred for the girls by the science teachers; and the suggestions for improving performance and participation of secondary school girls in science subjects.

4.4.2 Teaching science to girls

Majority of the sampled science teachers enjoyed teaching science to the girls. Table 4.22 below gives a synopsis of this, based on teachers’ gender, school categories, and the main teaching subjects.

<table>
<thead>
<tr>
<th>Enjoying teaching science to girls</th>
<th>Sex</th>
<th>School categories</th>
<th>Main teaching subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>M</td>
<td>F</td>
<td>GB</td>
</tr>
<tr>
<td>Yes</td>
<td>n</td>
<td>%</td>
<td>22</td>
</tr>
<tr>
<td>%</td>
<td>58</td>
<td>59</td>
<td>69</td>
</tr>
<tr>
<td>No</td>
<td>n</td>
<td>%</td>
<td>16</td>
</tr>
<tr>
<td>%</td>
<td>42</td>
<td>41</td>
<td>31</td>
</tr>
<tr>
<td>Total</td>
<td>n</td>
<td>%</td>
<td>38</td>
</tr>
<tr>
<td>%</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
</tbody>
</table>

Key: GB – Girls Boarding  
Gdb – Girls Day Boarding  
Mdb – Mixed Day Boarding  
MD – Mixed Day Schools

From Table 4.22 above, based on the various school categories, the teachers in girls’ day/boarding schools indicated the highest proportion of teachers who enjoyed teaching science to the girls. However, for physics teachers, only 31% enjoyed teaching science to the girls. In
all the other categories, over half of the teachers enjoyed teaching science to the girls. This explains why the instrumentality that teaching well would lead to positive influence of secondary school girls' science study was above average. Also, it indicates why the overall instrumentalities (effort that the science teachers put to attain factors that hold high valences) were above average.

**Reasons for enjoying teaching science to girls**

Thirty-five science teachers in the sample enjoyed teaching science to schoolgirls. Various reasons were given for this. From the girls' schools, the reasons given for enjoying teaching science to the schoolgirls were clustered into seven key groups. Table 4.23 below summarizes them.

| Table 4. 23 Reasons for enjoying teaching science to girls in Girls' school n=14 |
|---------------------------------|------------------|
| Reason for enjoying teaching science | Frequency |
| Disciplined and easy to handle | 13 |
| Girls are motivating to teach | 9 |
| Inquisitive and cheerful | 7 |
| Hard working and optimistic | 7 |
| Prepare them for professional courses unfairly held by men | 6 |
| Believe they can challenge boys | 4 |
| Prompt in handing in assignments | 2 |

The most frequent reason why the 14 science teachers in girls' schools enjoyed teaching science to girls was that they appeared disciplined and easy to handle. Also, the girls were motivating to teach. They were inquisitive and cheerful, hard working and optimistic, sanguine and buoyant, and also bright and confident. Other science teachers enjoyed teaching science to girls as it prepared them for professional courses, while others reportedly enjoyed teaching science to girls, as the girls believed that they could challenge boys.
From the mixed schools, several reasons were received and generally catalogued into ten different themes as reported in Table 4.24 below.

**Table 4.24 Reasons for enjoying teaching science to girls in mixed schools n=21**

<table>
<thead>
<tr>
<th>Reason for enjoying teaching science to girls</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attentive and active in class</td>
<td>16</td>
</tr>
<tr>
<td>Good during practical lessons due to keenness in making observations</td>
<td>12</td>
</tr>
<tr>
<td>Disciplined and receptive to instructions</td>
<td>10</td>
</tr>
<tr>
<td>Social, cooperative, and can work in groups</td>
<td>8</td>
</tr>
<tr>
<td>Have special liking for biology</td>
<td>5</td>
</tr>
<tr>
<td>Appreciative of the teachers’ efforts</td>
<td>5</td>
</tr>
<tr>
<td>Able to excel if well guided</td>
<td>5</td>
</tr>
<tr>
<td>Desire to make a mark in life</td>
<td>5</td>
</tr>
<tr>
<td>Take assignments seriously</td>
<td>4</td>
</tr>
<tr>
<td>Easily motivated (i.e. can be influenced to like something)</td>
<td>4</td>
</tr>
</tbody>
</table>

As shown in Table 4.24 above, the most frequent reason that the science teachers in mixed schools reported for enjoying teaching science to girls was that the girls were attentive and active in class. Other science teachers enjoyed teaching science to girls due to the girls' keenness during practical sessions. Also, the girls were notably disciplined and receptive to instructions, by accepting their weaknesses and showing willingness to be assisted.

Analyses of the reasons fronted by teachers in both girls' and mixed schools indicate that majority of the teachers who enjoyed teaching science to girls did so based on the girls' feminine characters. Indeed, only a few reasons emerged that supported the girls' academic capabilities and performance in science. Different reasons made different science teachers enjoy teaching science to the schoolgirls. It is significant to note that a good fraction of the
science teachers enjoyed teaching science to the girls, a factor appearing in both the girls' and mixed schools.

**Reasons for not enjoying teaching science to the secondary schoolgirls**

From the four girls' schools, six (30 per cent) of the 20 science teachers in the sample did not enjoy teaching science to the schoolgirls. Various reasons were given for this, clustered into five main categories indicated in Table 4.25 below.

**Table 4.25 Reasons for not enjoying teaching science to girls in girls' schools n=6**

<table>
<thead>
<tr>
<th>Reason for not enjoying teaching science to girls</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not academically aggressive and have poor learning methods</td>
<td>6</td>
</tr>
<tr>
<td>Pessimistic and have a negative attitude towards science</td>
<td>6</td>
</tr>
<tr>
<td>Stereotype science subjects</td>
<td>5</td>
</tr>
<tr>
<td>Weaker than boys and easily give up</td>
<td>3</td>
</tr>
<tr>
<td>Lack support and role models</td>
<td>3</td>
</tr>
</tbody>
</table>

The teachers, who did not take pleasure in teaching science to the girls in girls' schools noted that they were not academically aggressive, had poor learning methods. Equally, they also noted that the girls were pessimistic, had negative attitudes and lacked interest and enthusiasm in science. The stereotyping of science subjects as masculine by the girls also negatively influenced the science teachers' liking to teach science to girls. The girls were reportedly weaker than the boys and easily gave up, and lastly the girls lacked role models leading to lack of support.

From the mixed schools, the various reasons fronted by the 19 science teachers who did not enjoy teaching science to the girls were categorized into five main groups, reported in Table 4.26 below.
Table 4. 26 Reasons for not enjoying teaching science to girls in mixed schools n=19

<table>
<thead>
<tr>
<th>Reasons for not enjoying teaching science to girls</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have negative personal characteristics that are not motivating</td>
<td>19</td>
</tr>
<tr>
<td>Negative attitude to science and are generally scared of science</td>
<td>16</td>
</tr>
<tr>
<td>Persistent poor performance in science</td>
<td>16</td>
</tr>
<tr>
<td>Formed opinion that science is for boys</td>
<td>8</td>
</tr>
<tr>
<td>Cultural influence denying the girls time to study science</td>
<td>6</td>
</tr>
</tbody>
</table>

The science teachers in mixed schools who did not enjoy teaching science to the girls noted that they did not enjoy teaching girls science because of their negative personal characteristics that were not appealing to the science teachers. Some teachers did not enjoy teaching science to the girls due to negative attitude to science. Yet others believed that the girls' persistently poor science scores made them not to enjoy teaching science to the girls.

The idea of gender stereotyping has captured the attention of several scholars, especially with regard to textbooks. However this has been observed for quite some time (Obura 1991), and is still observable by the science teachers, and most of the reasons fronted for not enjoying teaching science to girls both in girls’ and mixed schools pointed towards this stereotyping.

