

**INFLUENCE OF THE NOVEL  
THE RIVER AND THE SOURCE ON  
SECONDARY SCHOOLGIRLS' LEARNING  
OF SCIENCE IN KENYA**

**BY**

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*Influence of the  
novel: The River and*



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## DECLARATION

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

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## TABLE OF CONTENTS

<b>Declaration</b> .....	<b>II</b>
<b>Dedication</b> .....	<b>III</b>
<b>Acknowledgements</b> .....	<b>IV</b>
<b>Table of Contents</b> .....	<b>V</b>
<b>List of Tables and Figures</b> .....	<b>IX</b>
<b>Abstract</b> .....	<b>XII</b>
<b>Chapter One: Introduction</b>	
1.1 Background to the Study .....	1
1.2 Statement of the Problem .....	11
1.3 Purpose of the Study .....	12
1.4 Specific Objectives .....	13
1.5 Research Questions .....	13
1.6 Significance of the Study .....	14
1.7 Delimitations and Limitations of the Study .....	14
1.8 Assumptions .....	15
1.9 Theoretical Framework .....	15
1.10 Definitions of Significant Terms .....	19
1.11 Organisation of the Thesis .....	20
1.12 Justification for Use of First Person Point of View .....	20

## **Chapter Two: Review of Related Literature and Discussion**

Introduction .....	22
2.1 Psychological Factors Affecting Girls' Performance in Science Subjects .....	22
2.1.1 Studies in Kenya .....	23
2.1.2 Studies Outside Kenya .....	25
2.1.3 Strategies to Remove the Psychological Barriers .....	25
2.2 The Influence of the Study of Literature on Peoples' Perception of Life .....	27
2.3 Summary of the Chapter .....	32

## **Chapter Three : Methodology**

Introduction .....	33
3.1 Research Design .....	33
3.2 The Study Locale .....	33
3.3 The Target Population.....	35
3.4 Sample and Sampling Procedures.....	36
3.4.1 Research Sites .....	36
3.4.2 Informants.....	38
3.5 Research Instruments .....	39
3.5.1 Questionnaires.....	40
3.5.2 Interview Schedules .....	40
3.5.3 Classroom Observation Schedules.....	41
3.6 Pilot Study .....	41
3.7 Validity and Reliability .....	42
3.8 Methods of Data Collection.....	44
3.9 Methods of Data Analysis and Presentation.....	49
3.10 Problems Experienced in the Field .....	50
3.11 Chapter Summary .....	51

## **Chapter Four: Data Presentation, Analysis and Discussion**

Introduction .....	52
4.1 Influence of the Novel <i>The River and the Source</i> on Secondary Schoolgirls' Liking of Learning Science Subjects .....	53
4.2 Influence of the Novel <i>The River and the Source</i> on Secondary Schoolgirls' Level of Confidence in Learning Science Subjects .....	67
4.3 Influence of the Novel <i>The River and the Source</i> on Secondary Schoolgirls' Pursuance of Science-Related Careers after School .....	75
4.4 Influence of the Novel <i>The River and the Source</i> on Secondary Schoolboys' Perception of Girls' Learning of Science Subjects .....	82
4.5 Pedagogical Approaches Teachers Adopt in the Teaching of the Novel <i>The River and the Source</i> .....	88
4.6 Chapter Summary .....	107

## **Chapter Five : Summary, Conclusions and Recommendations**

Introduction.....	108
5.1 Summary of Research Findings.....	108
5.2 Conclusions .....	109
5.3 Recommendations of the Study .....	110
5.4 Suggestions for Further Research .....	112

<b>References .....</b>	<b>113</b>
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<b>Appendix I : Girls' Questionnaire.....</b>	<b>121</b>
---	------------

<b>Appendix II : Boys' Questionnaire .....</b>	<b>125</b>
--	------------

<b>Appendix III : Girls' Interview Schedule.....</b>	<b>126</b>
--	------------

<b>Appendix IV : Boys' Interview Schedule.....</b>	<b>127</b>
--	------------

<b>Appendix V:</b> Interview Schedule for Teachers of Integrated English.....	128
<b>Appendix VI:</b> Interview Schedule for Teachers of Science Subjects.....	129
<b>Appendix VII :</b> Classroom Observation Schedule (I) for Literature Lessons ...	131
<b>Appendix VIII :</b> Classroom Observation Schedule (II) for Science Lessons....	133
<b>Appendix IX :</b> KCSE National Examinations Grading Scale.....	134
<b>Appendix X :</b> The 2000 KCSE Mean Grades of the Ten Schools Surveyed....	135

4.1.1. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	41
4.1.2. KCSE Performance of Boys for Maths Subject in the Surveyed Schools	42
4.1.3. KCSE Performance of Boys in Science Subjects in the Surveyed Secondary Schools	43
4.1.4. KCSE Mean Grades of Boys in the Surveyed Secondary Schools	44
4.1.5. KCSE Performance of Girls in Science Subjects in the Surveyed Secondary Schools	45
4.1.6. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	46
4.2. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects in the Surveyed Secondary Schools	47
4.2.1. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	48
4.2.2. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	49
4.2.3. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	50
4.2.4. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	51
4.2.5. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	52
4.2.6. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	53
4.2.7. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	54
4.2.8. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	55
4.2.9. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	56
4.2.10. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	57
4.2.11. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	58
4.2.12. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	59
4.2.13. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	60
4.2.14. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	61
4.2.15. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	62
4.2.16. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	63
4.2.17. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	64
4.2.18. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	65
4.2.19. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	66
4.2.20. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	67
4.2.21. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	68
4.2.22. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	69
4.2.23. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	70
4.2.24. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	71
4.2.25. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	72
4.2.26. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	73
4.2.27. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	74
4.2.28. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	75
4.2.29. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	76
4.2.30. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	77
4.2.31. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	78
4.2.32. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	79
4.2.33. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	80
4.2.34. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	81
4.2.35. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	82
4.2.36. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	83
4.2.37. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	84
4.2.38. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	85
4.2.39. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	86
4.2.40. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	87
4.2.41. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	88
4.2.42. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	89
4.2.43. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	90
4.2.44. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	91
4.2.45. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	92
4.2.46. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	93
4.2.47. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	94
4.2.48. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	95
4.2.49. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	96
4.2.50. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	97
4.2.51. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	98
4.2.52. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	99
4.2.53. Percentage Aspect of the Novel that Affects the Ability to Learn Science Subjects	100

## LIST OF TABLES AND FIGURES

TABLE	PAGE
1. 1: KCSE Percentage Mean Scores in Mathematics and Science Subjects from 1990 to 1996 at National Level by Gender .....	3
1. 2: KCSE Mean Scores in 1999 Maths and Science Subjects by Gender .....	9
1.3: KCSE Mean Scores in 2001-2002 Maths and Science Subjects by Gender .	10
3.1: Summary of the Study Sample .....	39
3.2: Summary of the Lessons Observed.....	46
4.1. 1: Percentage Influence of the Novel on Girls' Liking of Learning Science Subjects. ....	53
4.1. 2: KCSE Mean Grades for Mama Selah Girls High School Since 1996 .....	57
4.1. 3: KCSE Performance in Science Subjects at Mama Selah Girls High School Since 1996 .....	58
4.1. 4: KCSE Mean Grade for Ungoye Mixed Secondary School Since 1997 ....	62
4.1.5: KCSE Performance of Girls in Science Subjects at Ungoye Mixed Secondary School Since 1996 .....	63
4.1. 6: Percentage Aspects of the Novel that Make Girls Like Learning Science.....	65
4.2. 1: Percentage Influence of the Novel on Girls' Level of Confidence in Learning Science Subjects.....	68
4.2. 2: Percentage Aspects of the Novel that Make Girls be Sure of their Ability to Learn Science Subjects.....	73
4.3. 1: Percentage Influence of the Novel on Secondary Schoolgirls' Pursuance of Science-Related Careers After School.....	76
4.3. 2: Percentage Aspects of the Novel that Make Girls Aim at Pursuing Science Related Careers After School .....	80
4.4. 1: Percentage Influence of the Novel on Boys' Perception of Girls' Learning of Science Subjects .....	83
4.4. 2: Percentage Aspects of the Novel that Influence Boys .....	85

4.5. 1: Percentage Students' Views on the Pedagogical Approaches Teachers

Adopt..... 89

**FIGURE**

1: A Conceptual Model of the Study ..... 18

## LIST OF ABBREVIATIONS AND ACRONYMS

<b>A- Level</b>	Advanced Level
<b>EACE</b>	East African Certificate of Education
<b>EAEC</b>	East African Examinations Council
<b>EFA</b>	Education For All
<b>FAWE</b>	Forum for African Women Educationalists
<b>FEMSA</b>	Female Education in Maths and Science in Africa
<b>KCE</b>	Kenya Certificate of Education
<b>KCSE</b>	Kenya Certificate of Secondary Education
<b>KCPE</b>	Kenya Certificate of Primary Education
<b>KIE</b>	Kenya Institute of Education
<b>KNEC</b>	Kenya National Examinations Council
<b>NDP</b>	National Development Plan
<b>NPGD</b>	National Policy on Gender and Development

## ABSTRACT

Poor performance of girls in science subjects in Kenyan secondary schools has been a persistent problem. Yet, science is considered vital for the socio-economic development of the country, whose population is largely female. Research has shown that the poor performance is as a result of, among other things, psychological factors mainly influenced by gender stereotypes.

In 1998, after the recommendations of the 1989/93, 1994/96, 1997/2001 National Development Plans and the 1997 National Policy on Gender and Development, which emphasised the need to strengthen women's role in the economy through education, the novel, **The River and the Source** by Margaret Ogola, was introduced, among others, for study in secondary schools by forms three and four students. The novel explores some themes directly related to enhancing women's image as scientists and hence encourages girls' participation in science subjects.

As a move towards reducing the persistent gender disparity, it is imperative that all the strategies aimed at ensuring excellence of girls in Kenya Certificate of Secondary Education (KCSE) science subjects are evaluated. Within this move, the study set out to investigate the role that the novel **The River and the Source** plays in secondary schoolgirls' learning of science.

The study was conducted in Migori District, Kenya. The study adopted two research designs: a descriptive survey of ten schools, which was followed by a case study of two schools (one girls' and one coeducational). Data were collected through questionnaires, interviews, and classroom observations. The data were analysed both quantitatively and qualitatively and presented in form of tables and written narratives.

The study found that the novel **The River and the Source** makes many secondary schoolgirls, who started off with unfavourable attitudes to like and have confidence in learning science subjects. It also makes them aim at pursuing science-related careers after school. Furthermore, the novel improves secondary schoolboys' perception of girls' learning of science subjects. Hence, it is a positive intercession. However, the novel has minimal constructive influence on poor academic performers. The study recommends that such interventions as the study of the novel should start at primary school. The study also suggests that this research should be replicated in other districts in order to give a general assessment of the whole country.

## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

Globally, the low participation of girls in science education is a major challenge. In 1999, the World Conference on Science in Budapest stressed the need for special efforts to be made to ensure full participation of girls in science and technology. Similarly, in 2000, the World Education Forum in Dakar singled out science, technology and mathematics as a crucial issue in girls' education (<http://www.unesco.org>).

In Africa, especially, the situation is worse. Odaga and Heneveld (1995) observe that in many countries in Sub-Saharan Africa, the participation of girls in science subjects compared to boys is very low. To improve the situation, the 1999 Regional African Forum on Women, Science and Technology in Ouagadougou, stressed the need for an action plan that focuses on concrete issues that motivate girls to learn science (<http://www.unesco.org>). The gender divide that exists in science education in Sub-Saharan African weighs heavily against the socio-economic importance the nations attach to participation of all citizens in science. Therefore, enhancing girls' participation and performance in science subjects is an educational priority.

In Kenya, reducing the gender divide in education has been given some

consideration. At independence, the government underscored the vital role of education in national development. The 1964 Ominde Commission emphasized the need for education to promote social equality as well as serve as a source of manpower for the economic development of the nation (Republic of Kenya, 1964). In 1976, the Gachathi Committee emphasised the need for gender parity in education as vital in enhancing the pace of socio-economic development (Republic of Kenya, 1976). In the 1997 National Policy on Gender and Development (NPGD), the 1989/93, 1994/96, 1997/2001, and the 2002/2008 National Development Plans (NDPs), the government's commitment to strengthening women's role in the economy through education is well-articulated. The need to remove the stereotyping of gender roles in educational materials, the provision of role models and the improvement of the learning environment for girls are recommended as some of the major strategies to be adopted in eliminating gender disparity in education as well as in the entire society (Republic of Kenya, 1989; 1994; 1997a&c; 2002). Statistics show that since 1976 there has been a major improvement in secondary schoolgirls' access to education (Mudhai, 1998 Oct 31st; Republic of Kenya, 2000b).

The persistent gender disparity in participation in science and mathematics education, however, remains a challenge. A major concern as regards these subjects is the alarming gender disparity in performance. In his review of

significant statistics on secondary schoolgirls' education, Makau (1994) emphasises that apart from languages, girls' academic achievement in other subjects is lower than that of boys. He notes that 'particularly worrisome are the disparities in mathematics and sciences' (Makau 1994: 11).

Table 1.1 shows the KCSE percentage mean scores in mathematics and science subjects from 1990 to 1996. It is observable from the table that the performance of both boys and girls in all the subjects over the years has been below average (50%). It is also observable that even though the performance fluctuated over the years, gender disparity in performance still existed: girls continued to score poorer than boys in all the subjects. This poor performance by girls disadvantages them in terms of career placement since the scores are a vital consideration (Republic of Kenya, 1995).

**Table 1. 1: KCSE Percentage Mean Scores in Mathematics and Science Subjects from 1990 to 1996 at National Level by Gender**

SUBJECTS	1990		1991		1992		1993		1994		1995		1996	
	G	B	G	B	G	B	G	B	G	B	G	B	G	B
MATHS	10	15	14	20	9	14	11	17	9	13	10	15	24	27
BIOLOGY	17	19	23	25	19	22	29	33	35	38	33	35	34	37
PHYSICS	21	25	16	20	20	25	25	31	25	29	31	36	22	25
CHEMISTRY	26	28	26	29	30	33	29	32	30	34	28	32	23	27
PHYSICAL SCIENCE	17	19	16	19	19	22	23	27	22	25	21	23	19	22
BIOLOGICAL SCIENCE	18	20	17	20	21	24	24	28	26	29	28	32	20	22

**Key:** G-Girls

B- Boys

**Source:** KNEC (2000a)

The participation of females in mathematics and science education in Kenya has been considered important for socio-economic development (Republic of Kenya, 1997b&c). The 1999 Kenya population census report indicates that there are more females than males in the country (Republic of Kenya, 2001). This implies that the mathematical and scientific know-how of women is of urgent need for the future of the nation. Hence, low achievement of girls in these key subjects is detrimental to the needs of national development. Eshiwani (1986) argues that in Kenya, women are the strongholds of small-scale farming and that as such cannot be left out in the wind of technological change shaping the world. He points out that they need to know about modern farming methods as well as methods of storing produce.

The question of gender difference in cognitive abilities has been observed to have no influence on sex differences in educational outcomes (Chipman, 1994; Keeves and Kotte, 1994). Research carried out especially in Kenya between 1985 and 1999 (and discussed in Chapter Two) has shown that one of the major impediments to girls' participation in science education is psychological barrier mainly influenced by gender stereotypes. Several psychological (especially attitude related) factors such as dislike for science subjects, low level of self-confidence and lack of aspiration to pursue science-related careers have been cited by several scholars as influencing girls' achievement in science subjects (Mfou et.al, 1997; Gichura, 1999). In addition, scholars have

argued that gender stereotypes held by schoolboys negatively influence girls' learning of science subjects (Mfou et al, 1997; Rabari, 1992; Erwin and Paula 1998). The other factors that have been identified include poor school administration, lack of adequate facilities, poor teachers and parents' attitudes towards girls' learning of science subjects, lack of career guidance and counselling, and lack of qualified science teachers.