These findings may suggest why the instrumentalities for the science teachers were not very high. The reasons put forward are valid policy issues that if made positive, would raise the instrumentality levels for the science teachers to an all time extreme. Indeed if all the science teachers in girls’ and mixed schools would enjoy teaching science to schoolgirls, the gender of the student would cease to be an issue in teacher motivation.
4.4.3 Subject preferences

The science teachers were asked which specific science subject(s) they would prefer the secondary school girls learn. Mathematics was not included in this item, as it is a compulsory subject. Fifty-nine science teachers responded to this item, and although majority of the science teachers identified more than one subjects, the essence of the matter was in the prioritisation. The findings are reported in Table 4.27 below.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>10</td>
<td>50</td>
</tr>
<tr>
<td>Chemistry</td>
<td>5</td>
<td>25</td>
</tr>
<tr>
<td>Physics</td>
<td>3</td>
<td>15</td>
</tr>
<tr>
<td>All</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
</tr>
</tbody>
</table>

Biology received the best preference. The choice was supported by various reasons. First, the subject was relevant in the day-to-day lives of the girls, as it gave knowledge about body anatomy and the environment. Also, the subject was best for girls because they are keen and the subject contains fewer calculations and more drawings, making them perform well in the subject at KCSE. Equally, Biology was best for future careers for the girls, mainly medicine, nursing and pharmacy.

Chemistry received the second highest backing, as it provides wider career choices, and is considered for most faculties at the university. Also, the subject was preferred more by the girls, and was fairly well done by them. Physics was thought to be necessary due to technological advances, and to widen the girls' career opportunities and meet the job market demands. Finally, two teachers (10 per cent) from the girls schools thought that all the
science subjects should be made compulsory, because girls do just as good as boys, and since individual interest are varied, this will cater for individual differences.

From the mixed schools, 39 teachers responded to this item. In this category, no science teacher favoured that all the science subjects be made compulsory to the girls. The other results are presented in Table 4.28 below.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology</td>
<td>26</td>
<td>67</td>
</tr>
<tr>
<td>Chemistry</td>
<td>7</td>
<td>18</td>
</tr>
<tr>
<td>Physics</td>
<td>5</td>
<td>13</td>
</tr>
<tr>
<td>Chemistry and Biology</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>39</td>
<td>100</td>
</tr>
</tbody>
</table>

Akin to the girls' schools, Biology received the highest votes. This was so because the teachers thought it was less quantitative, literature oriented, and 'less expensive' (sic). They observed girls to have the ability to give attention to details, plus superior recall ability, considered an asset in Biology. The rest of the science teachers preferred biology because 'it was readily applicable in the daily lives of the girls'. Still, Chemistry was second, preferred mainly because they saw it as 'very utilitarian in the job market' (sic). Also it involves less calculations, and is performed considerably well by the girls.

Physics was considered more workable, as it required simple mastery of contents, after which applications became effortless. One Physics teacher enjoyed teaching the subject and 'believed everybody, including the girls could enjoy the subject', while another recommended physics "to prevent laziness in girls". Finally, Biology and Chemistry were
meant to be compulsory together, based on one teachers' view, due to the general apathy towards physics based on stereotyping, which is not as common with chemistry and biology.

The subject preferences indicate that though the place of science in technological advancement is always highlighted, the science teacher has not yet come to terms with the fact that all the sciences have equal value, and that girls should learn all sciences. Though biology was most cited, the reasons fronted were more sociological than scientific.

4.4.4 Improving performance and participation of secondary school girls in science

Lastly, science teachers were asked to give their views on how the performance and participation of the secondary schoolgirls in sciences could be enhanced. Fifty-eight science teachers responded to this item, while two did not. The responses were analyzed and categorized into two main groups, i.e. teaching methods, and morale boost for both the girls and the teachers, highlighted by Table 4.29, and explained further in the section below.

### Table 4. 29 Improving performance and participation of girls in science subjects

<table>
<thead>
<tr>
<th>Teaching methods</th>
<th>Reason</th>
<th>f</th>
<th>Improving morale</th>
<th>Reason</th>
<th>f</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved instructional methods</td>
<td></td>
<td>29</td>
<td>Interest and ambitions</td>
<td></td>
<td>23</td>
</tr>
<tr>
<td>Constant participation in practical</td>
<td></td>
<td>12</td>
<td>Patience and understanding</td>
<td></td>
<td>12</td>
</tr>
<tr>
<td>Exposure</td>
<td></td>
<td>11</td>
<td>Role models</td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Curriculum and policies</td>
<td></td>
<td>5</td>
<td>Motivating approaches</td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>Constant evaluation and examination</td>
<td></td>
<td>4</td>
<td>Guidance and counselling</td>
<td></td>
<td>5</td>
</tr>
</tbody>
</table>

**Teaching methods**

The recommendations given for improving performance and participation of secondary schoolgirls in science based on teaching methods were classified into five clusters. The most
frequent of these concerned improving instructional methods. Majority of the teachers suggested the use of magazines and audiovisuals, ordinary examples that relate science to everyday world, as well as other resources and teaching materials to demystify science and make it interesting. Constant participation in practical sessions was cited as another way of improving the girls' performance and participation in science. Also, exposure, through symposiums, science congress, science talks, conferences, demonstrations, field trips to technology areas (sic), and other science related activities could enhance girls' participation and improve their performance in science, according to the science teachers.

Morale boost

Proposals regarding morale boost were similarly categorized into five sets. The most frequently mentioned of these were factors pertaining to cultivating the girls' interest in science, and improving their ambitions. Patience and understanding in dealing with the girls was proposed, and that the teachers must understand the girls' problems. Also, leading female scientists, female professionals in science oriented disciplines, and the female science teachers should act as role models to the girls. Finally, guidance and counselling, which should be appropriate, depending on each specific case, and should include career guidance was proposed.

PART IV

4.5 MOTIVATION LEVELS

This section presents the findings from the instruments concerning the motivation levels, and provides answers to the third and fourth research questions. First, the motivation levels are presented, as reported by the science teachers. The section also reports how the motivation
levels vary based on school category, gender, educational qualifications, teaching experiences, and main subject taught by the science teacher, as established by the five null hypotheses tested (Ho1 – Ho5).

In this study, a science teacher’s overall work-motivation score, which is used to determine the motivation level, was determined by multiplying the valences, the instrumentalities and the expectancies, as reported in the instruments. According to the theoretical framework upon which this study was based, the work-motivation scores are determined by multiplying the valences, instrumentalities and expectancies. The twelve motivation factors guided the computerization of work-motivation scores for the science teachers in the sample.

4.5.1 Overall Level of Work Motivation

The third research question was:

- What is the overall level of work-motivation of science teachers in girls’ and mixed secondary schools?

Using The Michigan Organizational Assessment Package’s work-motivation questionnaire, which was adopted and modified for this study, the work-motivation scores for each of the respondents range from 1 – 343 (Hackman, 1977), and these are classified based on the squares of one up to seven, times seven, resulting into the classifications below:

<table>
<thead>
<tr>
<th>Range</th>
<th>Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 – 28</td>
<td>Highly De-Motivated</td>
</tr>
<tr>
<td>29 – 112</td>
<td>Slightly De-Motivated</td>
</tr>
<tr>
<td>113 – 252</td>
<td>Slightly Motivated</td>
</tr>
<tr>
<td>253 – 343</td>
<td>Highly Motivated</td>
</tr>
</tbody>
</table>

The overall work-motivation score for all the science teachers in the sampled schools was 89, implying that they were slightly de-motivated. Table 4.30 below presents the motivation levels of the science teachers.
From Table 4.30 above, majority of the science teachers (40 representing 66 per cent) were slightly de-motivated, based on their work-motivation scores. Overall, only 32 per cent of all the sampled science teachers were motivated, implying that 68 per cent were de-motivated.

The subsequent section highlights the motivation levels based on personal variables.

4.5.2 Influence of Personal Variables on Motivation Levels

The fourth research question sought to establish how the overall motivation levels of the science teachers vary based on some personal variables. Specifically, the question posed was:

- To what extent is the overall level of motivation of the science teachers in girls' and mixed public secondary schools influenced by:
  1. School category?
  2. Gender of the science teacher?
  3. Educational level of the science teacher?
  4. Experience of the science teacher?
  5. Main subject taught by the science teacher?

The following section presents the findings in response to the above research question.

**Motivation by School Categories**

Majority of the science teachers in all the categories of schools were de-motivated. Twenty-six of the science teachers in mixed schools representing 65 per cent and fourteen (70 per
cent) in girls' schools were slightly de-motivated. The other findings are tabulated in Table 4.31 below.

Table 4.31 Motivation Levels by School Categories n=60

<table>
<thead>
<tr>
<th>Motivation level</th>
<th>Mixed Schools (n=40)</th>
<th>Girls' Schools (n=20)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Percentage</td>
</tr>
<tr>
<td>Highly de-motivated</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Slightly de-motivated</td>
<td>26</td>
<td>65</td>
</tr>
<tr>
<td>Slightly motivated</td>
<td>14</td>
<td>35</td>
</tr>
<tr>
<td>Highly motivated</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>40</td>
<td>100</td>
</tr>
</tbody>
</table>

It is then clear, as Table 4.31 shows, that the level of motivation does not vary based on the school categories, according to the teachers. Further, the following statistical hypothesis was formulated in response to this research question:

**H0**: There is no significant difference in the overall work-motivation between science teachers in public girls' and those in public mixed secondary schools.

A 't' test was conducted to test the hypothesis above, and the results are summarized in Table 4.32 below.

Table 4.32 Comparison of differences in motivation by school categories

<table>
<thead>
<tr>
<th>Reference Grps.</th>
<th>n</th>
<th>Means</th>
<th>S.D</th>
<th>Degrees of freedom</th>
<th>t-value</th>
<th>2 tail significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Girls schools</td>
<td>20</td>
<td>93.45</td>
<td>59.58</td>
<td>33.36</td>
<td>.47</td>
<td>.640</td>
</tr>
<tr>
<td>Mixed schools</td>
<td>40</td>
<td>100.8</td>
<td>51.12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-Significant at .05

From Table 4.32, there was no significant difference in the level of motivation between science teachers in girls’ schools and those in mixed schools, hence **H0** was accepted at p <
.05. It is also noted that across the schools, the dominant motivation levels generally is slightly de-motivated. For that purpose, the study detected no major influence of school categories on the motivation level of science teachers in public girls’ and mixed secondary schools.

Motivation Levels by Gender

Table 4.33 presents the motivation levels of the science teachers based on their sex.

Table 4.33 Motivation Levels by Gender, According to Science Teachers n=60

<table>
<thead>
<tr>
<th>Motivation Level</th>
<th>Male Teachers</th>
<th>Female Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>Percentage</td>
</tr>
<tr>
<td>Highly De-Motivated</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Slightly De-Motivated</td>
<td>25</td>
<td>66</td>
</tr>
<tr>
<td>Slightly Motivated</td>
<td>12</td>
<td>31</td>
</tr>
<tr>
<td>Highly Motivated</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Total</td>
<td>38</td>
<td>100</td>
</tr>
</tbody>
</table>

As shown in Table 4.33 above, majority of the science teachers across the gender divide were reportedly de-motivated. Twenty-five male teachers, representing 66 per cent, and 15 females, representing 68 per cent, were slightly de-motivated. Thirty four per cent of the male science teachers were motivated compared to 27 per cent females. It is significant to note that the only highly motivated science teacher was male and the other highly de-motivated was female. No specific reason can be immediately fronted to explain why a higher percentage of female teachers were de-motivated than males.

To test whether there were any significant differences, the following statistical hypothesis was formulated in response to this research question:
H0²: There is no significant difference in the overall work-motivation between male and female science teachers.

A ‘t’ test was conducted to test the hypothesis, and the results are summarized in Table 4.34 below.

**Table 4.34 Comparison of differences in motivation by gender of the teachers**

<table>
<thead>
<tr>
<th>Reference Grps.</th>
<th>n</th>
<th>Means</th>
<th>S.D</th>
<th>Degrees of freedom</th>
<th>t-value</th>
<th>2 tail significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male teachers</td>
<td>38</td>
<td>107.3</td>
<td>57.99</td>
<td>54.83</td>
<td>1.87</td>
<td>.066</td>
</tr>
<tr>
<td>Female teachers</td>
<td>22</td>
<td>82.9</td>
<td>42.19</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-Significant at .05

From Table 4.34, there was no significant difference in the level of motivation between male and female science teachers, hence H0² was accepted at p < .05. The findings above indicate that both male and female science teachers were mainly de-motivated. Hence, the science teachers’ motivation levels did not vary based on the teachers’ gender, according to the findings of this study.

**Motivation Levels by Level of Education Attained**

The third part of the second research question sought to establish whether the motivation levels varied based on the various educational levels attained by the science teachers. The findings are presented in Table 4.35 below.
Table 4.35 Motivation Levels by Levels of Education n=60

<table>
<thead>
<tr>
<th>Motivation levels</th>
<th>S.I/Dip</th>
<th>B.Sc.</th>
<th>B.Ed.</th>
<th>B.Sc./PGDE</th>
<th>M.Sc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly de-motivated</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Slightly de-motivated</td>
<td>15</td>
<td>75</td>
<td>4</td>
<td>67</td>
<td>100</td>
</tr>
<tr>
<td>Slightly motivated</td>
<td>4</td>
<td>20</td>
<td>2</td>
<td>33</td>
<td>100</td>
</tr>
<tr>
<td>Highly motivated</td>
<td>1</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>20</td>
<td>100</td>
<td>6</td>
<td>100</td>
<td>27</td>
</tr>
</tbody>
</table>

As shown in Table 4.35, in all cases, the dominant motivation level was slight de-motivation. Fifteen science teachers representing 56 per cent, with Bachelor of Education (B.Ed) training, all the six science teachers (100 per cent) with Bachelor of Science (B.Sc) training, four (67 per cent) with B.Sc. and Postgraduate Diploma in Education (PGDE) training, and 15 (75 per cent) of those with Diploma in Education or S1 training reportedly fell in this category. The only M.Sc. degree holder was slightly motivated, while in all the other categories, de-motivation was more pronounced than motivation.

The following null hypothesis was formulated to further discover whether there existed any significant difference:

\[ H_0: \text{There is no significant difference in the overall work-motivation between graduate science teachers and those who have not attained a university degree.} \]

Using the inferential statistics of ’t’ test, the hypothesis above was tested, and the findings reported in Table 4.36 below.
Table 4.36 Comparison of differences in motivation by educational levels

<table>
<thead>
<tr>
<th>Reference Grps.</th>
<th>n</th>
<th>Means</th>
<th>S.D</th>
<th>Degrees of freedom</th>
<th>t-value</th>
<th>2 tail significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduates</td>
<td>40</td>
<td>99.68</td>
<td>51.41</td>
<td>33.65</td>
<td>.26</td>
<td>.800</td>
</tr>
<tr>
<td>Non-graduates</td>
<td>20</td>
<td>95.70</td>
<td>59.29</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results presented in Table 4.36 indicate that there was no significant difference in the level of motivation between graduate science teachers and those who have not attained a university degree; hence $H_0$ was accepted at $p < .05$. Akin to the other factors, majority of the teachers were slightly de-motivation. It is significant to note that no major differences on levels of motivation were observed, based on the educational levels.