Since the 1976 Gachathi Committee recommendations, already indicated, it is observable that the government has continually introduced the study of African feminist literature in secondary schools. The following African feminist literary texts were studied for the Kenya Certificate of Education (KCE) examinations, now phased out: the novel **Efuru** by Flora Nwapa in 1980, the short story anthology **Land Without Thunder** by Grace Ogot in 1983&1984, and the novel **So Long a Letter** by Mariama Ba in 1984 (East African Examinations Council (EAEC), 1980; KNEC, 1983 &1984). The texts successfully explore among other issues the role of women in socio-economic development (Taiwo, 1984). Feminism as a literary movement aims at enhancing women's self-concept – giving them encouragement, confidence and moral support in their struggle to free themselves from the oppressive gender stereotypes (Spencer, 1991).

In teaching literature in the secondary schools in Kenya, one of the objectives

is to enable learners to understand and appreciate literature (KNEC, 2000; Tomlinson and Ellis, 1980; Short and Candlin, 1989)). Tomlinson and Ellis note that literature can reveal to the students the nature and capabilities of human beings and give them more insight into their true selves as they compare themselves with the characters they have read about.

Eshiwani (1986) notes that during KCE, Literature in English, which was an optional subject, was one of girls' favourite subjects. In 1981 and 1982, for instance, over 60% of Form Four female candidates enrolled for the subject. This suggests that literature being a girls' favourite, but not domain, can act as a useful education tool for empowering women. Even though it is not stated in the literature that the above-mentioned literary texts were studied for purposes of improving girls' performance in a particular subject, the fact that the study of feminist literature can make girls be aware of their true potentialities and enable them to transform this awareness into tangible academic achievements cannot be ignored.

The overall examination results realized after the study of the literary texts above in schools, however, showed no positive change in gender disparity in performance. In the 1983 KCE examination results, for instance, only 4,464 girls (or 4.1% of the total candidates enrolment and 37% of the successful candidates) qualified for A level classes (Republic of Kenya, 1984a; 1984b). In

1984, only 4,331 girls (or 3.62% of total candidates enrolment and 37% of successful candidates) qualified for A level classes (Masaira, 1985, Jan 30<sup>th</sup>; Republic of Kenya, 1985). This suggests that the study of the literary texts above did not give the girls enough empowerment to enable them excel academically and hence overcome the gender divide.

In 1998, after the recommendations of the 1989/93, the 1994/96, the 1997/2001 NDPs and the 1997 NPGD, as already indicated, the Ministry of Education prescribed among other texts the novel **The River and the Source** by Margaret Ogola for study in secondary schools by forms three and four students. The others introduced at the same time were the play **The Burdens** by John Ruganda, and the short story anthology, **Looking for a Rain God and other Stories** edited by Ian Gordon. The set books were to be examined by KNEC between 1999 and 2002 in KCSE paper 101/2, which is a compulsory paper. The novel **The River and the Source** explores themes related to women and girl-child education. Such themes include courage and determination, the role of women in the society and competence of girls in science subjects (Roche and Musyoka, 1998; Wegesa, 1999). In the novel, the characters provide girls with role models and the thematic concern should give them encouragement and make them develop a positive attitude towards success particularly in science subjects. An interview with the curriculum developer in charge of Integrated English at the Kenya Institute of Education,

KIE, (2000, May 11) revealed that these were some of the factors considered while selecting the set book for study in secondary schools. According to the curriculum developer, literature has been used to pass messages on health issues, soil conservation etc and it can be used as a medium of passing messages of all kinds that are relevant to human development.

It is however realized that five years (1998-2002) after the study of the novel, gender disparity in performance particularly in mathematics and science subjects was still prevalent. The Standard Team (2000, Feb 25:2), commenting on the 1999 KCSE results, reports that:

Just like in the previous results, girls continued to score less in critical subjects such as mathematics and the sciences...like in the previous years, they continued to post poor results in the key subjects such as maths, physics, biology, chemistry, physical science and biological science.

Even though the length of time the novel has been studied may not be enough for the desired impact to be realized, the need for formative assessment of an ongoing curriculum programme is mandatory. According to Barnes (1982: 179), a curriculum developer undertakes formative evaluation mainly for 'the purpose of revising and improving the course'. Hence within the framework of formative evaluation, the duration a programme has taken is not a major issue. It is within this paradigm that this study, based on the summative evaluation results of KNEC, already presented, decided to attempt a formative assessment

of this curriculum intervention.

Table 1.2 presents performance by gender, marks and percentage in 1999 KCSE examinations in mathematics and science subjects. It is observable from the table despite the fact that both girls and boys performed poorly in all the subjects, girls' achievement was still lower than that of boys. The worst hit subject was mathematics where girls had an average score of 9.98% against boys' 14.28%. Biological science followed, then physical science, chemistry and lastly, physics. The best-performed science subject among girls was biology, in which girls had an average score of 33.73%, but in which they still stood low compared to boys' score of 37.04%.

**Table 1. 2: KCSE Mean Scores in 1999 Maths and Science Subjects by Gender**

Subject	Marked Out of	Boys		Girls	
		Marks	%	Marks	%
Mathematics	200	28.28	14.28	19.96	09.98
Biology	140	51.85	37.04	47.22	33.73
Physics	140	44.47	31.76	39.29	28.06
Chemistry	140	42.64	30.46	37.55	26.82
Physical Science	140	32.53	23.24	28.24	20.17
Biological Science	140	30.22	21.56	25.31	18.08

Source: KNEC (2000b)

NB: For purposes of clarity, I calculated the percentage (%).

It is noted that even in the 2000 KCSE the trend was the same. Waihenya

(2001, Feb 28<sup>th</sup>), however, reports that just like in 1999, the performance of both boys and girls in KCSE mathematics and science subjects was dismal compared to other subjects. The writer particularly notes that boys performed far much better than girls in the subjects.

Table 1.3 presents performance by gender and percentage in 2001-2002 KCSE examinations in mathematics and science subjects. It is observable from the table that like in Table 1.1 and Table 1.2, both girls and boys performed poorly in all the subjects and girls' achievement is still lower than that of boys. Even though slight improvement is noted in mathematics, physics and chemistry, over the two years, the gender disparity is persistent.

**Table 1.3: KCSE Mean Scores in 2001-2002 Maths and Science Subjects by Gender**

Subject	2001		2002	
	Girls (%)	Boys (%)	Girls (%)	Boys (%)
Maths	15.83	21.69	16.44	22.53
Biology	29.52	33.59	24.58	28.34
Physics	22.22	26.84	26.61	30.89
Chemistry	21.45	25.31	22.05	26.62
Biological Science	25.20	23.81	14.89	19.49

Source: KNEC (2003)

The results already presented are contrary to the expectation of the government

as implied in the NDPs and the NPGD that such strategies as the novel **The River and the Source** would motivate girls to achieve as much as boys in mathematics and science subjects and this would lead to gender parity in education and eventually in the entire society. These results, coupled with the consistent poor performance of girls in the subjects over the years, raise a major concern on the status of girl-child education in the country. Perhaps, the most critical question one asks is: Does the novel **The River and the Source** have any influence on secondary school girls' learning of science?

In this study, the science subjects under consideration include all the five KCSE science subjects already mentioned, viz: biology, physics, chemistry, physical science and biological science. According to the K.I.E. syllabus, any two of these science subjects are compulsory for KCSE. However, physical science can only be combined with biological science and vice versa.

## **1.2 Statement of the Problem**

Globally, the low participation of girls in science education is alarming. In Kenya, the persistent poorer performance of girls in science subjects compared to boys is problematic. This is because the population of the country is largely female and excellence in the subjects is considered vital for socio-economic development. The poorer performance of girls has been attributed to several factors such as psychological barriers (e.g. girls' negative attitudes towards

learning science, low level of self-confidence and poor self-concept), inadequate facilities, lack of qualified teachers, poor teachers' and parents' attitudes towards girls' learning of science subjects, and lack of career guidance and counselling.

The government has put in place various strategies (such as motivation of science teachers, provision of female teachers to act as role models, improving the learning environment for girls, provision of social, psychological and economic support and so on) to counteract these impediments. Among the strategies is the teaching of the novel **The River and the Source** introduced to counteract the psychological barriers. Against this background, this study set out to investigate the influence that the novel **The River and the Source**, as a strategy, has on secondary schoolgirls' learning of science. In an attempt to assess the source of the influence, it also investigated how the novel is taught and learnt in schools.

### **1.3 Purpose of the Study**

The purpose of the study was to explore the role the novel **The River and the Source** plays in secondary schoolgirls' learning of science. It also set out to describe how the novel is taught and learned in schools.

#### 1.4 Specific Objectives

The study set out to meet the following specific objectives:

- To explore the influence the novel **The River and the Source** has on secondary schoolgirls' learning of science.
- To describe the teaching and learning processes under which the influence operate.
- To make policy recommendations based on the findings.

#### 1.5 Research Questions

The study attempted to answer the following questions:

- Does the study of the novel **The River and the Source** make secondary schoolgirls like learning science?
- Does the study of the novel **The River and the Source** enhance secondary schoolgirls' level of confidence in learning science?
- Does the study of the novel **The River and the Source** inspire girls to aim at pursuing science-related careers after school?
- Does the study of the novel **The River and the Source** change secondary school boys' perception of girls' learning of science subjects?
- What pedagogical approaches do teachers adopt in the teaching of the novel **The River and the Source**?

## **1.6 Significance of the Study**

The data gathered in this study can be used by the stakeholders in girl-child education particularly the Ministry of Education, Science and Technology in coming up with appropriate strategies meant to reduce gender disparity in science. The findings on curriculum experiences of girls, in particular, can be useful in selecting gender appropriate set books for future study in the literature curriculum in order that girls' excellence in science be realized. This is important given the fact that literature set books last for a very short time in the curriculum before they are reconsidered. Lastly, the pedagogical evidence presented in the study of the novel **The River and the Source** can be used by curriculum developers and teacher educators in organising appropriate in-service courses meant to give teachers the relevant skills needed in teaching the novel in order that it may influence girls' learning of science.

## **1.7 Delimitations and Limitations of the Study**

This study focused only on the teaching and learning of the novel **The River and the Source** in Migori District, Nyanza. It means that other factors affecting girls' learning of science subjects both within and outside the school were not taken care of by the study. The study was also limited to only one district, out of the twelve in Nyanza Province, Kenya. This limits the extent of generalisation of the findings to the other eleven districts in the province and to the rest of Kenya even though the same novel is taught in all schools. This is

because Migori District may be influenced by unique student and school factors that may not be in the rest of the country. Lastly, my intensive exploration of the study of the novel in the whole district was limited by the time and money available for this research.

### **1.8 Assumptions**

The following were assumed by the study:

- Literature influences people's attitude towards and perception of life.
- Psychological factors affect girls' learning of science subjects and they can be removed.

### **1.9 Theoretical Framework**

The theoretical framework of the study is based on two theories: liberal feminism and generalization theory of transfer of learning. The two theories complement each other in the study.

Liberal feminism is a gender theory based on egalitarianism. The theory, as noted in Encyclopaedia Britannica (1993), dates back to Mary Wollstonecrafts' **A Vindication of the Rights of Woman**, published in England in 1792. A major work is also noted in Simone de Beauvoirs' **The Second Sex** published in 1949. The theory argues that merit and not birth should be the basis for social advancement and achievement. Education and curriculum in particular

are seen as essential in the realisation of an egalitarian society. It emphasises equal participation of all children in education regardless of sex. A major early proponent of the theory, Friedan (1963:318), notes:

A massive attempt must be made by educators and parents and ministers, magazine editors, manipulators, guidance counsellors to stop the early marriage movement, stop girls from growing up wanting to be 'just a house wife', stop it by insisting... that girls develop the resources of self, goals that will permit them to find their own identity.

The theory therefore points to the need to develop strategies, which can remove the barriers that exclude girls from participating in education (Davies, 1994). Such barriers include the psychological barriers such as lack of self-confidence, lack of interest in learning, fear of success and the gender stereotypes held by boys. These barriers impact negatively on girls' participation in education especially in their learning of maths and science subjects (Kelly, 1987). Hence to counteract the barriers, such strategies as the removal of gender stereotypes in textbooks and the inclusion of women of excellence in school texts have been adopted (McMurchy et al, 1983; Obura, 1991). The study of the novel **The River and the Source** is therefore one such strategy. In the novel, the stereotyped gender roles are reversed and the image of the woman in the society is exalted (Roche and Musyoka, 1998; Wegesa, 1999). Hence, the novel is of relevance to the educational needs of secondary schoolgirls.

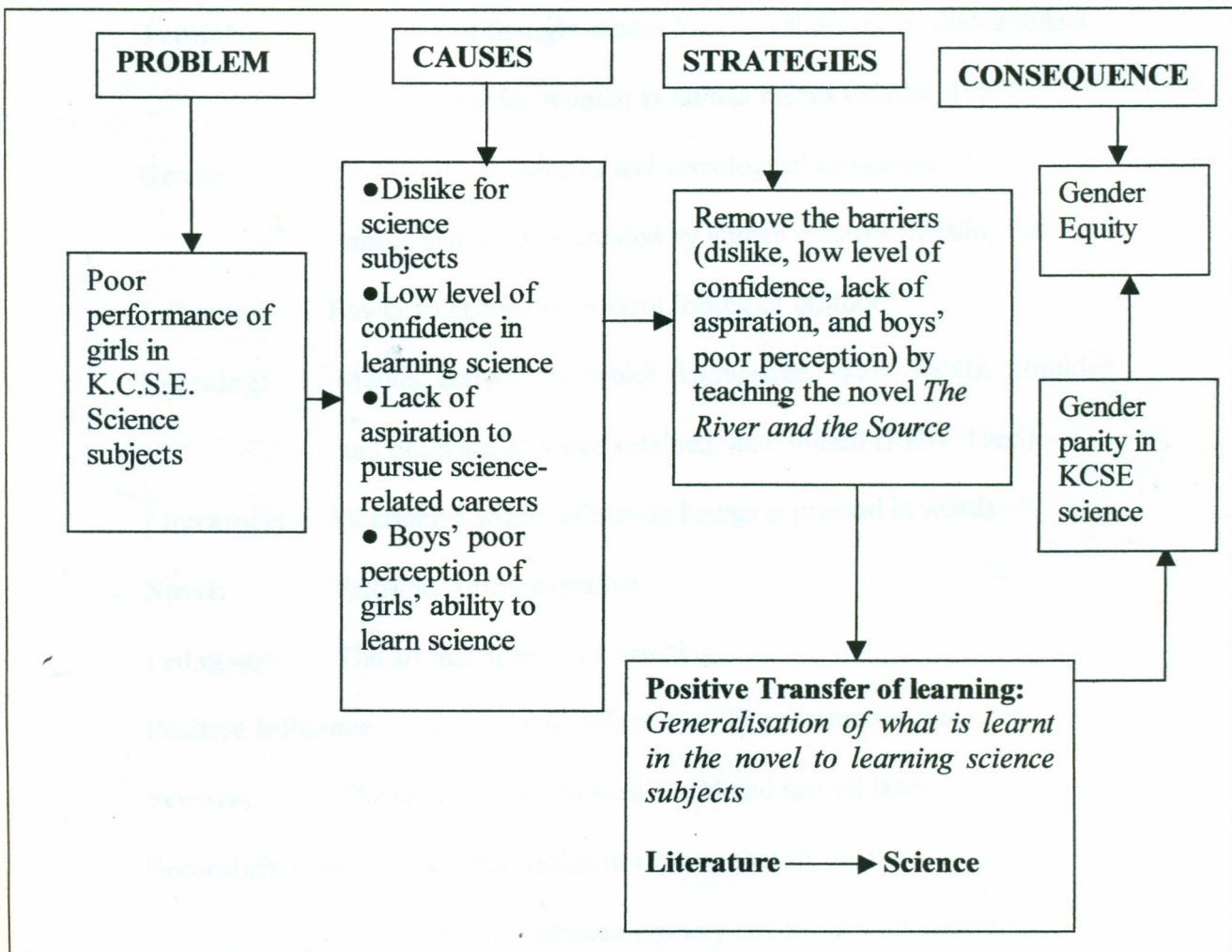
In this study, the liberal feminism theory sets the wider gender framework upon which the research problem is based. By establishing the influence the novel has on girls' learning of science, the study sought to establish the extent to which the psychological barriers have been removed.