Motivation Levels by Experiences

The science teachers were asked to indicate the number of years they have taught, and the number of years they have stayed in their current teaching station. This section reports the motivation levels of the science teachers, categorized according to both teaching experiences and the experiences in their current teaching station. Table 4.37 below presents the findings.

Table 4.37 Motivation Levels by Teaching Experiences $n=60$

<table>
<thead>
<tr>
<th>Motivation level</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
<th>16-over</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Highly De-Motivated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Slightly De-Motivated</td>
<td>12</td>
<td>52</td>
<td>13</td>
<td>87</td>
</tr>
<tr>
<td>Slightly Motivated</td>
<td>11</td>
<td>48</td>
<td>2</td>
<td>13</td>
</tr>
<tr>
<td>Highly Motivated</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>23</td>
<td>100</td>
<td>15</td>
<td>100</td>
</tr>
</tbody>
</table>
As Table 4.37 shows, the ratio of the slightly de-motivated to slightly motivated science teachers is averagely equal for the teachers with up to 5 years of experience, standing at 52:48. However, for the teachers with 6-10 years of experience, the proportion rises, with percentages of 87 for slightly de-motivated and 13 for slightly motivated. In the 11-15 years experience bracket, no science teachers were motivated. The slightly de-motivated teachers formed 91 per cent, with the remainder one teacher (9 per cent) reporting high de-motivation. To some extent, this indicates some trend towards de-motivation as the years of experience increases. The best motivation picture identified based on years of experience was observed among teachers with over 16 years experience since 54.5 per cent of them were motivated.

Table 4.38 below gives a rundown of the responses based on years of teaching experience in the current teaching stations.

<table>
<thead>
<tr>
<th>Teaching experiences in current station in Years</th>
<th>1-5</th>
<th>6-10</th>
<th>11-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivation level</td>
<td>n</td>
<td>%</td>
<td>n</td>
</tr>
<tr>
<td>Highly De-Motivated</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Slightly De-Motivated</td>
<td>20</td>
<td>61</td>
<td>18</td>
</tr>
<tr>
<td>Slightly Motivated</td>
<td>13</td>
<td>39</td>
<td>5</td>
</tr>
<tr>
<td>Highly Motivated</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>33</td>
<td>100</td>
<td>24</td>
</tr>
</tbody>
</table>

As Table 4.38 indicates, 61 per cent of the teachers with experience of between one to five years in their current station were de-motivated, while the other 39 per cent were motivated. The percentage of de-motivated teachers went up to 75 per cent among those with 6-10 years of experience, while all the teachers with over 10 years experience in their current teaching station were de-motivated. This implies that there tends to be an inverse link between the
motivation level and the number of years one stays in one teaching station, such that as one goes up, the other goes down.

The following statistical hypothesis was formulated to establish whether there is any significant difference:

\[ H_0: \text{There is no significant difference in the overall work-motivation between novice and experienced science teacher.} \]

Taking the experience level to be above five years, the 't' test was used to test the above hypothesis and the findings are presented in Table 4.39 below.

**Table 4.39 Comparison of differences in motivation levels by teaching experience**

<table>
<thead>
<tr>
<th>Reference Grps.</th>
<th>N</th>
<th>Means</th>
<th>S.D</th>
<th>Degrees of freedom</th>
<th>t-value</th>
<th>2 tail significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Novice</td>
<td>23</td>
<td>111.30</td>
<td>55.72</td>
<td>44.00</td>
<td>1.46</td>
<td>.151</td>
</tr>
<tr>
<td>Experienced</td>
<td>37</td>
<td>90.30</td>
<td>51.51</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Non-Significant at .05

The findings reported in Table 4.39 indicate that there was no significant difference in the level of motivation between experienced and novice science teachers, hence \( H_0 \) was accepted at \( p < .05 \). This implies that the trends identified earlier on based on years of teaching experience, indicating that the motivation levels tend to diminish with the number of years one has taught were not statistically significant. Further research can establish what link there is between these two, especially with regard to years of experience in the current teaching station.
Motivation Level by Main Teaching Subject

Table 4.40 below presents motivation levels based on main teaching subjects.

<table>
<thead>
<tr>
<th>Motivation levels</th>
<th>Mathematics</th>
<th>Chemistry</th>
<th>Biology</th>
<th>Physics</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Highly De-Motivated</td>
<td>1</td>
<td>6</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Slightly De-Motivated</td>
<td>10</td>
<td>62</td>
<td>8</td>
<td>47</td>
</tr>
<tr>
<td>Slightly Motivated</td>
<td>5</td>
<td>32</td>
<td>8</td>
<td>47</td>
</tr>
<tr>
<td>Highly Motivated</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>16</td>
<td>100</td>
<td>17</td>
<td>100</td>
</tr>
</tbody>
</table>

The last section of the fourth research question sought to establish the extent to which the motivation levels of the science teachers varied based on their main teaching subjects. As Table 4.40 indicates, the study established that across the four science subjects in question, the most frequent level of motivation was slight de-motivation.

Among the mathematics teachers, 10, representing 62 per cent, were slightly de-motivated. Similarly, eight chemistry teachers, representing 47 per cent, nine (50 per cent) biology teachers and all the physics teachers were also de-motivated. From the findings, physics teachers had the worst reported motivation levels, with all being de-motivated. Of all the mathematics teachers, 68 per cent were de-motivated, while for biology; the motivation-de-motivation ratio was 50:50. Chemistry had the best average levels, with over 53 per cent of the teachers reportedly being motivated.

To further determine if there was any significant difference based on the various teaching subjects, the following statistical hypothesis was formulated:
HO₅: There is no significant difference by main teaching subjects in the overall work-motivation of the science teachers.

The analysis of variance (ANOVA) was performed and the findings presented in Table 4.41.

**Table 4.41 Comparison of differences in motivation by teaching subjects**

<table>
<thead>
<tr>
<th>Source</th>
<th>Degrees of freedom</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F Ratio</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>3</td>
<td>18432.8082</td>
<td>6144.2694</td>
<td>2.2689</td>
<td>.0904*</td>
</tr>
<tr>
<td>Within Groups</td>
<td>56</td>
<td>151646.8418</td>
<td>2707.9793</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>59</td>
<td>170079.6500</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Significant at .05

The ANOVA results indicated an F ratio of 2.2689 and an F Probability of .0904. This meant that there was a significant difference in the level of motivation based on the various main teaching subjects. At p < .05, the null hypothesis HO₅ was rejected. Further post-comparison determined that the significant difference existed between chemistry and physics teachers. Further research with specific reference to the main teaching subjects is recommended to unearth supplementary facts on how motivation links to the various subjects.

The findings from this section can indicate that majority of the science teachers in the sampled schools were either slightly de-motivated or slightly motivated. The level of motivation among the science teachers did not vary significantly based on the various school categories, the gender of the science teachers, their educational levels, and the teaching experiences. However, a significant difference in the level of motivation among the science teachers based on the various main teaching subjects was noted, specifically between chemistry and physics teachers.
4.6 Summary

This chapter has presented and analysed the findings of this study. The study has established that science teachers in girls' and mixed secondary schools are slightly de-motivated. This did not vary based on school category, gender of the teacher, teaching experience, and level of education. However, a significant difference was noted based on main subjects taught.

Concerning the motivation factors, the perception of the head teachers significantly differed with those of the teachers. Of the twelve factors under review, the head teachers reported all to be slightly motivating, while the science teachers reported seven as slightly motivating and five as slightly de-motivating. Neither the head teachers nor the science teachers considered any of the 12 factors as either highly de-motivating or highly motivating.

Concerning the students' gender, this research has established that majority of the science teachers in girls' and mixed secondary schools enjoy teaching science to schoolgirls. This can explain why the instrumentality that teaching well will lead to positive influence of girls' science study was highest (mean 5.30). However, the reasons for not enjoying teaching science to girls and the recommendations for improving performance and participation of the girls in sciences can be utilized to improve the overall instrumentalities, thereby raising the motivation levels.
CHAPTER V
SUMMARY AND DISCUSSION OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction
This study set out to establish the overall level of motivation of the science teachers in girls’ and mixed secondary schools. Equally, the study sought to establish the influence of variables such as school type, gender of the science teacher, educational level, years of teaching experience and the main teaching subjects of the science teacher. The study further sought to establish how each of the twelve motivation factors identified for this study influence the level of motivation of the science teachers. Finally, the study set out to investigate how the students’ gender influence the motivation of the science teachers in girls’ and mixed secondary schools.

The reviewed literature revealed that motivation has been widely studied. Both content and process theories of motivation reveal that the motivation to work is influenced by certain factors, internal and external – intrinsic and extrinsic. Maslow’s (1943) needs hierarchy theory arranges human needs into a five-step hierarchy. Herzberg’s (1959) dual-factor theory divides the factors into either motivators or hygiene, while Alderfer (1972) categorized the needs into three – existence, relatedness and growth. The reviewed process theories include the equity theory of J.S Adams (1963), the Goals-setting theory of Locke (1968), and the expectancy theory of Vroom (1964), which guided this study. Literature was also reviewed on studies based on the expectancy theory, and studies on motivation of teachers in Kenya.

The study employed two sets of questionnaires (Appendices 1B and 2B), which were modified versions of the *Motivation Questionnaire*, administered to the science teachers and
the head teachers in the sample. Work motivation scores were calculated for the individual science teachers and for the whole group in the sample. Further, the motivational effect of each of the twelve factors was calculated by multiplying the mean expectancies and the mean valences, as reported by the science teachers and their respective head teachers. The twelve motivation factors identified for this study were; Pay increase and bonuses, Job security, Work itself, Working conditions, Appreciation of work done, Promotion and professional growth, Sympathetic help with personal problems, Tactful discipline, Clear task definition, Consideration of local circumstances, Involvement in formulation of national education policy, and Appraisal of teaching abilities. Halliday (1995) and Steyn (1995) identified these factors, among others as factors influencing teachers' motivation. The subsequent section reports the research findings.

5.2 Summary of Research Findings

The sample included provincial and district schools, which were girls’ and mixed, and further divided into girls’ boarding, girls’ day/boarding, mixed day/boarding, and mixed day.

In majority of the schools, male science teachers outnumbered females, with a similar trend being evident among pupils in mixed schools. By age, majority of the head teachers were aged between 35 and 44 years, while a large number of the science teachers were aged between 25 and 34 years. Though a significant number of the science teachers had Diploma in Education qualification, majority of both the head teachers and the teachers had a B.Ed Degree. All the head teachers were professionally trained teachers, while only 10 per cent of the science teachers were untrained B.Sc teachers. Whereas a big fraction of the head teachers had taught for between 16 and 20 years, and administered for between six and ten
years, a large number of the science teachers had teaching experiences of between one and
ten years, and had stayed in their current teaching station for one up to five years.

With regard to the motivation levels, majority of the science teachers (68 per cent) were de-
motivated, hence only 32 per cent were motivated. The overall motivation level was slight
de-motivation. The motivation of the science teachers did not vary significantly based on the
various school categories, the gender of the science teacher, the teacher’s level of education,
and the years of teaching experience. A significant difference in the motivation of the science
teachers based on the various teaching subjects was noted, specifically between Chemistry
and Physics teachers. Notably, Chemistry had the best teacher-motivation levels, with 53 per
cent motivated, while Physics had the worst teacher-motivation levels, with all the teachers
being de-motivated.

Among the twelve motivation factors under review, seven were motivating to the science
teachers. These were: Work itself, Appreciation of work done, Job security, Appraisal of
teaching abilities, Clear task definition, Working conditions, and Promotion and professional
growth in that order. The five de-motivating factors were: Sympathetic help with personal
problems, Pay increase and bonuses, Participation in formulation of national educational
policy, Tactful discipline, and Consideration of local circumstances in that order. Overall, the
motivational effect of the twelve factors combined was 18.14, implying that they were
slightly motivating. The head teachers on the other hand scored an overall of 27.70, and
categorized all the twelve factors as motivating.

Concerning the students’ gender, a good number of the science teachers enjoyed teaching
science to the girls. The factors predominantly mentioned for enjoying teaching science to
the girls was that they were disciplined and easy to handle, and that they were active and attentive in class. The reason most cited for not enjoying teaching science was that the girls were not academically aggressive, had poor learning methods, and had negative personal characteristics that were not motivating.

Most of the science teachers preferred that Biology be made compulsory for the girls in secondary schools because the subject was relevant to the day-to-day lives of the girls, was less quantitative, literature oriented, and less expensive (sic). Finally, most of the science teachers suggested that the performance and participation of the secondary schoolgirls could be improved through improving instructional methods, and raising interest and ambition of the girls in science.

5.3 Discussion

The findings of this study indicate that the science teachers were de-motivated in their job. These findings concur with those of Ngalyuka (1985), Muchira (1988), and Immonje (1990), but are contrary to the findings of Mutie (1993) with regard to secondary school administrators and teachers in Kitui district and Mumo (2000) with regard to TTI tutors within Nairobi province. Motivation being the force to perform an act, it is the conviction of this study that the lack of motivation persistently being mentioned among teachers, and specifically science teachers truly exists. Yet motivation cannot be decreed by threat to discipline, or by money alone. It is apparent that motivating (providing with a motive to act in a desired manner) has no meaning outside the needs of subordinates. Efforts to provide a motive not related to valued needs would produce zero results.
Twelve motivation factors guided the study. According to the VIE theory, an individual’s motivation to perform a specific task is determined by the individual’s perception of expectancy, instrumentality, and valence. The expectancies and valences were established to find the motivational effects for the twelve factors. The subsequent section gives a rundown of the factors.

**Pay increase and bonuses:** According to Maslow (1943), Herzberg (1959) and Alderfer (1972), this is a lower order need, which is more active among junior employees. Hence one would expect that the factor could not seriously influence science teachers. Over time, the Kenya government through the TSC has attempted to improve the amount of pay and/or bonuses to the teachers in general and science teachers in particular. Yet researches carried out in this area have explored how this factor still influences the motivation and/or job satisfaction of teachers. Mumo (2000) found that the TTI tutors in Nairobi province were dissatisfied with the salary and fringe benefits, similar to Ngalyuka (1985), and Karugu (1980). According to Bame (1991) it is the top de-motivator among educators in Ghana.

This study has reaffirmed the findings that the factor is a de-motivator. The factor is highly valued by the science teachers. However, though the TSC is trying much to improve the amount of pay and bonuses, the findings imply that even if all the five phases awarded by the TSRC in 1997 were implemented today, the factor would still remain a de-motivator, based on the expectancy scores. There seems to be no link between the amount of pay and bonuses one gets and teaching well. The only solution to this dilemma is, as stated in the *Draft Master Plan on Education and Training* (Republic of Kenya, 1998), to make any further increase in the amount of pay and bonuses contingent upon teaching well, based on supervision reports.
Job Security: The majority of the secondary school teachers in Kenya are employed by the TSC, thereby enjoying relative security in their jobs, as a teacher completes probation and is confirmed as a permanent and pensionable employee. The study found this factor to be the second best motivator among the Kenyan secondary school science teachers. This concurs with the findings of Mumo (2000), Karugu (1980), and Bame (1991). Though Maslow, Herzberg, and Alderfer consider this a lower order need, it proved to be highly valued by the science teacher in secondary schools.