The generalization theory of transfer of learning observes that appreciable education results cannot be realized unless the necessity of imparting attitudes that function generally is taken into consideration. This will make it possible for experiences (such as habits, orderly procedures, ideals e.g. neatness, accuracy, perseverance, problem-solving skills, satisfaction with success etc) obtained in one situation to be applicable to other situations (Kelly, 1965; Oliva, 1992; Perkins and Salomon, 1994). Perkins and Salomon note that it is possible for 'far transfer' to occur between situations that on appearance seem remote and opposed to one another. For instance, one can apply a basic strategic football principle, such as 'make use of the wings' to business practice, political or military campaign. The major early proponent of the theory, Judd who was writing in 1915 as quoted in Kelly (1965:309) notes that:

The important psychological fact is that the extent to which the student generalises his training is itself a measure of the degree to which he has secured from any course the highest form of training. One major characteristic of human intelligence is to be defined by calling attention to the fact that a human being is able to generalise his experience.

In this study, following the theory, it is expected that the girls will generalize whatever is learnt about the female characters in the novel **The River and the Source** to their own learning of science subjects. This is expected to eventually impact on the removal of the psychological barriers. So this will lead to their doing well in the science subjects. A conceptual model of the study as synthesised from the theoretical framework is illustrated in figure 1.

**Figure 1: A Conceptual Model of the Study**



**Source: I have synthesised this model from the theoretical framework**

### 1.10 Definitions of Significant Terms

- Attitude:** A habitual mode of thought or feeling that influences behaviour.
- Curriculum:** All the selected, organised, evaluative and innovative educational experiences provided to the learners consciously or unconsciously under the school authority in order to achieve designated learning outcomes (Malusu, 1997).
- Feminism:** A school of thought whose beliefs, values and attitudes reflect high regard for women as human beings (Matlin, 1987).
- Gender:** Psychological features and sociological categories of males and females created by human cultures (Matlin, 1987).
- Influence:** Power to change or control feeling or attitude
- Learning:** Mental activity by which knowledge, skills, habits, attitudes and deals are acquired retained, and utilised (Kelly, 1965).
- Literature:** All creative works of human beings expressed in words.
- Novel:** Fictitious prose narrative.
- Pedagogy:** The art and science of teaching.
- Positive influence:** Favourable, affirmative, or constructive influence.
- Science:** The study of the physical world and natural laws.
- Secondary school:** The educational institution that serves the level of education between primary and tertiary education.
- Stereotypes:** Organised set of beliefs about people or things.

### **1.11 Organisation of the Thesis**

This thesis is organised into five chapters. Chapter One is an introductory chapter, which deals with the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, assumptions of the study, significance of the study, delimitations and limitations of the study, theoretical framework and definitions of significant terms. Chapter Two is a review of literature related to the study. The literature is reviewed under two subsections: the psychological factors affecting girls' learning of science subjects and the influence of the study of literature on peoples' perception of life. The knowledge gaps to be fulfilled by the study are also presented in the review. Chapter Three presents the methodology adopted in conducting research. This includes such details as the research design, study locale, and target population, sample and sampling procedures, research instruments and procedures for data collection and analysis. In Chapter Four, data are presented, analysed and discussed. Chapter Five presents a summary of research findings, conclusions, recommendations of the study and suggestions for further research.

### **1.12 Justification for Use of First Person Point of View**

Most research reports are written from the omniscient point of view. However, this report has been mainly written from the first person point of view. The omniscient point of view has also been used. Since a larger portion of data

analysis and discussion of the thesis is based on qualitative data, I feel that using the first person point of view enables me to take responsibility for whatever I report. Winkler (1989:2-3) reports that the rules of writing research reports are now relaxed and writers can use the first person point of view. He says:

Lately, however, many prestigious journals have relaxed their rules. Authors are now allowed to use the 'I' or 'We' point of view when reporting research data or when drawing attention to their findings.

Magoma (1999), and Bunyi (1996) support the use of this point of view. Bunyi argues that the point of view enables the researcher to take responsibility for his or her report. The style of writing has been utilized by several feminist researchers including Coutler (1995), Marshall (1999) and Luke (1998).

## CHAPTER TWO

### REVIEW OF RELATED LITERATURE

#### Introduction

A review of the available literature has revealed that no research has been done on the influence that the study of the novel **The River and the Source** has on secondary schoolgirls' learning of science. Much research on gender disparity and science education has concentrated more on establishing causes of gender disparity rather than on the evaluation of the strategies put in place to reduce the phenomenon. The little available literature on the influence of the study of literature on secondary schoolgirls' learning of science is however general in nature and not linked to the novel being studied. The literature, nevertheless, provided the essential links needed to derive the objectives of the study. The review is under the following two main sub-headings:

- The psychological factors affecting girls' performance in science subjects.
- The influence of the study of literature on people's perception of life

#### 2.1 Psychological Factors Affecting Girls' Performance in Science Subjects

Studies have found that several psychological factors such as deficiency in interest, confidence and aspiration to pursue science-related careers affect girls' learning of science subjects. In other studies, boys' poor perception of

girls' learning of science subjects has also been identified as a major barrier. The review of related literature on the psychological factors is divided into two sub-sections: studies in Kenya and studies outside Kenya. The last section reviews literature on strategies to remove the psychological barriers.

### **2.1.1 Studies in Kenya**

Eshiwani (1985) conducted a survey on secondary schoolgirls' access to science and mathematics in higher education. He found that girls have low motivation to pursue mathematics and science subjects. Torongey (1986) conducted a survey on the problems experienced by girls in learning physics at 'O' level and their implications on girls' interest in the subject. He found that girls lack confidence in handling apparatus and are easily influenced by the general belief among older students that physics is difficult.

Wachanga (1987) conducted a survey on the factors that affect girls' learning of 'O' level chemistry and their effects on achievement in some co-educational schools. He found that girls' attitude towards chemistry was negatively influenced by poor teaching methods, mathematical aspects of chemistry, teachers' attitude towards girls' learning of science subjects, and lack of confidence in handling laboratory apparatus.

Museve (1993) did a survey study on the influence of gender on the choice of

science related careers among form three secondary school students. She found that most girls considered science-related careers too hectic for them and very few considered the high status jobs to be suitable for them. She found that both boys and girls considered all the high status jobs she asked about to be more suitable for men than for women. The research suggests that girls have a negative perception of their ability to succeed in science careers.

Gichura (1999) conducted a survey of the factors that influence secondary schoolgirls' performance in science subjects. She found that girls have a negative attitude towards science. She also found that given a choice, girls preferred arts-based courses to science courses. They felt that arts subjects are easier to pass and that they have more career opportunities for them.

Kakonge (2000) carried out a survey on gender differences in entry, attainment and teachers' perspectives in science subjects in secondary schools. She found that teachers had a negative perception of girls' ability to learn science. Majority of the teachers highlighted that girls have less positive attitudes towards learning science subjects, participate less during lessons, have less favourable learning strategies and aspirations, and are hampered by various social and psychological factors in the learning process.

### **2.1.2 Studies Outside Kenya**

Mfou et al. (1997) conducted surveys on students' attitudes to teaching and learning of science, mathematics and technology subjects in secondary schools in Cameroon, Ghana, Tanzania and Uganda. They found that girls consider science and mathematics to be difficult; they think the subjects are meant for boys and are not important for their future life after school. In addition, they also found that the girls are not exposed to the science-based careers available to them; that they are generally lazy; have poor self-concept; lack incentive and generally believe that careers in arts-based courses take a shorter time to accomplish than science-based careers. Further, the researchers established that very few boys believed that science is more important for girls than for boys or that girls can do better than boys in science.

Hatchel (1998) carried out a survey on the entry of girls into higher secondary sciences among girls in year 10 classes in Australia. The researcher found that lack of female scientists in historical records negatively influence girls' perception of sciences.

### **2.1.3 Strategies to Remove the Psychological Barriers**

On removal of the barriers, Gachukia (1994) and Godia (1997, Feb 15<sup>th</sup>) have written on the need for more female science teachers to be provided in girls schools to act as role models, the need for girls to be exposed to many women

in science-oriented careers and the need to change the negative stereotyped attitudes of science teachers about the academic potential of female students. Further, Obura (1991) has written on the need to remove the gender stereotypes in educational materials including textbooks. Similarly, the 1997 NPGD outlines the strategic objectives for removing the barriers as improvement of the learning environment of the girl-child, development and adoption of curricular teaching materials and textbooks to improve the self-image, lives, work and opportunities of girls (Republic of Kenya, 1997c).

Nyakan (1987), in his survey on secondary schoolgirls' attitudes towards O' level Physics in Kenya, found that strategies such as provision of science textbooks, formation of science clubs in schools and construction of laboratories could positively influence girls' negative attitudes towards science. In addition, in her study described above, Hatchel (1998), found that through encouragement, girls could be influenced to succeed in learning science.

Lastly, the Ministry of Education (currently the Ministry of Education, Science and Technology), Ministry of Research, Technical Training and Technology and the Forum for African Women Educationalists (FAWE) in Kenya conducted an experimental project among nine girls' secondary schools. The project was meant to change the attitudes of teachers and girls towards

mathematics and science through guidance and counselling of girls, improving teaching facilities in science and providing in-service training for science and mathematics teachers. The project realized a positive change in the attitude of girls towards science. Within three years (1994-1997), the overall KCSE results for the pilot schools had improved by 66.66% (FAWE, 1998).

The literature reviewed above demonstrates that both within and outside the country, psychological barriers are a major impediment to girls' learning of science subjects and that these barriers can be removed through encouragement, improving the learning environment, guidance and counselling. The current study, however, intended to find out if the psychological barriers could be removed through the teaching of the novel **The River and the Source**.

## **2.2 The Influence of the Study of Literature on Peoples' Perception of Life**

Several scholars who have written about literature as a discipline argue that the study of literature is educative. This means that the study of literature can lead to the acquisition of desirable knowledge, skills and attitudes. Brooks et al (1964) observe that literature is a product and a commentary on life process. By studying it, we get to know the meaning of experience. It enlarges our experience of the world and of ourselves and brings forth a new world and a new outlook to the world we have gone through. Gachukia and Akivaga

(1978), emphasise that literature has a role in shaping peoples' attitudes towards life. They emphasise that the writer tries to persuade readers to accept a given view of life from a given dimension on behalf of a class, race or nation.

Tomlinson and Ellis (1980), emphasise that the study of literature, provides students with a multiplicity of experiences, philosophies and attitudes of other societies. As a result, the students become more informed and tolerant of the world outside their own. In addition, the study of literature can make students realise their true capabilities as they compare with the characters encountered in literature. Ngugi (1981), observes that literature is a class-conscious product of the society, which reflects the struggle of one class to emancipate itself from oppression by another class. Thus, the purposes of literature include sensitising people against social injustice. This implies that literature can act as an invaluable tool for sensitising girls against the gender stereotypes that bar them from competing favourably with boys in sciences.

Gomile-chidyaonga (1996), has written on the role of literature in girl-child education campaign in Malawi. The author notes that in a pilot project, Theatre for Development (which won the Agathe Uwilingiyamana Award), performing and creative arts were used to mobilise communities to encourage girls to enrol and stay in school. The project had quite impressive results: girls' performance improved tremendously, enrolment rate rose, low dropout was realized and

some girls were able to come back to school having dropped out due to pregnancy or early marriage. Further, some parents vowed to delay marrying off their daughters until after they had finished schooling. The village elders in particular refused to allow young girls in their villages to be married early. This shows that literature can serve as a tool for persuading people to change their gender stereotyped attitudes and practices.

Other scholars such as Msosa (1982) notes that the study of literature can lead us into understanding the totality of life on which our daily concerns are based. Short and Candlin (1989) have also observed that literature is a vital aid to learning. Hence, it can be used to pass across useful experiences that can influence peoples' perception of life.

In a study in Kenya, Rimbui (1982) carried out a survey of secondary students' attitudes towards literature in English. He found that students felt that literature interprets life, sharpens their intellectual faculties, and enables them to understand the socio-economic forces, which shape the society. They also felt that the knowledge acquired through literature could help them adapt to their environment.

In Australia, Martino (1995) conducted an experiment on the impact of the study of a short story, *The Altar of the Family* by Michael Wilding, on boys'

perception of gendered discourses in a coeducational Catholic secondary school. The researcher found that stories, which do not render the gender issue as problematic, are the best in curbing personal antagonism between boys and girls. Such stories make the students reflect on the impacts of the stories upon their lives. She found that the boys were able to empathise with the main character in the story, who is a victim of gender stereotypes. The study suggests that the study of literature can positively influence secondary schoolboys' perception of girls in schools. However, the current study intended to find out whether the study of the novel **The River and the Source** could have the same impact on boys in relation to girls' learning of science subjects.

James (1999), conducted a qualitative action research on the impact of fictitious narratives on peoples' perception of life among informants of a seminar in Australia. He found that the narratives provided conditions for the informants to speak their feelings and thoughts thus giving way to an exploration of cultural beliefs to which these feelings are tied. He established that whatever was learnt in stories led to composition of feeling, thought and action in culturally relevant context. Private issues affecting individuals could be brought out into the public cultural domain for sharing. This study shows that the study of literature can provoke a sharing of issues and thoughts affecting individuals thus enabling them to learn from one another. The current

study, intended to find out the influence that the study of the novel **The River and the Source** may have on secondary schoolgirls' lives in relation to their learning of science subjects.

On the teaching and learning of literature, Moody (1971) emphasises that the duty of literature teachers should be that of teaching literature to have a special impact on the students. He adds that the teacher should not be concerned with producing any form of robot behaviour, which is meaningless to the students. Loise (1975) highlights that whatever a student learns from any literary text will greatly depend on what the student thinks about literature, what he experiences from the text and how he is taught. Rimbui (1982) in his study stated above found that positive attitudes that students develop towards literature come about when teachers make the subject lively and involve students in discussions and improvisations; on the other hand, unfavourable attitudes come about when teachers make the subject boring, over rely on guidebooks and use the lecture method.

The above reviewed literature indicates that the study of literature has an influence on people's perception of life. It also informs of the teaching learning processes under which such influence is possible. Following these earlier works, the current study sought to find out the specific influence that the study of the literary text, the novel **The River and the Source**, has on secondary

schoolgirls' learning of science as well as the teaching learning processes under which such influence operates.

### 2.3 Summary of the Chapter

The literature reviewed in this chapter highlights that psychological barriers are a major impediment to girls' learning of science subjects and that the barriers can be removed. The literature also highlights that the study of literature has an influence on peoples' perception of life. However, the current study intended to find out whether or not the study of the novel **The River and the Source** can remove the psychological barriers that impact negatively on secondary schoolgirls' learning of science and at the same time explore the pedagogical processes under which the novel is studied.

## CHAPTER THREE

### METHODOLOGY

#### **Introduction**

In this chapter, procedures and strategies used in the study are described. The research design, sampling procedures, research instruments and the methods used in data collection, analysis and presentation are discussed.

#### **3.1 Research Design**

The study set out to explore the influence the novel **The River and the Source** has on girls' learning of science. It also explored the teaching and learning processes under which such influence operates. The study was both quantitative and qualitative in nature. The research design adopted was a descriptive survey, which was followed by a descriptive case study. Verma and Beard (1981) observe that the two approaches usually complement each other in many research studies.

#### **3.2 The Study Locale**

The study was conducted in Migori, which is one of the eight districts in Nyanza Province, Kenya. Singleton (1993) observes that the ideal setting for a research study is one that directly satisfies researchers' interests. Having taught in Migori District, I had professional interest to do research in the area. My awareness of the gender disparity that exists in performance in science subjects

in Migori District (Republic of Kenya, 2000a) also influenced me. Further, Rabari (1992) observes that gender disparity in achievement is wider in rural than in urban areas, hence a rural district was an ideal setting for the research. Moreover, the 1997 NPGD recommends that more data on girl-child education be gathered from the rural parts of the country (Republic of Kenya, 1997c).

In addition, Singleton observes that the ideal setting for any study should be easily accessible to the researcher and should be that which permits instant rapport with the informants. I chose Migori District because it was easily accessible to me. I was familiar with most teachers in the schools hence data collection was not likely to be hindered by their hostility due to suspicion. However, Wamahiu and Karugu (1995) and Magoma (1999) point out that familiarity with the informants has its own problems as sometimes the informants may refuse to cooperate with the researcher since they would feel that he/she already knows the answers to his /her questions. However, whether working with a familiar or unfamiliar group, the researcher must learn to handle the informants carefully. I gained cooperation in the research by establishing good working rapport with the informants. Within two weeks after engaging the informants and myself in informal talks about the teaching profession and about life in general, I was able to forge an excellent working atmosphere with them.

### 3.3 The Target Population

For the descriptive survey, the target population comprised all the 634 Form Four girls in the nine girls' and 18 co-education public secondary schools in the district, and 384 Form Four boys in the co-education schools. For the descriptive case study, the target population comprised all the 87 girls, 26 boys in Form Four, four teachers of Integrated English and nine of the three science subjects (chemistry, physics, and biology) in the two schools.

I targeted the public coeducational and girls only secondary schools because girls were the major interest of the study. At the same time, I could easily find boys, a minor focus in the study, in the coeducational schools. Even though in Kenya there are private schools as well, I decided to target public schools because they constitute by far the majority of schools in Kenya (Republic of Kenya, 2000b).

I targeted the Form Four girls because they had studied the novel **The River and the Source** for the past one-year hence could answer questions about it much better than the Form Threes who had just been introduced to it. I targeted the Form Four boys because they were part of the girls' learning environment hence could not be isolated from the totality of girls' educational experience. In addition, other studies cited in chapter two have indicated that boys' negatively affect girls' learning of science subjects.

I targeted both English and science teachers because the former taught the novel **The River and the Source**, hence, could give information on the pedagogical approaches teachers adopt in the teaching and learning of the novel while the latter taught science subjects which were of interest in the research and hence could provide data on girls' change or lack of change of attitude towards learning science subjects.

### **3.4 Sample and Sampling Procedures**

The sample for the study was selected as follows:

#### **3.4.1 Research Sites**

For the descriptive survey, I used the purposive sampling to select 10 schools to act as research sites. The figure is more than the minimum sample (20%) required for descriptive studies (Gay, 1992). I selected five girls' schools and five co-education schools. These were those schools in which the teaching and learning of the novel **The River and the Source** was going on. Other schools had not started teaching the novel. In the selected schools, all the students had read the novel though they had not finished discussing it. Quinn (1992) emphasises that the 'significance field' of a literary text, that is the readers' response (or what the reader makes of the text), unfolds as the text is read. He adds that the text controls not only what we think about what we read but also how we are to think about what we read. The implication is that the onset of

literary appreciation is the reading of a literary text and discussion only enriches the appreciation. Against this background, I decided to select those schools in which the students had finished reading the novel.

For the case study, I purposefully selected two schools, Mama Selah (girls only) and Ungoye (co-education), out of the 10. For the sake of anonymity, Mama Selah, Ungoye and all other proper nouns given to informants and schools involved in the study are pseudonyms. The two schools provided information- rich cases for detailed study (Patton, 1990). Patton explains that information rich cases are those from which one can learn a lot about the purpose of the research. I selected these schools considering the gender of the teachers. Mama Selah was the only girls' school out of the five in which a female teacher taught the novel while Ungoye was the only coeducational school out of the five in which a male teacher taught the novel. The gender factor, though not specifically investigated in the study, was a vital consideration in sampling since the teaching of literature in English in Kenya is done by both sexes.

Patton highlights that typically, qualitative inquiry focuses in depth on even single cases. In this study, I purposefully selected only one Form Four stream in each of the two case study schools. (Ungoye was single streamed; hence, I selected the only Form Four stream. Mama Selah was double streamed and in

both streams female teachers taught the novel. However, I selected only one stream. In selecting the stream to study, I considered the fact that the teacher of English had stayed in the school much longer (for six years) hence she knew the students much better than her counterpart in the other stream who had been there for only one term.

### **3.4.2 Informants**

I used the simple random sampling to select 126 girls and 76 boys [20% of the students' population as in Gay (1992) recommends for survey studies] from the 10 schools to respond to the questionnaire. After obtaining the names of the students from the class register, I wrote them on pieces of paper, stack them in a box and picked out the required number at random. On average, I selected 13 girls and 15 boys per school.

During the case study, I purposefully selected 20% of the girls and 20% of the boys in the case study classrooms (as highlighted by Gay, 1987) for interview. I selected the students considering their participation in class. I selected only those who appeared to be active in class. I felt that these students would be able to give me more information than the less active ones. Wamahi and Karugu (1995), highlight that in an ethnographic interview, only those who are able to give as much information as possible about the purpose of the research should be selected.

In Mama Selah, the classroom under observation had 37 girls and I selected eight for interview. In Ungoye, there were 39 students: 13 girls and 26 boys and I selected six boys and six girls. In total, I interviewed six boys and 14 girls. I also interviewed in Ungoye, four Form Four teachers: one of Integrated English, Mr. Odundo while the other three were of the three science subjects: Mrs. Kamau (physics), Mr. Wafula (chemistry) and Mrs. Okumu (biology). In Mama Selah, I interviewed three teachers, one of Integrated English, Mrs. Owuor, while the other two were of the three science subjects: Mr. Odera (physics and chemistry) and Mrs. Otiende (biology). A summary of the study sample is provided in Table 3. 1 below.

**Table 3. 1: Summary of the Study Sample**

Research Design		Target Population				Sample			
		Students		Teachers		Students		Teachers	
		Girls	Boys	English	Science	Girls	Boys	English	Science
Survey		634	384	-	-	126	76	-	-
Case Study: Mama Selah	Classroom Observation	74	-	2	6	37	-	1	2
	Interviews	74	-	2	6	8	-	1	2
Case Study: Ungoye	Classroom Observation	13	26	2	3	13	26	1	3
	Interviews	13	26	2	3	6	6	1	3

**3.5 Research Instruments**

Questionnaires, interviews and observation schedules were my data gathering

devices. In the process of developing the instruments, I consulted the supervisors who as experts found the instruments were appropriate for obtaining the needed information.

### **3.5.1 Questionnaires**

I prepared two student questionnaires for both girls and boys (see appendices I and II). The questionnaires were both open-ended and closed-ended. Kathuri and Pals (1993) emphasise that whereas the open-ended types of questions give informants freedom of response, the closed-ended types facilitate consistency of certain data across informants. While the girls' questionnaire focused on the influence that the novel **The River and the Source** has on girls' learning of science subjects as well as the pedagogical processes under which such influence operates (see research questions 1,2,3, and 5), the boys' questionnaire focused on the influence the novel has on boys' perception of girls' learning of science subjects as well as the pedagogical processes under which such influence operates (see research questions 4 and 5).

### **3.5.2 Interview Schedules**

I used the interview schedule as a follow-up instrument to gather more data to complement the quantitative data from the questionnaires. I made four separate interview schedules (see appendices III, IV, V and VI) for the following informants: girls, boys, teachers of English, and teachers of the three science subjects (physics, chemistry and biology). The interview with the

students involved both focus group discussions and individual interview. However, the one for teachers was a semi-structured individual interview.

### **3.5.3 Classroom Observation Schedules**

I used two observation schedules to observe live lessons. One schedule was structured for obtaining only the necessary information from the literature lessons and the other for science lessons. The schedule for literature lessons focused on teachers' behaviour in the classroom, language of instruction, and pupils' participation, all meant to answer research question 5. The schedule for science lessons focused on girls' participation in the science class as well as the salient gendered discourses in the science classrooms. These were meant to answer research questions 1 to 4.

### **3.6 Pilot Study**

Wiersma (1995), points out that piloting of research instruments is very useful in finalising them. Bell (1993), emphasises the role of piloting in ascertaining the validity of research instruments. It was necessary that I piloted the instruments to determine their validity since they had never been used in any study before. It was also necessary that I checked for ambiguity, confusion and poorly prepared items.

I purposefully selected three schools in the district (outside the main study

sample) in which the teaching and learning of the novel was going on, for piloting the instruments. The schools were: Odera Chune (coeducational), Nyaligunga (girls' only) and Nyadero (girls' only). I randomly selected from each school 13 girls (20%) and 12 boys (20%) to fill in the questionnaires. To ascertain the validity of the interview schedules, I interviewed six girls (10%) and six boys (10%). I also interviewed, four Form Four teachers (one of Integrated English and three others of the three science subjects) who I had randomly selected from each of the two pilot schools. For the classroom observation schedule, I carried out observations during class sessions in one Form Four stream in each of the two schools for two weeks. In total, I observed per school two lessons involving the teaching of the novel and six for the three science subjects (two per each). Following the pilot report, I revised the instruments as necessary (e.g. by addition of extra items and removal of ambiguous items in the questionnaires and interview schedules) for the final data collection.

### **3.7 Validity and Reliability**

In qualitative research, concepts of validity and reliability are rather complex. Nevertheless, ensuring the validity and reliability of data collected is important. Wiersma (1995), emphasises that ensuring validity in a qualitative research involves the application of a good research method. The author agrees further that it is necessary that the researcher develops a relationship with the

informants, who will enable him or her to gain access to reliable information, uses a variety of data collection techniques and collects adequate data.

I ensured validity of the instruments by checking that the items were appropriately worded and focused on the research questions. I also sought expert advice from my supervisors who evaluated the instruments and confirmed that they were valid. In addition, I tried to establish a good rapport with my interviewees. Further, I also gathered comprehensive data by using a variety of data collection procedures, which included classroom observations, teachers' and students' interviews, and students' questionnaires. These enabled me to thoroughly explore the issues under investigation.

To establish the reliability of my questionnaires, I used the **split-half method**. In this case, I administered the questionnaires to the 26 girls' and 12 boys' I had selected from the three schools. I then divided the questionnaires into two comparable halves by including all odd items in one half and all even items in the other half. I thereafter computed each student's score on the two halves. Consequently, each student had two scores: a score for the odd items and a score for the even items. Using the **Pearson r correlation formular**, I correlated the two scores to get a split-half reliability coefficient of **0.926** for girls' questionnaire, and **0.965** for boys'. Finally, I applied the **Spearman-Brown correction formular** to get a total reliability coefficient of **0.962** for

girls' questionnaire **and 0.982** for boys' questionnaire. I concluded that the questionnaires were very reliable. According to Gay (1992) any instrument with a reliability coefficient of **0.8** and **1.0** is acceptable as reliable enough.

Concerning ascertaining the reliability of the interview schedule, Gay (1992) recommends that the guide should be pre-tested on a small sample from the same population and the feedback used to revise the questions in the guide. By selecting six girls, six boys and four teachers from the three schools for piloting the interview schedules, and using the feedback to revise the schedules, I was able to come up with very reliable interview schedules.

As far as ascertaining the reliability of classroom observation schedules is concerned, Gay (1992) argues that one of the best of ways of doing this is by the researcher thoroughly training before the observation. By observing two lessons of English and six of the three science subjects, I was able to self-train on what to observe, how they are to be coded and how often (see also section 3.8). The insights gained from this experience enabled me to revise the schedule and hence be sure of its reliability.

### **3.8 Methods of Data Collection**

I conducted this research in the first and second terms of school, between the months of February and May 2001. This was an appropriate time, as the Form

Four classes were not engaged in mock exams (usually taken in July) or in revision for KCSE examinations (usually taken between October to November).

Before I carried out the study, I obtained authority to conduct research from the Ministry of Education. The Nyanza Provincial Director of Education issued me with a letter of authority to conduct research in Migori District. I also informed the District Education Officer of the intended research project. Thereafter, I sought permission from the school headteachers who later on arranged for me to meet the teachers and students.

With the help of the concerned class teachers or subject teachers, as necessary, I personally administered the questionnaires. This ensured the informants did not discuss among themselves the appropriate answers to write. It also allowed me to establish acquaintance with the teachers and make the necessary arrangement with them for classroom observation, especially in the case study schools.

The classroom observation involved naturalistic non-participant observation (Gay, 1992) in which I was present in the classroom during the lessons to be observed in each school. I took the 'outsider looking in' stand and did not interact with the teacher or the students during the lesson. On my seat at the

back of the class for the days I observed the lessons, I simply recorded and studied behaviour as it occurred. According to the syllabus, there are eight lessons per week for Integrated English in Forms Three and Four, half of which are for Literature in English. Also, there are five lessons per week for each of the three science subjects (physics, chemistry, and biology). Of the four literature lessons, only two lessons set for the teaching and learning of the novel **The River and the Source** were observed per week for a period of two months. Similarly, of the five lessons per week for the three science subjects, only two were observed per subject per week for two months. This helped me to control overlap among some of the lessons in the two case study schools. To ensure further that the observation occurred in, at least, a natural setting, I took precautions not to let the concerned teachers know the observation date in advance. Table 3.2 summarises the number of lessons observed.

**Table 3.2: Summary of the Lessons Observed**

<b>Subject</b>	<b>No. of Lessons per week</b>	<b>No. of lessons per month</b>	<b>No. of lessons for two months</b>
<b>Literature in English</b>	2	8	16
<b>Physics</b>	2	8	16
<b>Chemistry</b>	2	8	16
<b>Biology</b>	2	8	16
<b>Total</b>	<b>8</b>	<b>32</b>	<b>64</b>

Like other data collection techniques, classroom observation has got its own

limitations. Gosh (1992) highlights that observation may be hampered by such factors as prejudice, haste, and conservatism. Peil (1995) and Bunyi (1996) note that the presence of an observer may also have some effect on the observees. However, Peil clarifies that establishing casual friendly contacts can reduce the effect. To minimise these limitations, I self-trained during the piloting stage of the research. This made me to familiarise myself with the technique as well as master the aspects of the observation to concentrate on. Gosh (1992) emphasises that the selection of relevant facts to be observed is very vital for making sound observations. Also, I made two preliminary classroom observations in order to familiarise myself with the observees before the actual observation for data collection was done. During the survey period, I made friendly contacts with the informants. This enabled the teachers and students to be quite comfortable with my presence in their classes and hence they were able to continue with their normal learning as if I were not there.

At the end of the observation, I interviewed the students and teachers. I used individual interview with the teachers and the girls at Mama Selah. I realized that the girls felt at ease with my presence among them. At times, while outside the classroom, they would greet me as if I was one of their teachers, though I had told them that I was one of their colleagues in class. I felt that individual interview with them was more appropriate. Similarly, individual interview with the teachers was more appropriate since I had already

established with them a good working rapport, after I had been allowed to conduct research in the two schools.

For students at Ungoye, I used focus group discussion. This is a fairly new technique of interview. According to Wamahiu and Karugu (1995), in focus group discussions, about six to twelve members are interviewed collectively instead of individually. Wamahiu and Karugu emphasise that focus group discussions are suitable for obtaining data on group attitudes and perceptions especially on sensitive research areas. I used focus group discussions because I realized that the students were rather timid in my presence, hence were not likely to give me reliable data through individual interview. Wamahiu and Karugu add that the interview is like a guided discussion among the informants and the researcher merely acts as a facilitator, his purpose being to ensure that all the informants participate actively in the discussions.

For the discussions, I purposively selected six boys and six girls to participate in two different focus groups. One group was for boys and the other one was for girls. I chose these students considering their gender and the fact that they were the most active in both the science and literature lessons. Wamahiu and Karugu note that the members of each group must share at least two characteristics, though the characteristics differ depending on the nature of the research. During interview, I recorded data by means of audiotapes and field

notes. The tape recording helped me to accurately check the wording of any conversation that I might have wished to quote and to check that the notes were reliable.