Work Itself: According to Maslow, Alderfer, and Herzberg, this is a higher order need. Hence as professional highly educated people, it is not surprising to note that the factor was the highest motivator among the secondary school teachers. Mumo (2000) found this factor (freedom to select teaching methods) to be motivating to the TTI tutors. Equally, Karugu (1980) found the factor (interesting and challenging career) to be motivating. Bame (1991) also found this factor to be the least that can cause a teacher to be de-motivated and leave teaching in Ghana. Interestingly, Ngalyuka (1985) found this factor to be de-motivating to the primary school teachers, more so to the older teachers. It is then apparent that as one goes higher the education hierarchy, educators tend to find satisfaction from the job they do.

Working Conditions: Herzberg classified this as a hygiene factor, hence equal to the lower order needs. However, the factor proved slightly motivating to the science teachers. According to Halliday (1989), conditions of service for teachers include such aspects as appointment and initial posting, probation and confirmation, duties and accountability, hours of duty, holiday arrangements, transfers, resignation and retirements, housing, and sick pay and special leaves among others. In Kenya, most of these are centralized and managed by the TSC, while specific schools manage others. This research established that this factor tended
to vary based on various schools. Hence some schools managed the affairs of the teachers better than others, while in whole, the factor proved motivating.

**Appreciation of Work Done:** though Mumo (2000) found the TTI tutors to be de-motivated by this factor, and Ngalyuka (1985) found that the rural primary school teacher was dissatisfied with lack of recognition, same to Karugu (1980), this study has established otherwise. The factor proved motivating to the science teachers.

**Promotion and Professional Growth:** promotion and professional growth has overtime negatively affected the motivation of educators in Kenya. Karugu (1980) found the factor best de-satisfier, among elementary school teachers and head teachers in Nairobi. Ngalyuka (1985) established that the means of promotion for rural primary school teachers was unfair and de-motivating. Similarly, Bame (1991) identified this as the second best de-motivator among the Ghanaian educators. Mumo (2000) found the factor to negatively affect the motivation of tutors in Kenyan TTIs. This study has established that the factor though motivating, is the least among the seven.

The procedure for promotion in Kenya involves merit, based on the number of years completed, or awarding administrative positions hence removal from the classroom. This, as Onyango (2001) observes, has rid the classroom of very competent educators, but who may not necessarily have administrative competencies. The principal effects of this are that those who remain classroom teachers are either disgruntled, or content to be ordinary teachers. Hence as the Koech Commission recommends, promotion of best performing teachers should not involve removal from classroom teaching (Republic of Kenya, 1999).
Sympathetic Help With Personal Problems: despite the fact that Halliday (1995) and Steyn (1995) identified this factor as significant in motivating teachers, to the Kenyan science teacher, the factor is quite inconsequential. This was due to the relatively low value attached to the factor. In a third world situation where the main concern is determining 'what our teachers really want in order to perform exceptionally well', such factors with little valence should be granted minimal attention at best, and ignored wholesome at worst.

Tactful Discipline: any human being is liable to error, and the response given to the error determines future correction or repetition of the error. This study established that the science teacher is de-motivated by the way in which his/her discipline cases are handled. This was equally true with the TTI tutors, according to Mumo (2000). Though the procedure for disciplining arrant teachers is properly spelt out in the TSC Code, it seems that most administrators tend to flout the procedure. The immediate administrators, who are the head teachers thought that the ways in which they handled the discipline cases was tactful. However, as Onyango (2001) observes, the head teachers not wanting to be seen as less proficient in this management task opted to rate their abilities highly.

Clear Task Definition: majority of teachers in Kenyan secondary schools have a laid down task procedure. The factor is slightly motivating as would be expected. These findings concur with those of Bame (1991) among the Ghanaian educators.

Consideration of Local Circumstances: since teachers serve in various parts of the country with different geographical, social and economic conditions, there was a need to test the effect of this on their motivation. Currently, the government and the TSC have designated hardship zones, as well as Nairobi city with special salary or allowances for the personnel in
those areas. These are similar to the *Inducement Allowances* in Sierra Leone (Commonwealth Secretariat, 1993). The factor proved slightly de-motivating, as the expectancy levels were extremely low.

**Involvement in Formulation of National Education Policy:** policy changes in education may be triggered by a variety of occurrences e.g. change of government, recommendation by a national commission of education (such as the *Koech Commission* of 1998) among others. The policy change may not affect schools directly but relate to teachers and their conditions of service. According to Halliday (1989), for educational policies to have maximum impact, they should be set in unambiguous language, must take account of the teachers' known situation and views, and must be comprehensively explained and published. The consultation period affords the opportunity for fresh thought to be brought to bear on the proposals, while allowing time for all stakeholders to come to terms with its implications.

Consultation encourages the teachers to be party to the changes and by their participation to become committed to its introduction. It then goes without saying that the findings of this study avidly explain why problems continue to bedevil the 8-4-4 system of education. Though science teachers highly value this factor, they least expect that it will occur hence the factor is de-motivating. Care must be taken to attempt involving teachers, if success in any program is to be realized.

**Appraisal of Teaching Abilities:** in most African countries South of the Sahara Kenya included, appraisal involves reports on teachers by the head teachers, submitted to the Ministry of Education or the TSC at intervals, usually annually, and these reports are held in personal files of the teachers concerned (Halliday, 1989). The appraisal reports become key
cases of promotion, and or discipline. In Kenya, schools inspectors are the main external appraisers, while the head teachers are the internal appraisers. Contrary to the findings of Karugu (1980), this research has established that appraisal is a slightly motivation factor among the science teachers. Hence the way in which the science teachers are currently appraised is likable to them.

5.4 Conclusion

The science teacher same to any other worker must be motivated so as to perform his/ her duty effectively. This study has established that the overall motivation level was slight de-motivation. Still, the findings of this study indicate that the science teacher is de-motivated by five of the identified twelve factors, and motivated by the remaining seven. However, there are no extreme cases of high motivation or high de-motivation, and overall the valence-times-expectancy value indicates that the factors are slightly motivating. Hence the regression to de-motivation may be attributed to the instrumentalities.

The overall instrumentality score was slightly above average. This study was carried out in girls and mixed secondary schools, under the rationale that the relatively poor performance and participation of the girls in science could point a direction towards low motivation among their teachers. Indeed as this study has established, the gender of the student has some impact on the instrumentalities of the science teachers handling girls, and by extension on their motivation levels.
5.5 Recommendations

5.5.1 Policy Recommendations

The main finding of this study is that the science teachers' expectancies of attaining motivation factors that hold high value to them was significantly low, creating the de-motivation situation identified. This study therefore recommends the following policy issues:

1. Salaries and bonuses awarded to teachers should in future be contingent upon teaching well, based on appraisal report, and performance output.

2. Though the science teacher feels relatively secure in his/ her job, the government and the TSC must ensure that the science teacher is constantly reminded that continued stay at work will in future depend to a greater extent on work performance. This will rid the teaching profession of disgruntled elements who seek refuge in teaching as a source of a stable pay slip.

3. The liberal nature of the science teachers' work where in many instances, though guided by the syllabus, he/ she decides what and when to teach must be maintained and enhanced.

4. The promotion of a teacher must be contingent upon effective teaching, and this must not imply departure from classroom to higher office, as this leaves the classrooms with disgruntled, ineffective pessimists, who are a disgrace to the teaching profession. Still, such offices are not limitless, implying that at one moment or another, the promotion will have to stop, while identifying offices to be filled.

5. Efforts to consider the local circumstances in which the science teachers operate should be enhanced. This must however be carefully evaluated to avoid creating animosity between teachers in different regions.