It is important to highlight that the interview method as a data collection technique has got its own limitations. One of the limitations is that sometimes it is not possible to get the cooperation of the potential informants. To reduce this, I tried to forge a friendly atmosphere and create a positive attitude towards the informants. Gosh (1992) highlights that establishment of a good rapport between the researcher and the informants is necessary for a successful interview. I believe that the interviews generated information that bridged the gaps in the data gathered by the questionnaires and classroom observations.

### **3.9 Methods of Data Analysis and Presentation**

In this study, quantitative and qualitative data were gathered. Therefore quantitative and qualitative analysis procedures were used. In quantitative analysis, the data, which were collected through the questionnaires, were grouped according to the research questions. Thereafter, I used tally sheets to generate frequency counts out of which I calculated percentages.

As regards qualitative data analysis, I transcribed the pieces of information collected through interview schedules, and observation schedules into written

texts by combining the notes taken and tape recordings into coherent discourse. I then examined the data for completeness and relevance in order to ascertain their usefulness, adequacy and credibility in answering the research questions. I thereafter organised these data and analysed them as per the research questions. During the analysis, I first read the data thoroughly for familiarity. Thereafter, I established the various categories in the data, which were distinct from each other. Thus, whereas quantitative analysis helped me to numerically establish the influence the novel **The River and the Source** has on secondary schoolgirls' learning of science as well as describe the pedagogy of the novel, qualitative analysis helped me to narrate the influence as well as the teaching-learning processes under which such influence operates.

### **3.10 Problems Experienced in the Field**

The most common problem I experienced during data collection was that of absence of teachers during classroom observation due to both official and teachers' personal reasons. In some cases, the teachers had gone for workshops, seminars or meetings, while in other cases; they had gone to attend funerals of relatives or to attend to their children at home. On the other hand, some teachers, at times, simply skipped their lessons.

I also faced the problem of hostile informants. Even though I was familiar with the locale, in one school, the headteacher totally refused to allow me carry out

the study in her school, even with the letter of authority to conduct research, and I therefore had to choose another school. I learned that in data collection, what matters so much is not whether one has the authority to conduct research but ones' individual ability to access information despite all odds. In this case, interpersonal skills are valuable.

Further, I faced the problem of travelling long distances from one school to another and from my place of residence to the case study schools. The period of data collection had much rain and rough weather. I therefore had a lot of anxiety, as some places were not easily accessible by road. In other places, the public transport vehicles available were unroadworthy and I was not always sure of arriving at the schools before the lessons began.

### **3.11 Chapter Summary**

In this chapter, I have described the procedures and strategies that were used in the study. In particular, I have described the research design, the sampling procedures, the research instruments and the methods, which were used in data collection, analysis and presentation. Lastly, I have described the problems, which I experienced during data collection.

## CHAPTER FOUR

### DATA PRESENTATION, ANALYSIS AND DISCUSSION

#### Introduction

In this chapter, data are presented, analysed, and discussed. The study set out to explore the influence that the novel **The River and the Source** has on secondary school girls' learning of science and to describe the teaching and learning processes under which such influence operates. The study attempted to answer the following research questions:

- Does the study of the novel **The River and the Source** make secondary schoolgirls like learning science?
- Does the study of the novel **The River and the Source** enhance secondary schoolgirls' level of confidence in learning science?
- Does the study of the novel **The River and the Source** inspire girls to aim at pursuing science-related careers after school?
- Does the study of the novel **The River and the Source** change secondary school boys' perception of girls' learning of science subjects?
- What pedagogical approaches do teachers adopt in the teaching of the novel **The River and the Source**?

The content of this chapter is organised around the above research questions of the study.

#### 4.1 Influence of the Novel *The River and the Source* on Secondary Schoolgirls' Liking of Learning Science Subjects

During the survey, the questionnaire was administered to 126 girls in ten schools. Out of these, 94 girls (74.6%) indicated that they liked learning science subjects before studying the novel while 32 girls (25.4%) responded that they did not like learning science subjects before studying the novel. This high level of interest in learning science is contrary to the findings of earlier researches. For instance, Gichura (1999) and Mfou et al (1997) found that many girls do not like learning science subjects. This contradiction could be due to the fact that many of the schools I studied were high performers in KCSE (see Appendix X).

In what follows, data on the 32 girls, who did not like learning science before studying the novel, will be presented. Table 4.1.1 presents by percentage the survey data on the influence the study of the novel **The River and the Source** has on the 32 girls' liking of learning science subjects in the ten schools.

**Table 4.1. 1: Percentage Influence of the Novel on Girls' Liking of Learning Science Subjects.**

Description	No. of girls	Percent
Girls influenced by the novel to like learning science subjects.	30	93.7
Girls not influenced by the novel to like learning science subjects.	2	6.3
<b>Total</b>	<b>32</b>	<b>100.0</b>

Table 4.1.1 shows that many of the girls (93.7%), were influenced. This suggests that the novel **The River and the Source** influences girls' liking of learning science subjects. This observation is in concordance with Perkins and Salomon (1994), who note that it is possible for transfer of learning to occur between situations that on appearance seem remote and opposed to one another. Hence it is possible for whatever is learnt in a literary text to be applied to learning science subjects.

During classroom observations, I noted that in Mama Selah majority of the girls liked learning science. They were very active in their science classes: they responded to questions promptly, challenged themselves and their teachers in class and were willing to illustrate their answers to questions on the blackboard when called upon to do so. In one of my observations, I sat in a chemistry lesson, which was largely conducted by the students. These girls had already been given topics to read on for presentation. When the lesson began, Mr. Odera gave the girls 15 minutes each to present on their topics, ask and answer questions. Mr. Odera took the back seat. The students made presentations on their topics with ease and to the satisfaction of the teacher. The other students were also very active in the lesson, as they reacted to their colleagues' presentations. At the end of the lesson, the teacher simply summarised the presentations and gave the students an assignment. This observation, together with similar others, indicated to me that the girls liked

learning science subjects.

During the interviews I held with eight of the girls at Mama Selah, six said that the novel **The River and the Source** had an influence on their liking of learning science subjects. One girl said:

I never liked science subjects because I never believed that I could make it to a higher level but since I read the novel, **The River and the Source**, and saw how Wandia excels, I started working hard so that I could be like Wandia.

Another girl said:

I had a belief that girls are not as bright as boys. They cannot become engineers or be in other science professions but Vera proved me wrong. She is my role model and I am now working hard to become an engineer. I am sure with determination I will make it.

In these responses, the girls describe their change of attitude towards learning science subjects. They express a strong conviction to excel in science subjects just like the characters in the novel. The responses suggest that the novel is a good strategy for counteracting girls' dislike for learning science subjects.

The two science teachers interviewed at Mama Selah supported the fact that most girls in the school liked learning science subjects. Mr. Odera pointed out that there had been a marked improvement in attitude towards science subjects since 1998 (when the novel was introduced). He said that in 1999, the school recorded the highest mean of 7.458 in physics and two of the candidates were

admitted to do Civil Engineering at the University of Nairobi. In chemistry, in the same year, the school had 17 grade As. These results, he stressed, had motivated the girls. He said:

Girls in this school like science. The previous girls' performance inspired them. They read to understand and digest. That is our policy --- Our students know that in science students have to have initiative and think for themselves.

I noted that Mama Selah was a well-established school. According to Mr. Odera, Mama Selah Girls High School was established in 1973. Hence, it is now 28 years old. The school is a provincial double-streamed boarding school. At the time of the study, it had a student population of 354 students. The two Form Four streams had 37 students each. There were 21 teachers: 11 graduates and 10 diploma holders.

I noted that the school had the following basic learning and boarding facilities: playground, school fence, eight classrooms, a library, two laboratories, a home science room, electricity, four dormitories, a dining hall, a kitchen, a school bus and teachers' quarters. For the past five years, the schools' mean in the national examinations has been above average (6.000) as shown in Table 4.1.2 below.

**Table 4.1. 2: KCSE Mean Grades for Mama Selah Girls High School  
Since 1996**

<b>YEAR</b>	<b>SCHOOL MEAN (POINTS)</b>
<b>1996</b>	6.980
<b>1997</b>	6.963
<b>1998</b>	6.556
<b>1999</b>	6.860
<b>2000</b>	7.281

**Source:** Mama Selah Girls High school

**Nb:** The maximum point to be attained is 12.000 (see Appendix IX).

From Table 4.1.2 above, it is observable that even though the performance has fluctuated over the years, it has always been above average. Currently, (the year 2000) the performance is better than in the previous years. This shows that Mama Selah is a good school.

As far as the teaching of Integrated English and science subjects is concerned, there are two teachers of Integrated English, two biology teachers, two physics teachers and two chemistry teachers. The school usually admits girls who score highly in the Kenya Certificate of Primary Education (KCPE). From the discussion with teachers, the girls are admitted with not less than 400 marks out of 700. This suggested to me that the girls were of high intellectual ability. The school's mean of 8.0764 in English in the KCSE of 2000, together with the consistent good performance in English over the past five years, suggested to me further that the girls were good in English hence were able to understand

the novel **The River and the Source** well. It was therefore easy to believe that the study of the novel positively influenced their liking of learning of science subjects. Their positive attitude towards science is also reflected in their good performance in science subjects in KCSE. The table below shows the performance of Mama Selah Girls High School in KCSE science subjects since 1996.

**Table 4.1. 3: KCSE Performance in Science Subjects at Mama Selah Girls High School Since 1996**

<b>YEAR</b>	<b>PHYSICS (POINTS)</b>	<b>BIOLOGY (POINTS)</b>	<b>CHEMISTRY (POINTS)</b>
<b>1996</b>	5.130	7.070	4.660
<b>1997</b>	4.760	6.7377	5.3132
<b>1998</b>	5.667	6.3424	5.4197
<b>1999</b>	7.458	6.9571	6.4419
<b>2000</b>	6.500	7.0700	6.1410

**Source:** Mama Selah Girls High School

**Nb:** The maximum point to be attained is 12.000 (see Appendix IX).

From Table 4.1.3 above, it is observable that even though the performance of the girls in the science subjects over the years has been fluctuating, from the latest results (the year 2000), it is above average. The positive trend shown by these results is consistent with the results in Table 4.1.2 suggesting that the girls are high performers. Hence, from these observations, the teachers' comments and those observations on students' participation in class, I inferred that the study of the novel **The River and the Source** positively influences these girls' liking of learning science subjects.

Things were, however, different at Ungoye Mixed Secondary School. From the classroom observations in the science classes, I noted that a number of girls were somewhat inactive, looked bored, sleepy and listlessly responded to questions in the science classes. However, they appeared to like the biology class. During the interviews with the six girls, only two girls confidently responded that the novel **The River and the Source** positively influenced their learning of science subjects. The other four expressed with difficulty and lack of confidence (a factor that suggested to me that they were insincere) that they liked learning science subjects and that the novel positively influenced their liking of learning science. These four girls stated that they liked studying the novel because it informed them more about the Luo community traditions. The influence that the novel had on their liking of learning science subjects did not feature in their explanations in the open-ended questions.

On further probing, three of the girls cited Akoko and Nyabera as their favourite characters because they are hardworking and make them aware of the Luo community traditions. The other girl cited Becky as a favourite character because 'she works hard in school to become a nurse'. This latter explanation is contrary to what the novel says about the character of Becky – she never works hard in school and she never becomes a nurse. This explanation suggested to me that the girl did not understand the events in the novel. I inferred that the girls, contrary to their statements on the novels' positive

influence, were not influenced by the novel to like learning science subjects.

During interviews with the three science teachers at Ungoye, two of the teachers said that, generally, girls at Ungoye do not like learning science subjects. Mrs. Kamau said:

They have a negative attitude towards physics. Many of them think physics is like maths and so hate it...they do not want to answer questions in class and they fear assignments.

Mr. Wafula emphasised that many of the girls at Ungoye were below average students and hence feared learning chemistry because of the low grades they score. He added that one of the major drawbacks to the science department was that the school usually enrolls girls who score poorly in KCPE and hence are not capable of doing well in the sciences. According to Mrs. Okumu, the girls are admitted with as low as 200 marks out of 700 compared to 400 out of 700 for Mama Selah. Mr. Wafula added that the school lacks some basic teaching and learning facilities for science subjects such as a science laboratory and this made effective teaching of the subjects very difficult. For instance, in a physics lesson I observed in the school, the topic being taught was *Determination of the focal point of lenses*. Lack of laboratory demonstration made the students to be entirely lost in the lesson. Yet at Mama Selah, where the same topic was taught through laboratory demonstration, the girls seemed to enjoy the lesson. By using the sun as the source of light, they were able to practically determine

the focal point of lenses and measure the focal length.

I found that Ungoye, unlike Mama Selah, was not a well-established school. According to Mr. Wafula, Ungoye was established in 1989 on harambee basis. Thus, the school is now 12 years old. Former harambee schools have now been renamed district schools. The school is a day school with a few boarders, even though the boarding facilities are not as good as in Mama Selah. The four classes are single streamed with a student population of 139 students. The Form Four class had 39 students: 13 girls and 26 boys. At the time of the study, the school had 14 teachers, six of whom were graduates, seven were diploma holders and one was a university student. The following major physical facilities were available in the school: playground, school fence, four classrooms, a library, three dormitories, a kitchen, administration block, and staffroom. However, I noted that the following basic boarding and learning facilities were missing: laboratory, dining hall and teachers' quarters. As far as the teaching of Integrated English and sciences is concerned, the teaching staff comprised one biology teacher, one chemistry teacher, one physics teacher, and two Integrated English teachers.

The poor facilities in the school are also reflected in the schools' poor performance academically. Over the past four years, the school has not performed well in KCSE examinations. Table 4.1.4 shows the schools'

performance in KCSE since 1997.

**Table 4.1. 4: KCSE Mean Grade for Ungoye Mixed Secondary School Since 1997**

YEAR	MEAN GRADE (POINTS)
1997	4.948
1998	3.512
1999	3.881
2000	4.041

**Source:** Ungoye Mixed Secondary School

**NB:** The maximum point to be attained is 12.000 (see Appendix IX).

It is observable from the table above that even though the performance of the school has fluctuated over the years, from the latest results (the year 2000) it is below average (6.000). This shows that the students are poor academic performers and the school is not good academically. This partly suggested to me why most of the girls were not able to understand the novel **The River and the Source** and why the study of the novel is not likely to have a positive influence on their liking of learning science subjects. The girls' inability to understand the novel is reflected in the schools' consistent poor performance in English over the past five years. From the 2000 KCSE results, the schools' mean in English is 4.134.

The girls' poor academic performance is also reflected in the schools' consistent poor results in science subjects over the years. Table 4.1.5 indicates the performance of girls at Ungoye Mixed in KCSE science subjects since

1996.

**Table 4.1. 5: KCSE Performance of Girls in Science Subjects at Ungoye Mixed Secondary School Since 1996**

YEAR	BIOLOGICAL SCIENCE (POINTS)	PHYSICAL SCIENCE (POINTS)
1996	1.532	1.579
1997	1.519	3.531
1998	1.945	2.897
1999	3.441	2.441
2000	3.478	4.260

**Source:** Ungoye Mixed Secondary School

**Nb:** The maximum points to be attained is 12.000 (see Appendix IX).

Table 4.1.5 above indicates that even though girls' performance in biological science over the years has been improving consistently, their performance in physical science has been fluctuating. It is also observable that though from the latest results (the year 2000) the performance in both subjects is better than in the previous years, it is still below average (6.000). The results are consistent with other results in Table 4.1.4 confirming that girls at Ungoye are poor performers and are in a poor school hence they may not like learning science subjects and they may not be positively influenced by the study of the novel **The River and the Source** (which they were also not able to understand) to like learning science subjects.

The above description suggests that Mama Selah and Ungoye are very

different. The analysis of the difference between the two schools enabled me to explore the variety of situations in which science subjects are taught and hence investigate in depth the influence that the study of the novel **The River and the Source** has on girls' learning of science in different situations.

From the survey data collected from the ten schools and case study data at Mama Selah, presented above, it can be deduced that the study of the novel **The River and the Source** positively influences many girls to like learning science subjects. This finding is supported by the argument advanced by K.I.E. (2000, May 11) and Short and Candlin (1989) that literature can be used to pass across useful experiences that can influence peoples' perception of life. However, from the case study data at Ungoye, we can infer that the positive influence is minimal on girls who score poorly in KCPE and get admitted to poor schools where they do poorly academically. The majority of secondary schoolgirls are in such schools (Republic of Kenya, 2000b). It follows therefore that an intervention targeting girls' dislike for learning science subjects in Kenya should begin right from primary school.

The research further explored the specific aspects of the novel that most influenced girls' liking of learning science subjects. Table 4.1.6 below quantitatively indicate the responses of the 30 (93.7%) girls who responded that the novel positively influenced their liking of learning science subjects

(See Table 4.4.1). The table shows by percentage the specific aspects of the novel **The River and the Source** that most influenced them.

**Table 4.1. 6:Percentage Aspects of the Novel that Make Girls Like Learning Science**

Aspect	No. of girls (out of 30)	Percent
The author Margaret Ogola is a doctor	12	40.0
Vera excels in Science and becomes a university graduate in electrical engineering	23	76.7
Wandia excels in science and becomes a medical doctor.	23	76.7
The major female character Akoko is portrayed as a courageous and determined woman who influences other characters' success in science oriented careers	12	40.0
The events in the novel include most female characters succeeding in life including science oriented careers	12	40.0
Most of the successful female characters in the novel represent women encountered in real life including science-related professions.	11	36.7

The table indicates that majority of the girls from the ten schools were influenced by the facts that Vera excels in science and becomes a university graduate in electrical engineering (76.7%) and that Wandia excels in science and becomes a medical doctor (76.7%).

During the interviews with girls at Mama Selah and Ungoye, six of the eight girls at Mama Selah and two of the six girls at Ungoye responded that the

characters, Vera and Wandia, most influenced their liking of learning science subjects. One girl said:

Vera and Wandia are my favourite characters...they inspire me to work hard in class especially in sciences so that I can also be somebody in life. I really admire them and I want to be very much like them. This is my goal in life.

Another girl said:

I am so much inspired by Wandia. She is my role model and I am studying hard to be a doctor like her.

From the above responses, it can be seen that many girls were influenced to like learning science subjects by the facts that Vera and Wandia excel in science and become university graduates in electrical engineering and medicine respectively. This finding is underscored in the argument advanced by Gachukia (1994) and Godia (1997) that exposing girls to many women with scientific orientation can motivate them to learn science subjects.

In summary, the novel **The River and the Source** positively influences many of those girls who did not like learning science subjects. Hence, positive transfer of learning is realized and the psychological barrier, dislike for learning science subjects is, to a large extent, removed. However, the novel has minimal positive influence on those girls who score poorly in KCPE and get admitted to poor schools where they are not able to excel academically.

#### **4.2 Influence of the Novel *The River and the Source* on Secondary Schoolgirls' Level of Confidence in Learning Science Subjects**

During the ten schools' survey, the questionnaire was administered to 126 girls. Out of these, 65 girls (51.6%) responded that they had a high level of confidence learning science subjects before studying the novel, while 61 (48.4%) responded that they did not have a high level of confidence in learning science subjects before studying the novel.

The inference is that a good number of girls have confidence in learning science subjects. This observation is however in discordant with previous findings about the same which indicate that many girls lack confidence in learning science subjects (Erinosho, 1994; Jones and Smart, 1995; Erwin and Paula 1998; Tsuma, 1998). This finding could be as a result of the fact that many of the schools studied were high performers in KCSE (see Appendix X).

In what follows, the survey data on the 61 girls (from the ten schools) who did not have confidence in learning science subjects before studying the novel will be presented. Table 4.2.1 below presents by percentage the data on the influence the study of the novel **The River and the Source** has on the level of confidence of the 61 girls.

**Table 4.2. 1: Percentage Influence of the Novel on Girls' Level of Confidence in Learning Science Subjects.**

<b>Description</b>	<b>No of girls</b>	<b>Percent</b>
Girls influenced by the novel to be sure of ability to learn science subjects.	58	95.1
Girls not influenced by the novel to be sure of ability to learn science subjects	3	4.9
<b>Total</b>	<b>61</b>	<b>100.0</b>

The table above indicates that 58 (95.08%) girls became sure of their ability to learn science subjects after studying the novel, while the novel had no such influence on three (4.92%) of the girls. This finding suggests that largely, the novel **The River and the Source** increases girls' level of confidence in learning science subjects. The finding is supported by Tomlinson and Ellis (1980) and Gomile-Chidyaonga (1996) who argue that literature can be used to influence students' attitude towards education and life in general.

During classroom observations, I noted that many of the girls at Mama Selah had a high level of confidence in learning science subjects. They promptly responded to questions in class and with confidence and ease illustrated their answers on the chalkboard. All the eight girls interviewed in the school said that the novel **The River and the Source** enhanced their level of confidence in learning science subjects. One girl said:

Vera excels in engineering and this encourages me so much since she was just a girl the way I am. I feel that girls can do as well as boys in sciences as the subjects are not meant for a particular sex. From the novel, I have learnt that all that we need is determination.

Another girl said:

From the novel, I have learnt that I can make it like Wandia or even Vera. They act as role models for us girls to copy since they work so hard in school and excel in science subjects to become what they are. I now believe that nothing is impossible and what one human being has achieved another one can achieve.

From the above responses, one notices a sense of pride and determination (the hallmarks of self-confidence) in the girls as they pursue science subjects. From the statements, there is no doubt that the novel **The River and the Source** has had a positive impact on these girls.

The interviews with teachers revealed that majority of the girls in the class have confidence in learning science subjects. The two science teachers I talked to responded that the girls' level of confidence had risen over the past two years. Mr. Odera said:

The students have settled in chemistry. In physics out of the 22, I have only three who are below average but they won't get grade Es either.

Mrs. Otiende, who taught biology, explained that one of her strategies for building confidence in her students was by exposing them to more scientific

experience through frequent educational trips and through invitation of science oriented guest speakers to talk to them. One girl told me that when she related the courage and determination in Vera (one of the characters in the novel) to what one guest speaker told them about excellence in science subjects, she became quite sure of her ability to excel in science subjects. The girl explained that the novel offers her constant encouragement to continue learning science subjects even when they prove difficult.

In Ungoye, the classroom observations revealed to me that a number of girls had low level of confidence in learning science subjects. They were generally dull during the lesson and indolently responded to questions in all their science classes. For instance, I noticed that in the physics class, one girl was very passive. She neither asked nor answered most of the questions. Her physics teacher, Mrs. Kamau, told me that she later on dropped the subject to do biology when she was about to enrol for KCSE examinations. In an interview, the girl told me that she realized she was very weak in the subject and would not do well in the examinations. So she dropped it to take biology, which was easier to pass.

During the interviews with the girls, however, four of the six girls responded hesitatingly that the novel **The River and the Source** increased their level of confidence in learning science subjects. Upon probing on whether they

believed that women are important in the world of science, the four girls said that the most important role of women is that of procreation to ensure continuity in life. This suggested to me that the girls still held gender stereotypes hence had not been positively influenced. One girl, in a bid to explain why the novel increased her level of confidence said:

I can say that Nyabera during her course used to do maths and science and she passed the subjects very well. So, she can motivate me to study science so that I can be somebody who can do science best.

This response suggested to me that this girl had not understood the novel. The reality in the novel is that the character, Nyabera, does not attend any course and she does not go to school. Since this girl did not understand the novel, it was unlikely that it could influence her learning of science subjects.

During interviews with the science teachers at Ungoye, all the three teachers said that majority of the girls in the class had low level of confidence in learning science subjects. Mrs. Kamau and Mr. Wafula, especially, were of the opinion that most of their female students feared learning science subjects. They pointed out that the school admits girls with low marks hence with low ability to learn science subjects. This opinion suggested to me further that since the girls are poor academically and are in a poor school, the study of the novel **The River and the Source** may not enhance their level of confidence in

learning science subjects.

From the ten schools survey data and the case study data at Mama Selah, I inferred that the novel **The River and the Source** enhances many secondary schoolgirls' level of confidence in learning science subjects. This finding is echoed by Gomile-Chidyaonga (1996) who reports the high level of confidence that theatre arts, a literary genre, gave girls in campaign for girl-child education in Malawi. In the campaign, girls' performance improved tremendously and enrolment rate increased among others. From the findings at Ungoye, I inferred that the novel has minimal positive influence on girls who score low marks in KCPE and get admitted to poor schools.

The research further explored the specific aspects of the novel that most increased girls' level of confidence in learning science subjects. Table 4.2.2 presents by percentage the survey data from the ten schools on the specific aspects of the novel **The River and the Source** that made the 58 girls (see Table 4.2.1) most sure of their ability to learn science subjects.

**Table 4.2. 2: Percentage Aspects of the Novel that Make Girls be Sure of Their Ability to Learn Science Subjects**

Aspect	No of girls (out of 58)	Percent
The author Margaret Ogola is a doctor	13	22.4
Vera excels in Science and becomes a university graduate in electrical engineering	39	67.2
Wandia excels in science and becomes a medical doctor.	45	77.6
The major female character is portrayed as a courageous and determined woman who influences other characters' success in science-oriented careers	27	46.6
The events in the novel include most female characters succeeding in life including science-oriented careers	31	53.4
Most of the successful female characters in the novel represent women encountered in real life including science-related professions	16	27.6

Table 4.2.2 above shows that majority of the girls' level of confidence was influenced by the facts that Wandia excels in science and becomes a medical doctor (77.6 %) and that Vera excels in science and becomes a university graduate in electrical engineering (67.2%).

During interviews held with girls at Mama Selah and Ungoye, all of the girls at Mama Selah and two of the six girls at Ungoye, told me that the characters, Vera and Wandia, most increased their level of confidence in learning science subjects. One girl said:

Vera encourages me so much. She works hard in school to be what she is. This gives me a lot of confidence as I am made to believe that if I study hard, I will be able to pass the sciences.

Another girl noted:

Wandia and Vera are my favourite characters. When I read the novel, they inspire me in almost everything... In particular, they give me confidence in learning the biology and chemistry subjects that I take. I am now sure that I can make it in my final exams.

The above responses demonstrate that the characters, Vera and Wandia, influenced many of the girls to have an increased level of confidence in learning science subjects.

In summary, the inference is that the novel **The River and the Source** largely enhances the level of confidence of those girls who have low level of confidence in learning science subjects, especially academically good students in good secondary schools. Hence, positive transfer of learning is realized and the psychological barrier, low level of confidence in learning science subjects is to a large extent, removed. Again in this section just like in section 4.1, many of these girls were influenced by the fact that the characters, Vera and Wandia, excel in science and become university graduates in electrical engineering and medicine, respectively. It appears therefore that characterisation is a very powerful aspect of literature. However, it is also

important to note that the novel has minimal positive influence on the level of confidence of those girls who score poorly in KCPE and get admitted to poor schools where they are not able to excel academically.

#### **4.3 Influence of the Novel *The River and the Source* on Secondary Schoolgirls' Pursuance of Science-Related Careers After School**

During the ten schools' survey, the questionnaire was administered to 126 girls. Out of these, 74 girls (51.6%) responded that they aimed at pursuing science-related careers before studying the novel, while 52 (48.4%) responded that they did not aim at pursuing science-related subjects before studying the novel. The implication here is that majority of girls already aim at pursuing science-related careers after school. This observation is, however, contrary to research findings by other scholars who found that many girls consider the science-based careers too hectic for them and instead prefer arts-based courses. (Museve, 1993 and Gichura, 1999). A possible explanation for this finding is that many of the schools from which the data in this study were gathered are doing well academically (see Appendix X).

Since the study set out to explore the influence the study of the novel has on girls' learning of science, data on the 52 girls (from the ten schools) who said they did not aim at pursuing science related careers before studying the novel will be presented. Table 4.2.1 presents by percentage data on the influence the

study of the novel **The River and the Source** has on career aspirations of the 52 girls.

**Table 4.3. 1: Percentage Influence of the Novel on Secondary Schoolgirls' Pursuance of Science-related Careers After School**

<b>Description</b>	<b>No of girls</b>	<b>Percent</b>
Girls influenced by the novel to aim at pursuing science-related careers after school	43	82.7
Girls not influenced by the novel to aim at pursuing science-related careers after school	7	13.5
Girls who did not respond to the question	2	3.8
<b>Total</b>	<b>52</b>	<b>100.0</b>

From Table 4.3.1 above, it can be seen that majority of the girls (82.7%) were influenced by the novel to aim at pursuing science-related careers after school. The inference here is that, to a large extent, the novel **The River and the Source** makes secondary schoolgirls aim at pursuing science-related careers after school. This view is in harmony with the view held by Tomlinson and Ellis (1980) who emphasise that the study of literature can make students realise their true capabilities as they compare with the characters encountered in literature.

During interviews, six of the eight girls interviewed at Mama Selah High School responded that the novel made them aim at pursuing science-related

careers after school: one girl wanted to become an engineer, two wanted to become doctors and the other three were studying to be pharmacists. However, two girls were not influenced: one aspired to be a journalist and the other, a lawyer, both high profile careers, nevertheless. One of the girls aspiring to go into science-oriented careers said:

Vera has made the weaker part of me grow I am so much encouraged by her...I used to believe that girls cannot do well in science careers since sciences are difficult and can only be managed by boys. However, my attitude has now changed and I am working very hard to pass maths and physics so that I can become an engineer like Vera.

Another girl said:

Wandia is my favourite character. I want to become a doctor like her. I have always wanted to become a doctor but the fear that doctors are men has always discouraged me. When I read about Wandia, I was encouraged to go for medicine like her.

The interview with the science teachers revealed that many of these students aimed at pursuing science-related careers after school. Both Mr. Odera and Mrs. Otiende reported that when they informally asked the girls about their career aspirations, many of them aspired for science-based careers. Mr. Odera cited the fact that three of the previous students had been admitted to do civil engineering at a public university in the country as most influential. He said:

In 1996, one of our students was admitted to the university to do civil engineering. Again, in 1999, two were admitted to do civil engineering. This has inspired our girls, as they also want to go for the same. Previously, there weren't any girls being admitted to pure science courses. They were mainly admitted for education courses.

Contrary to the findings at Mama Selah High School, in Ungoye, only two girls said the novel **The River and the Source** inspired them to pursue science-related careers after school. The girls said they aspired to become doctors. The other four girls said the novel does not inspire them to pursue the same. Upon probing, they said that sciences are difficult adding that it is not possible for girls to become engineers or pilots. Three of the girls said that they wanted to become teachers while one wanted to become a businesswoman.

During the interviews with the teachers of science at Ungoye, all the three emphasized that when they asked the girls about their career aspirations, many of them did not aspire to pursue science-related careers after school. Mr. Wafula said:

Most of our girls aspire to be housewives. They cannot do well in the scientific professions since they are very weak in the science subjects. Their ability is below average...they just believe that they cannot make it.... Many of the girls prefer arts based to science-based careers.

This response suggests that due to their poor academic performance, the girls have a low opinion of them and had not been influenced by the study of the novel **The River and the Source** to aim at pursuing science-related careers after school.

From the ten schools survey, data and case study data at Mama Selah, it can be inferred that the study of the novel **The River and the Source** inspires many girls to aim at pursuing science related careers after school. From the case study at Ungoye, it can be inferred that the novel has minimal positive influence on girls who are poor academically and are enrolled in poor schools.

The research further explored the specific aspects of the novel that most made secondary schoolgirls aim at pursuing science-based careers after school. Table 4.3.2 presents by percentage quantitative data from the survey on the specific aspects of the novel **The River and the Source** that made the 43 girls (see Table 4.3.1) aim at pursuing science-related careers after school.