6. The government must endeavour to involve more and more teachers while formulating national education policies. These included seeking their contributions before reviewing and implementing any new curriculum, involvement in marking and
setting national exams, and in developing educational texts. More often than not, these are preserves of teachers from a clique of 'elitists' schools, but should be opened up to teachers from all categories of schools.

7. School inspectors have in many cases been former classroom teachers, some of them earning those offices after failure to perform in class. This negates the good intentions of staff appraisal. Hence the government must endeavour to appoint only competent people as school inspectors.

8. Finally, the big disparity in responses between the head teachers and the science teachers point towards a big rift between the two. Administratively, this may not be quite healthy, and may be due in parts to promotion of incompetent people to headship. The government must in future insist on competence, and endeavour to appoint people with proved administrative competencies as head teachers. Also, other remedial measures may include in-servicing through the Kenya Education Staff Institute (KESI), or implementation of suggestions based on research findings (as of Onyango, 2001).

5.5.2 Institutional Recommendations

As the secretary to the school board of governors and the chief executive of the school, the head teacher represents the TSC. The onus of directing is bestowed on him/her, calling upon the head to be a leader (managing both growth and change), than a manager (comfortable with the status quo). To them, this study recommends that they:

a. Strive at all times to create a friendly working environment for the teachers. In-house rules modelled specifically for the school must be interwoven with careful utilization of the available scarce resources creating an open school climate, healthy for both personal and professional existence and growth.

b. Endeavour to appreciate even the slightest effort a teacher makes to improve work output, through such avenues as certificates of merit, staff retreats, or 'best teacher' notice boards. However, these must be directly contingent upon performance.
c. Being sympathetically concerned about the teachers' affairs must be avoided at all costs, as the teachers themselves have indicated that they least value this. In cases of discipline, the heads must be fair, but justly following the laid down procedures.

d. Avail copies of the *Education Act (Cap 211)*, the *TSC Act (Cap 212)*, and the *TSC Code* together with any circular letters relevant to teachers. This will enhance clear task definition, which the teachers greatly valued.

e. Finally, the head teacher must encourage staff appraisal. These should start as colleague appraisal or clinical supervision. The results of any appraisal should be availed to the teacher appraised, though the resultant confidential report must be kept hush-hush.

5.5.3 Suggestions for further research

The position taken by this thesis should provoke more researches to prove that the findings are wrong and nothing is as bad as is painted in this study. It is hoped so. However, it shall be surprising (and suspicious) if further research do not in fact confirm this position. But either way, further research in the following areas is recommended:

i) A similar study with science teachers in boys' schools to provide comparison.

ii) A similar study with humanities, languages, and technical teachers for comparison.

iii) Since most of the identified factors were highly valued by the science teachers, another study can utilize other motivation factors other than the twelve in this study.

iv) The study be replicated in another district, or using a larger sample.
BIBLIOGRAPHY


Dear Sir / Madam:

We are pleased to acknowledge your effort towards promoting the education of the girl-child in science subjects. We are currently carrying out a study aimed at promoting the education of the secondary school girls in sciences.

Having taken cognisance of your endeavours, we request you to complete the attached questionnaire, the purpose of which is to help us explore the motivation factors influencing those teachers handling the secondary school girls in science subjects in your school.

Your positive participation will go along way in facilitating positive learning of sciences among secondary school girls.

Thank you.

Sincerely,

OCHIENG' OWUOR, MICHAEL
APPENDIX 1B
HEAD-TEACHERS’ QUESTIONNAIRE

PART A: CONTEXTUAL AND PERSONAL DATA

Please, provide answers to these questions. Be frank and honest in your response. Your response will be treated with outmost confidentiality.

1. Name of your school

2. Category (tick [✓] one) i) Provincial ________ ii) District ________

3. Type (tick [✓] one) i) Girls’ Boarding ________ ii) Mixed Boarding ________
   iii) Girls’ Day ________ iv) Mixed Day ________
   v) Mixed Day/Boarding ________ vi) Girls’ Day/Boarding ________

4. If mixed, what is the average proportion of male to female student i) Male ________%
   ii) Female ________%


6. Sex (tick [✓] one) i) Male {} ii) Female {}

7. Teaching experience (count current year as a whole year) ______________ yrs.

8. Administrative experience (count current year as a whole year) ______________ yrs.

9. Level of Professional Training (tick [✓] all attained) i) PI {}
   ii) S1 {}
   iii) B.Ed. {}
   iv) Others (specify) ____________________

10. What is the total number of the following categories of teachers in your school?
    i) Male Graduates ______________
    ii) Female Graduates ______________
    iii) Male non-Graduates ______________
    iv) Female non-Graduates ______________

11. What is the ratio of male to female science teachers in your school i) Male ________%
    ii) Female ________%.
**QUESTION 1:**

Below are some factors, which can affect the motivation of the science teachers handling girls in your school. Please, indicate to the right of each factor on a scale of 1 – 7 how important the factors are in motivating the science teachers (see Key below).

Example: If item No.15 is Sciences congress, which in your school is slightly motivating to male teachers while neutral to the female teachers, then write 5 for M and 4 for F.

| 15. Science Congress | M {5} | F {4} |

**KEY:**
1. Highly de-motivating;  2- Moderately de-motivating  3 – Slightly De-motivating  
4. Neutral  5- Slightly motivating  6- Moderately motivating  7- Highly motivating.

<table>
<thead>
<tr>
<th>Male Teachers</th>
<th>Female Teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Salary increase or Bonus</td>
<td>{ }</td>
</tr>
<tr>
<td>2. Job Security in teaching</td>
<td>{ }</td>
</tr>
<tr>
<td>3. Teaching itself</td>
<td>{ }</td>
</tr>
<tr>
<td>4. Working conditions</td>
<td>{ }</td>
</tr>
<tr>
<td>5. Appreciation of work done</td>
<td>{ }</td>
</tr>
<tr>
<td>6. Promotion &amp; Professional Growth</td>
<td>{ }</td>
</tr>
<tr>
<td>7. Sympathetic help with Problems</td>
<td>{ }</td>
</tr>
<tr>
<td>8. Tactful Discipline</td>
<td>{ }</td>
</tr>
<tr>
<td>9. Job Description</td>
<td>{ }</td>
</tr>
<tr>
<td>10. Considering Local Circumstances while Making Decisions</td>
<td>{ }</td>
</tr>
<tr>
<td>11. Involvement in Formulating National Education Policies</td>
<td>{ }</td>
</tr>
<tr>
<td>12. Appraisal of Teaching Capabilities</td>
<td>{ }</td>
</tr>
</tbody>
</table>
**QUESTION 2:**

How available are the following factors, rating on a scale of 1 – 7, to the science teacher in your school if they teach science to the secondary school girls well? (See the key below).

**KEY:** 1 – Extremely Not Available; 2 – Highly Not Available; 3 – Slightly Not Available; 4 – Somewhat Available; 5 – Slightly Available; 6 – Highly Available; 7 – Extremely Available

How available is …

<table>
<thead>
<tr>
<th>Factor</th>
<th>Male Teachers</th>
<th>Female Teacher</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Salary Increase and Bonus</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>2. Job Security</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>3. The Work Itself</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>4. Improved Working Conditions</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>5. Appreciation of Work done</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>6. Promotion and Professional Growth</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>7. Sympathetic Help with Personal Problems</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>8. Tactful Discipline</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>9. Proper Job Description</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>10. Considering Local Circumstances in Decisions</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>11. Participation in Formulation of National Education Policies</td>
<td>{}</td>
<td>{}</td>
</tr>
<tr>
<td>12. Appraisal of Teaching Capabilities</td>
<td>{}</td>
<td>{}</td>
</tr>
</tbody>
</table>

Thank you.
Dear Sir/Madam,

Congratulations for the unparalleled effort you have put in seeing that the performance of the girl-child in science subjects perks up. Your school has been selected as one of the few for the purpose of undertaking a study to explore some factors that influence the motivation of science teachers of girls in secondary schools in Kenya.