**Table 4.3. 2: Percentage Aspects of the Novel that Make Girls Aim at Pursuing Science Related Careers After School**

<b>Description</b>	<b>No. of girls (out of 43)</b>	<b>Percent</b>
The author Margaret Ogola is a doctor	15	34.8
Vera excels in science and becomes a university graduate medical doctor	24	55.8
Wandia excels in science and becomes a medical doctor.	28	65.1
The major female character is portrayed as a courageous and determined woman who influences other characters' success in science-oriented careers	15	34.8
The events in the novel include most female characters succeeding in life including science-oriented careers	20	46.5
Most of the successful female characters in the novel represent women encountered in real life including science-related professions	18	41.9

Table 4.3.2 indicates that many of the girls were influenced by the fact that Wandia excels in science and becomes a medical doctor (65.1%) and that Vera excels in science and becomes a university graduate in electrical engineering (55.8%).

During the interviews, six of the eight girls at Mama Selah High School and two of the six girls at Ungoye reported that the characters, Vera and Wandia, most inspired them to aim at pursuing science-related careers after school. One

girl said:

Wandia is my favourite character. She has managed to reach where only men are able to reach. This inspires me and my ambition is to be a doctor like her and I am studying very hard to achieve it.

Another girl reported:

Wandia and Vera are my role models. They encourage me very much in the science subjects that I take...my ambition is to become a professional doctor like Vera or an electrical engineer like Vera.... If not I want to become a computer analyst.

Again in this section, just like in sections 4.1 and 4.2, the two characters, Vera and Wandia, have been singled out by most of the girls.

In summary, the novel **The River and the Source** positively influences majority of the girls who did not aim at pursuing science related careers after school. Hence, as in sections 4.1 and 4.2, the study of the novel achieves positive transfer and it removes the psychological barrier, lack of aspiration to pursue science-related careers. This massive power of the novel **The River and the Source** is underscored in Lawrence (1936: 535) in his paper *Why the novel matters*. He notes:

The novel is the one bright book of life. Books are not life. They are only tremulations on the ether. But the novel as a tremulation can make the whole man a live tremble...,which is more than poetry, philosophy, science or any other book.

Since just like in the previous sections many of these girls were influenced by the fact that the characters, Vera and Wandia, excel in science and become university graduates in electrical engineering and medicine, respectively, it can be inferred that characterisation as an aspect of literature is very powerful in influencing peoples' attitudes towards life. Tomlinson and Ellis (1980) in support of this finding, emphasise that characterisation can provide far-reaching educative experiences to students of literature. However, it is also important to note that the study of the novel **The River and the Source** has minimal positive influence on career aspirations of those girls who score low marks in KCPE and get admitted to poor schools.

#### **4.4 Influence of the Novel *The River and the Source* on Secondary Schoolboys' Perception of Girls' Learning of Science Subjects**

During the five schools survey, the questionnaire was administered to 76 boys. Table 4.4.1 presents by percentage the quantitative data on the influence the study of the novel **The River and the Source** has on these boys' perception of girls' learning of science subjects.

**Table 4.4. 1: Percentage influence of the Novel on boys' Perception of Girls' Learning of Science Subjects**

<b>Description</b>	<b>No. of Boys</b>	<b>Percent</b>
Boys influenced by the novel to believe that girls are capable of excelling in science subjects.	70	92.1
Boys not influenced by the novel to believe that girls are capable of excelling in science subjects.	6	7.9
<b>Total</b>	<b>76</b>	<b>100.0</b>

From the table, it can be seen that majority of the boys (92.1%) responded that the novel makes them believe that girls are capable of excelling in science subjects. On further inquiry, 68 of the boys (89.5%) emphasised that they thought that the role of women in the society is as important as the novel highlights.

During the case study interviews at Ungoye, four out of the six boys responded that they were influenced by the novel to change their attitude towards girls' learning of science subjects. One of the boys said:

I used to think that girls cannot perform better than boys in science but when I read of how Vera and Wandia excelled in science subjects and how Wandia excelled in her career as a doctor, I changed my opinion.

Another boy said:

I have always believed that women cannot rise above men in whatever way but when I read of how Akoko manages to get audience with the DC and secures back her late husbands' wealth grabbed by her greedy brother in-law, Otieno Kembo, I now believe that women are capable of succeeding in any aspect of life including scientific careers.

These responses suggest that from the study of the novel, the boys have acquired a positive perception of women and of their role in the world of science. This view is supported by Martino (1995), who found that the study of literary texts could influence boys' perception of gender stereotypes. The finding is however contrary to Mfou et al (1997) who argue that very few boys believe that science is more important for girls than boys or that girls can do better than boys in science. Museve (1993) is also of the opinion that many boys believe that women are not suitable for high status jobs such as engineering and medicine.

The difference in viewpoints could be as a result of the fact that the boys who were involved in the two latter studies above, unlike the boys in this study, had not been gender-sensitised to change their views hence their perception of women was based on the gender stereotypes they held. This finding suggests that such interventions as the study of the novel **The River and the Source** are productive in improving secondary schoolboys' perception of girls' learning of science.

During the survey, the study further explored from the boys what influenced them to change their attitudes. Table 4.4.2 shows the most distinctive categories of their responses:

**Table 4.4. 2: Percentage Aspects of the Novel that Influence Boys**

<b>Themes</b>	<b>Frequency</b>	<b>Percent</b>
Courage and determination of the female characters	46	65.7
Economic role of the female characters	24	34.3
<b>Total</b>	<b>70</b>	<b>100.0</b>

Table 4.4.2 above indicates that majority of the boys (65.7%) were influenced by the courage and determination of the female characters. They cited the courage and determination in such characters as Akoko, Vera and Wandia. Quite salient in their responses was the battle between Akoko and her brother in law Otieno Kembo that Akoko wins. To them Akoko's winning of this fight symbolised women's' ability to succeed even in science careers. The boys also cited Wandia's success as a medical doctor with Ph.D in Medicine. Some of the boys even brought in their personal experience and gave examples of having seen women serve as administrators such as chiefs and District Officers and also as career scientists.

Table 4.4.2 also indicates that 24 boys (34.3%) cited the economic role of the female characters. These boys explained that the trait of hard work in Akoko,

Vera and Wandia influenced them. They cited particularly Akoko's occupation as a farmer through which she gets bountiful harvests to sustain her family. They explained that through the character of Akoko, they believed that women could succeed in anything including science. They also cited the academic hard work of Vera and Wandia especially the fact that they manage to beat all the boys in their classes and emerge winners in science and science-oriented careers.

During the case study interviews, four of the six boys said that they were mainly influenced by the courage and determination of Akoko, Vera and Wandia. One of the boys said:

Akoko is a very powerful woman. She manages to recover her wealth, which had been grabbed by her brother-in-law, Otieno Kembo. Her granddaughter, Vera takes after her. She also beats boys academically in school. Wandia is also like Vera. These events in the novel make me believe that women can succeed in all aspects of life, even in science, which is male-dominated.

The responses above indicate that majority of the boys were influenced by the exploits of the female characters Akoko, Vera and Wandia. Here again, just like in the previous sections in this chapter, characterisation stands salient. This is a further reflection that characterisation is a very influential aspect of literature.

The three science teachers interviewed at Ungoye told me that the boys while learning science together with the girls did not seem to have a negative attitude towards the girls. Mrs. Kamau and Mr. Wafula, for instance, emphasised that in such class tasks as group discussions, the boys co-operated with the girls very well. The teachers added that since 1999 (when the novel was introduced), they had seen the boys encourage the girls during their group discussions. This suggested to me that the study of the novel **The River and the Source** had improved their perception of girls' learning of science subjects.

During classroom observations, the boys treated the girls with respect in their science classes. There were no sneers or any form of contemptuous behaviour from the boys towards girls' participation in class, even though many of the girls lacked confidence in learning the science subjects. This finding is supported by Tomlinson and Ellis (1980) who argue that the study of literature provides students with a multiplicity of experiences, philosophies and attitudes of other societies and as a result, the students become more informed and tolerant of the world outside their own.

The findings here suggest that as a result of studying the novel **The River and the Source**, majority of the boys have acquired a positive perception of girls' learning of science subjects. Hence, positive transfer of learning is realized. It

follows therefore that while learning together with the girls, these boys would provide a psychologically secure atmosphere for girls to learn science subjects. Perhaps the major drawback to the girls at Ungoye is their low academic ability.

In summary, the novel **The River and the Source** influences majority of the secondary schoolboys to change their negative perception of girls' learning of science subjects. Many of these boys were influenced by the courage and determination in the characters of Akoko, Vera and Wandia.

#### **4.5 Pedagogical Approaches Teachers Adopt in the Teaching of the Novel *The River and the Source***

During the ten schools' survey, the questionnaire was administered to 126 girls and 76 boys (a total of 202 students). Out of these students, 189 (93.6%) responded while 13 (6.4%) did not. Table 4.5.1 presents by percentage the most distinctive pedagogical approaches cited by the students.

**Table 4.5. 1: Percentage Students' Views on the Pedagogical Approaches Teachers Adopt**

<b>Pedagogical Approaches</b>	<b>No. of Students</b>	<b>Percent</b>
Reading aloud	189	100.0
Analysis by discussion	189	100.0
Note taking	189	100.0
Questioning	163	86.2
Assessment	152	80.4

Table 4.5.1 above illustrates that from the responses, five main categories of pedagogical approaches were generated: reading aloud, analysis by discussion, note taking, questioning and assessment. More specifically, the table indicates that 189 responses (100.0 %) were that reading aloud was a major pedagogical approach. The students explained that they read the book aloud as the teacher explained and at other times, the teacher read aloud as students followed silently in their books. They also cited occasional dramatization of the parts being read.

During classroom observations in the two case study schools, I noted that reading aloud occupied an integral part in the teaching of the novel. In both Mama Selah and Ungoye, many of the lessons involved students reading aloud

a whole page in turns while the teachers read aloud only the parts they wanted to highlight. However, there were some differences in the ways Mrs. Owuor of Mama Selah and Mr. Odundo of Ungoye encouraged their students to read the text aloud. Whereas Mrs. Owuor would always use praise words such as 'good' or 'well done' as students completed reading some portions of the novel, Mr. Odundo did not engage in any verbal encouragement. He would always ask the next student to continue reading from the next paragraph. He did not even try to find out from the students whether they understood what they read, at the end of each paragraph. He only tried to explain to them whatever they had read at the end of the whole reading session. It appeared to me that his students were merely verbalising the sentences in the paragraphs without necessarily understanding whatever they read. This partly explained why some of the girls had not understood the novel.

The students of Mrs. Owuor, on the other hand, were more interested in reading aloud. They would not wait to be told to read. Immediately one of them finished reading a paragraph, the next interested student would continue reading the next paragraph unless the teacher told them to stop, when she wanted to explain a point or find out whether they had understood what they had read. This was a shortcoming on the part of Mr. Odundo given the poor academic ability of his students.

Tomlinson and Ellis (1980), notes that for the understanding and the retention of the surface content of a story, reading aloud is crucial. The authors advise that after students have read aloud, the teacher can read aloud only significant sections. It follows from these authors that through this teaching strategy, the students will master and understand the plot and the characters of a given literary text. Hence, if the strategy is not employed, the students may not be able to recall the storyline or the characters of a novel.

Tomlinson and Ellis (1980) and Moody (1971), stress that for reading aloud to have better impact, it needs to be accompanied by role-play, where certain students can play the roles of characters from the book and are questioned by the other students about their actions, words and motives or reading can also be accompanied by dramatisation, where groups of pupils dramatise scenes from the book after thorough preparation. These were, however, not evident in either of the classes, though Mrs. Owuor said she at times used these approaches. All the same, given their high intellectual ability, Mrs. Owuor's students could still understand the novel without her necessarily employing the role-play or dramatisation. Though Mr. Odundo's students said that they were satisfied with the way they read the novel aloud in class, the fact that they did not understand the novel, made the use of role-play and dramatization a necessary accompaniment to reading aloud.

During interviews, one student in Mama Selah High School said that, in one of their lessons, as they dramatized a chapter of the novel she felt quite proud to identify with Wandia and at another instance with Vera. She added that this experience made her want to be like the two characters throughout her life. It follows therefore that the manner in which reading aloud is executed will have an impact on whether or not the girls will be influenced by the study of the novel to change their unfavourable attitudes towards learning the science subjects that they take. Thus if the reading aloud is done like recitation especially with girls of poor academic ability, it may hinder the study of the novel from influencing the girls' learning of science.

Table 4.5.1 further indicates that 189 responses (100.0%) were that 'analysis by discussion' was a major pedagogical approach. From the survey data, many of the students noted that they were organised into groups, and then given a chapter to summarise after which they presented the summary to the class. The chapter summary involved identifying, with illustrations, the themes, the character traits of the major characters involved and the literary devices used in the chapter. They also noted that at other instances, teachers opened discussions in class involving all the students.

During classroom observations, discussion was a major teaching strategy. After reading aloud, the teachers would give the class certain questions to

discuss. I observed that in the discussions, the learners appeared to be the centre of focus. Whereas Mrs. Owuor encouraged more whole class discussions, Mr. Odundo encouraged more group discussions. In whole class discussions, students would give their individual views on the subject matter to the whole class while in-group discussions; the students would discuss the subject matter as a group and then present their views as a group, through the group leader.

For instance, in one of Mr. Odundo's lessons, after reading Chapter Two of part four of the novel with the students, Mr. Odundo wrote the following tasks on the board:

- *Describe the major events in the chapter and how they occur.*
- *Discuss the character and role of Wandia Mugo as presented in the chapter.*
- *Discuss the character and role of Aoro Sigu in the chapter.*
- *Discuss the major themes in the chapter*
- *With illustrations, identify the features of style in the chapter.*

Mr. Odundo thereafter organized the thirty students in attendance into groups of six and assigned each group one of the above tasks to work on. In the formation of the groups, Mr. Odundo ensured that girls and boys were well-mixed. Each of the five to six groups usually formed had either a boy or a girl. As the students discussed, Mr. Odundo would move round the class to actually see what they were doing. The group discussion took around fifteen minutes. Thereafter, each group, through the chosen group leader, presented their

discussions. As each group presented, the other students listened and took notes. At the end of each presentation, the students asked the presenter questions which the latter tried to explain with the help of group members. Mr. Odundo later on explained that group discussions had the advantage of helping the weaker students.

In many of the group presentations, nevertheless, the presenters were mainly boys and only some three girls out of the thirteen were usually active. Mr. Odundo explained that the group members democratically chose the presenters and because the groups were competing for marks, he did not want to interfere with their choices of who (girls or boys) would present on behalf of the group. He, however, added that as they discussed in their various groups, he ensured that both girls and boys participated.

Even though during the interviews, the students said that they were satisfied with group discussions as a teaching strategy, I felt that the domination of the presentations by boys sent wrong gender signals to the boys and girls. The girls were likely to believe that leadership roles (as exercised by group presenters) are mainly a privilege of males. These perhaps made them not believe the gender equality message of the novel, especially women's capability of succeeding in learning science. Hence, it might have hindered their being positively influenced by the study of the novel to have favourable attitudes

towards learning science subjects.

As far as whole class discussions are concerned, in one of Mrs. Owuor's lessons, after reading Chapter Ten of Part Three with the students, she wrote the following tasks on the board:

- *Comment on the character of Vera as presented in the chapter.*
- *Who is Mary Ann Ngugi and what influence does she have on Veras' life?*
- *Explain the themes evident in the chapter*
- *With illustrations identify the features of style in the chapter.*

Unlike Mr. Odundo, Mrs. Owuor engaged the whole class in discussion task by task. She would read a question and then turn to the class for their contributions. The girls would put up their hands bidding to be nominated to speak. Mrs. Owuor would then turn to the rest of the class and ask them to comment on what the speaker had said. Together with the class, Mrs. Owuor arrived at appropriate solutions to the tasks. Mrs. Owuor later commented that whole class discussions saved her a lot of time as majority of her students were above average.