Attached to this letter is a questionnaire. You are required to give your sincere response to the questionnaire. Remember, there is no right or wrong answer, and your genuine response will be considered as it is. Your positive participation is highly regarded, as it will contribute to the success of this study, and in the long run advance science education among the secondary school girls in Kenya. Your response will be treated with utmost confidence.

Thank you.

Sincerely,

Ochieng', O.M.
APPENDIX 2B
SCIENCE TEACHERS' QUESTIONNAIRE

PART A – CONTEXTUAL AND PERSONAL DATA

Please provide answers to the following questions. Be frank and honest in your response. Your response will be treated with utmost confidentiality.

1. Name of your school ____________________________

2. Category (tick [✓] one) i) Provincial { }  
   ii) District { }

3. Type (tick [✓] one) i) Girls' Boarding { }  
   ii) Girls Day { }  
   iii) Mixed Boarding { }  
   iv) Mixed Day { }  
   v) Mixed Day/Boarding { }  
   vi) Girls' Day/Boarding { }

4. Your age in years 25 – 30 { } 31 – 34 { } 35 – 40 { } 40 – over { }

5. Sex (tick [✓] one) i) Male { } ii) Female { }

6. Teaching experience (count current year as a whole year) ______________ yrs.

7. Teaching experience in your current station ______________ yrs.

8. Responsibility ____________________________________

9. Level of professional training (tick [✓] all attained) i) PJ { }  
   ii) S1 { }  
   iii) B.Ed. { }  
   iv) M.Ed { }  
   v) Others specify____________________

10. Your major teaching subject (s) ____________________________
    ____________________________
    ____________________________
PART B - MOTIVATION QUESTIONNAIRE
(Adopted from Hackman, J R (1977) as quoted from The Michigan Organizational Assessment Package)

QUESTION ONE:
Here are some things that could happen to teachers if they do their jobs especially well. How likely is it that each of these things would happen if you performed your job especially well? Please, tick [✓] into the appropriate box next to each number (See Key below).

KEY: N/L – not at all likely
S/L – somewhat likely
Q/L – quite likely
E/L – extremely likely

<table>
<thead>
<tr>
<th></th>
<th>N/L</th>
<th>S/L</th>
<th>Q/L</th>
<th>E/L</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) You will get a bonus or pay increase</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>b) You will be secure in your job</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>c) Your work will interest you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>d) You will receive good working conditions</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>e) The work you do will be appreciated</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>f) You will receive promotion and grow professionally</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>g) You will receive sympathetic help with your personal problems</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>h) Your discipline cases will be tactfully handled</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>i) You will receive clear definition of what is expected of you</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>j) Local circumstances will be taken into consideration in reaching decisions about your inquiries</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>k) You and your colleagues will be involved in the formulation of national educational policies</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>l) Your teaching capabilities will be appraised</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
QUESTION 2:
Different science teachers want different things from their work. Here is a list of things a science teacher could have on her/his job. How important is each the following things to you? Please, tick [✓] the appropriate level of importance in the corresponding boxes (See Key below).

<table>
<thead>
<tr>
<th>KEY</th>
</tr>
</thead>
<tbody>
<tr>
<td>L/I – Less important</td>
</tr>
<tr>
<td>M/I – Moderately important</td>
</tr>
<tr>
<td>Q/I – Quite important</td>
</tr>
<tr>
<td>E/I – Extremely important</td>
</tr>
</tbody>
</table>

How important is…

<table>
<thead>
<tr>
<th></th>
<th>L/I</th>
<th>M/I</th>
<th>Q/I</th>
<th>E/I</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) The amount of pay you get</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>b) The security of your job</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>c) Interest in your work</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>d) The working conditions</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>e) Appreciation of work done</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>f) Promotion and professional growth</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>g) Sympathetic help with personal problems</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>h) Tactful discipline</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>i) Clear definition of what is expected of you</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>j) Consideration of local circumstances in reaching decisions concerning you</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>k) You and your colleagues’ involvement in formulation of national educational policies</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>l) Appraisal of your teaching capabilities</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>
QUESTION 3:
Below you will see a number of pair of factors that look like this:

Warm weather → Sweating........1 2 3 4 5 6 7

You are to indicate by marking [✓] the appropriate number to the right of each pair how often it is true for you personally that the first factor leads to the second factor in your job. Remember, for each pair, indicate how often it is true by ticking [✓] the box under the response, which seems most accurate (See Key below).

KEY
NEV – Never
S/T – Sometimes
OFT – Often
A/A – Almost always

<table>
<thead>
<tr>
<th></th>
<th>NEV</th>
<th>S/T</th>
<th>OFT</th>
<th>A/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Working hard → teaching well</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Teaching well → good students scores in KCSE</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Teaching well → positive influence of girls’ sciences score</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
PART C

1. Do you enjoy teaching science to girls? i) Yes     ii) No     .

2. List five reasons for your answer in question 1 above
   a. 
   b. 
   c. 
   d. 
   e. 

3. If you were to choose the science subjects to be studied by girls in your school, which one(s) would you prefer?
   a. 
   b. 
   c. 

4. Give reasons for each of your choice in question 3 above
   a. 
   b. 
   c. 

5. You have put up good efforts to ensure that the performance and participation of secondary school girls in science remains high. How would you advice other science teachers to improve the performance and participation of secondary school girls in science?


Thank you.
APPENDIX 3

RESEARCH PERMIT

I, Dr./Mr./Mrs./Miss. CHELGOK MICHAEL, hereby declare that:

I have been permitted to conduct research in:

Location: 

District: 

Province: 

The topic of the research is:

Motivation factors influencing the science teachers in public secondary schools: a case study of co-educational schools in Migori District, Kenya.

The period of the research is from 18th October, 2001 to 30th October, 2002.

Signature: 

Date: 

Research permit No.: MORS/12/001/31C/214

Date of issue: 18th October, 2001

Fee received: SHS. 500

P. O. Box 30044, Nairobi
OCHIENG MICHAEL OWUOR
KENYATTA UNIVERSITY
P.O BOX 43844
NAIROBI.

Dear Sir,

RE: RESEARCH AUTHORIZATION

On the basis of your application for authority to conduct research on, "Motivation Factors Influencing The Science Teachers in Public Secondary Schools". A case of Girls and Co-Educational Schools in Migori District, Kenya, I am pleased to inform you that you have been authorized to conduct research in Migori District for a period ending 30th October, 2003.

You are advised to Pay Courtesy Calls on The District Commissioner, and The District Education Officer, Migori District before Commencing your research project.

You are further advised to avail two copies of your research findings to this Office upon completion of your research project.

Yours faithfully,

A. G. KAARIA
FOR: PERMANENT SECRETARY/EDUCATION

CC.

THE DISTRICT COMMISSIONER,
MIGORI DISTRICT.

THE DISTRICT EDUCATION OFFICER,
MIGORI DISTRICT.
TO WHOM IT MAY CONCERN:

RE: RESEARCH AUTHORIZATION.

Mr. Ochieng' Michael Owuor is a student from Kenyatta University who is undergoing his med course and now undertaking his research project on "motivation: Factors influencing the Science Teachers in Public Secondary Schools."

He is now authorized to conduct research in Migori District Secondary Schools for a period ending 30th October, 2003.

Please accord him all the necessary assistance for his work to be affordable.

[Signature]

ABUNGU S. OWISO
for: DISTRICT EDUCATION OFFICER,
MIGORI DISTRICT.

AEO/eac.

C.

P.S.

[Handwritten notes]

KENYATTA UNIVERSITY LIBRARY