During the interviews, all her students said that they liked the way they discussed the novel in class and they did not have any problem with this method of teaching. One of the students said that during the whole class discussions, they not only understood the major themes of the novel such as

the place of women in the society but also the roles of the characters such as Vera and Wandia better. Another girl said that she did not know that competence of women in science subjects was a theme in the novel until she raised the issue in a class discussion because it had appeared in a past examination paper. This implied that through analysis of the novel by discussion, the students' not only sharpened their understanding of the novel but also came to discover more about it in relation to women and the world of science. I inferred that the strategy was vital in making the study of the novel to positively influence these girls' learning of science subjects.

Rimbui (1982) notes that good teachers of literature should engage students in class discussions. Although analysis by discussion was a major pedagogical strategy that enabled the study of the novel to positively influence many girls and boys in both schools, in Ungoye, the gender biased manner in which the group discussions were conducted, partly made the study of the novel not influence these girls' learning of science subjects.

Table 4.5.1 also shows that 189 responses (100.0%) were that 'note taking' was a major pedagogical strategy. The students explained that they took short notes during the lesson but that they sometimes copied notes given by the teacher before the teacher came to class.

During the case study, I observed that students made their own notes during the literature lessons. Sometimes, the teacher would highlight the important points for them to note down. Mr. Odundo for instance would tell his students: “ I want you to write this down....”; “Please note....” I realized that whereas Mrs. Owuor would actually move round the class to see what the students wrote down, Mr. Odundo would not. Asked whether he actually marked the pupils’ books to see the kind of revision notes they had, Mr. Odundo said he occasionally did that. Since both Mr. Odundo and Mrs. Owuor said that they did not give students notes about the novel but encouraged them to make their own notes in class, I found this to be a shortcoming on the part of Mr. Odundo as he would not be able to verify the source of the notes whenever he collected the books for marking. This laxity partly suggested why some of his female students were not able to understand the novel. It is generally noted that students have the tendency of copying notes of their predecessors, from guidebooks or from fellow students from other schools just to please their teachers. They do this whether they understand the notes or not. I am of the opinion that a combination of both strategies is necessary for the benefit of the student. It is important that a few students’ notes are marked in class. This will discourage the lazy students who would not want to make notes or will be waiting to copy other students’ notes. At the same time, it is important that the teacher, after class, collects the books for detailed checking.

During the interviews all the students reported that they made their own notes in class. The students added that while revising from the notes, they understood the novel better. They not only mastered the themes but also the characters. It is during this process that they carefully singled out their favourite characters. One girl remarked that revising the notes makes her identify with Vera and Wandia even more especially with their exploits as female pioneers in the world of science.

The strategy of making students make their own notes while studying a literary text is widely acceptable. Rimbui (1982) observes that students do not like teachers who give them notes especially guide books to copy. Also, Tomlinson and Ellis (1980) emphasise that it is important for teachers to get students make their own short notes which are later on marked. This study found that that though note taking in class is a major pedagogical strategy in both schools, in Ungoye, where the teacher did not check what the students wrote down in class, the strategy may not be very effective. This partly explained why the study of the novel did not influence these girls' learning of science.

From Table 4.5.1, it is further indicated that 163 responses (86.4%) were that 'questioning' was a major pedagogical skill. Here, the students reported that they were frequently questioned orally in class to test their understanding of the lesson.

During the case study, I observed that students were given a variety of oral questions, which included those of recall, comprehension and analysis. In one lesson, for instance, Mrs. Owuor asked the learners: Who is Mark Sigu? When do we first meet him? (recall). In the same lesson, she asked students to describe the character traits of Vera and identify the themes that are evident in the chapter (analysis). The teacher also asked the students to explain why Aoro was climbing walls with fear and worry (comprehension).

Whereas Mrs. Owuor, while questioning, would ask students probing questions, Mr. Odundo did not. Mr. Odundo later on explained that he was still going through the plot of the novel with the students and this only required a lot of recall questions that did not need a lot of probing. To him, probing was mainly necessary in analysis of themes and character traits. Nonetheless, his recall questions came much later when the students had already finished reading the novel aloud and were now discussing it. I realized that some of the girls who had been involved in reading aloud were not able to recall what they had read. To this, a need for the recall questions to be integrated with reading aloud was evident.

During the interviews, the students said that questioning was very useful to them. They emphasized that the approach not only enhanced their understanding of the novel as a whole but also enabled them to master the plot.

Tomlinson and Ellis (1980), emphasise that the use of questioning is vital in the understanding and retention of the story and in the appreciation of the plot and the relevance of the book to the pupils' own life. In addition, Brook (1963) observes that questions from the teacher and questions from the pupils should form an integral part of a literature lesson.

Concerning the role of questioning on the influence the novel had on their learning of science subjects, one girl said that questioning was very useful in making her understand the character traits of Vera and Wandia better, for instance, when the teacher asks them to identify the character traits of the two with illustrations. The girl said that during this process as she explains herself, she gets to understand the two and to identify with them. This not only makes her understand the novel better but also gives her more confidence in learning science. Kissock and Lyortsuun (1982), emphasise that questioning is of great value to teaching and learning. They note that the use of questioning as a pedagogical strategy has the following advantages: it develops the process of thinking, clarifies information, answers concerns, motivates students by encouraging active participation in learning, encourages students to ask their own questions and provokes students and teachers to share the ideas that they have. From the above information, I concluded that though questioning is a major pedagogical approach for the novel in the two schools, in Ungoye, the fact that the strategy is not integrated with reading aloud, makes it ineffective

in making students understand the novel. This partly explained why the study of the novel did not have the desired impact on girls in the school.

Finally, Table 4.5.1 shows that 152 responses (80.2%) were that students were frequently assessed on their learning of the novel. Many of these students responded that they were given tests, mainly from past examination papers both national and mocks from other districts.

During the case study, I observed that in both schools the students were frequently tested on the novel. I noted that whereas Mr. Odundo frequently used questions from past examination papers, Mrs. Owuor frequently gave quizzes. These were short-answer questions about the lesson content. Mr. Odundo explained that his preference for questions from past examination papers from other districts was because they were standardised examinations that had been used elsewhere and he could easily get their marking schemes. He added that given the fact that he had to prepare students for examinations, standardised tests, similar to those of KNEC, were useful. Mrs. Owuor explained that quizzes are useful in making the students retain the lesson content and for evaluating the students' understanding of the lesson. She added that she gave the students tests during the weekends, on fortnight basis, emphasising that, occasionally, she would organise for joint tests with other schools. Even though Mr. Odundo may be right in saying that questions from

past examination papers are of higher quality, there is danger in assessing students using such instruments. Such questions offer no challenge to the students as in many occasions the teacher will find that the students already had access to them. The usefulness of such questions is usually in generating discussions during the lesson. However, although as Mr. Odundo says, students have to be prepared for summative assessment (Sutton, 1991), as it is this assessment that will determine their future, a good assessment instrument must be original. This deficiency on the part of Mr. Odundo, partly suggested why some of his students were not able to understand the novel.

From the interview with the students, assessment formed a basic part of pedagogy. The students said that they experienced no problem with the way they were assessed on the novel. They said that the assessments not only prepared them for the final examination by KNEC but also enabled them to master the novel. In the latter case, they understood the plot, characters, themes and literary devices better. The students at Mama Selah High School added that as they went over the tests with their teacher, they came to understand the relevance of the novel to their everyday life including their learning of the science subjects that they take. This was so because they discussed the questions at length before arriving at valid answers.

Sutton (1991), emphasises that assessment of learning is central to effective

teaching and learning. To Sutton, the most useful kind of assessment to a classroom teacher is formative assessment. Sutton explains formative assessment as an ongoing process by which a child's learning is absorbed and used to plan for the next step. Sutton adds that without formative assessment teachers could not function effectively. Hopkins (1989) notes that formative assessment is for improvement of learning. Even though both Mr. Odundo and Mrs. Owuor engaged in formative assessment, the short quizzes given by Mrs. Owuor to her students to determine whether the objectives of her lessons had been achieved were better in improving learning than the past examination questions given by Mr. Odundo to prepare students for final examinations. Mrs. Owuor's assessment procedure appeared to be ideal for a classroom teacher and this procedure could work well with girls of low ability such as Mr. Odundo's.

From the information presented above, I inferred that though assessment of the students was a major pedagogical practice that enabled the novel to have an influence on girls' learning of science, the fact that it was done using generic instruments in Ungoye made it ineffective. This partly explained why the girls in Ungoye did not understand the novel hence were not influenced to have favourable attitudes towards learning of science subjects.

Another important aspect of pedagogy is the use of teaching aids. During the

case study, however, I observed that neither teacher used teaching aids in any of the lessons. I felt that the use of some teaching aid in some of Mr. Odundo's lessons was necessary since in some of the class discussions his students appeared to be lost. For instance, some of the girls were not able to differentiate between the characters, Tony and Tommy Muhambe. In this case, pictures of people similar to Tony and Tommy Muhambe could be of great help. Tomlinson and Ellis (1980), emphasise that pupils can be asked to draw the characters as they envisage them, then compare drawings and explain why they have presented them in a particular way. Also the commercially available audio and audiovisual tapes of the novel **The River and the Source** could be used.

Brook (1963), emphasises that maps, encyclopaedias, pictures and so on should be part of the literature teacher's teaching aid package. I recognize the fact that Ungoye is a poor school and may not afford some of the teaching aids needed such as audiotapes and audiovisuals, but Mr. Odundo could still improvise some teaching aids such as charts or ask students to gather some of them such as pictures of people representing the characters themselves. Students are at times very resourceful.

Although the two teachers indicated that they at times used audiotapes, and pictures, these were not evident during any of the lessons I observed. The

students said that none of the teachers employed teaching aids. Mr. Odundo's students emphasised that they were simply taught through the use of the textbook and past exam papers. This also partly suggested to me why Mr. Odundo's girls did not understand the novel.

From the information above, teaching aids, though necessary in some lessons in Ungoye, were not usually used in the teaching of the novel **The River and the Source**. This might have hindered the study of the novel from positively influencing these girls' learning of science subjects.

Further, I noted that neither of the teachers had a lesson plan during all the lessons. This suggested that the teachers rarely planned their lessons. During the interviews, however, both teachers stressed that they planned their lessons but that they needed not carry their preparations to class as they had mastered them off head. This seemed to be untrue since some of the lessons were illogical and ended haphazardly suggesting that they were not carefully planned. One of Mr. Odundo's lessons, for instance, started with students opening a chapter of the novel and reading aloud without any formal introduction. The objectives of this lesson were not clear as it ended with the sound of the bell with no clear conclusion. This suggested that Mr. Odundo rarely planned his lessons.

The need for literature teachers to plan their work is highly emphasised. Tomlinson and Ellis (1980), stress that adequate preparation by the teacher and by the students is very necessary if a literature lesson is to be enjoyable and useful. Yinger and Hendricks (1995), in support of this view, emphasize that planning is an essential component of pedagogy as it directs the teacher on how to select the learning experiences and respond to students' needs and interests. Brook (1963), emphasises that adequate preparation by literature teachers is a must.

The explanation for this is that students will gain very little from a disorganised lesson. Thus within such lesson, the mastery of plot, themes, and characters and the reflection of the relevance of the novel upon the students' lives, especially by students of poor academic ability, such as girls at Ungoye, may be impossible. In such circumstances, the influence that the study of the novel **The River and the source** may have on secondary schoolgirls' learning of science will be very minimal.

In summary, I found that reading aloud, analysis by discussion, questioning, note taking and assessment were the major pedagogical approaches used in the teaching and learning of the novel. It is these teaching and learning processes that provide the means by which the positive influence that the novel **The River and the Source** has on girls' learning of science subjects is generated.

However, in Ungoye, the execution of these strategies appeared to be flawed.

#### 4.6 Chapter Summary

In this chapter, the data collected have been presented, analysed and discussed in relation to the research questions. The following areas have been explored: the influence of the study of the novel **The River and the Source** on secondary schoolgirls' liking of learning science, the influence of the study of the novel on secondary schoolgirls' level of confidence in learning science, the influence of the study of the novel on girls' aspiration to pursue science-related careers after school, the influence of the study of the novel on secondary school boys' perception of girls' learning of science subjects and the pedagogical approaches that teachers adopt in the teaching of the novel **The River and the Source**.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

#### Introduction

This chapter presents a summary of research findings, conclusions, recommendations of the study and suggestions for further research. The purpose of this study was to explore the influence that the study of the novel **The River and the Source** has on secondary schoolgirls' learning of science and to describe the pedagogical processes under which the influence operates. The study adopted a descriptive survey design, followed by a case study. It was conducted in Migori District, Kenya. Data were collected by use of questionnaires, interviews, and classroom observations.

#### 5.1 Summary of Research Findings

The study found that:

- The novel **The River and the Source** positively influences majority of the girls who started off not liking science.
- The novel **The River and the Source** positively influences majority of the girls who started off with low level of confidence in learning science subjects.
- The novel **The River and the Source** positively influences majority of the girls who did not aim at pursuing science-oriented careers after school.

- Many of the girls were influenced by the fact that in the novel **The River and the Source**, the female characters, Vera and Wandia, excel in science subjects and pursue science-oriented careers.
- The novel **The River and the Source** has minimal influence on those girls who score poorly in KCPE and get admitted to poor schools such as Ungoye.
- The novel **The River and the Source** makes many boys believe that women are capable of excelling in the world of science hence have an improved perception of girls' learning of science.
- Though the novel **The River and the Source** is taught using a variety of learner-centred methods, which involve reading aloud, analysis by discussion, note-taking, questioning and assessment, the teachers' execution of the above strategies in schools such as Ungoye, which enrol girls with low marks in KCPE is flawed: reading aloud is not integrated with questioning; analysis by discussion is gender-biased, note-making in class is not checked, assessment is done using generic instruments, the lessons are inadequately prepared for and teaching aids are not used.

## 5.2 Conclusions

From the aforementioned findings, it can be concluded that even though the novel **The River and the Source** has a positive influence on girls' learning of science subjects, the influence is more in those schools where other

factors such as students' entry behaviour, school establishment and facilities for learning science subjects are favourable. It can also be concluded that though the novel **The River and the Source** is taught using a variety of learner-centred methods, the teachers' execution of the above strategies in some schools is flawed. This appears to hinder some of the girls from being positively influenced.

### 5.3 Recommendations of the Study

The study therefore recommends that:

- Since the novel **The River and the Source** positively influences many of the girls who have unfavourable attitudes towards learning science subjects, schools should introduce the study of the novel and other related feminist texts in secondary schools right from Form One.
- Since the novel **The River and the Source** has minimal influence on those girls who score poorly in KCPE and get admitted to poor schools, an intervention on girls' poor attitudes to learning science subjects through the teaching of literature should begin in primary school by exposing girls to children's literature with similar themes.
- Since the novel **The River and the Source** appears to remove the psychological barriers, schools should direct more efforts to the elimination of other barriers, which include poor school administration, lack of adequate facilities, teachers' and parents' attitudes, lack of

career guidance and counselling, and lack of qualified teachers.

- Given that the novel **The River and the Source** is already phased out of the curriculum, yet, it is an effective intervention to counteracting the psychological barriers, the Ministry of Education, Science and Technology should find a suitable gender sensitive literary text to replace it.
- The Ministry of Education, Science and Technology should sensitise teachers of similar texts to not only emphasize the themes in the texts that are relevant to girls' learning of science subjects, but also to adopt gender sensitive teaching and learning strategies.
- The Ministry of Education, Science and Technology should sensitise teachers to engage a variety of teaching skills which include adequate planning for lessons and the use of teaching aids such as pictures, newspaper cuttings and audio or audiovisual tapes in order to make students understand the novel.
- The Ministry of Education, Science and Technology should commission novelists, playwrights, poets and short story writers to write literary texts whose themes explore competence of women in science subjects and careers. Such texts should serve as suitable replacements for or be studied along with the novel **The River and the Source** to intensify the gender campaign.

### 3.4 Suggestions for Further Research

- This study evaluated only one strategy put in place to ensure girls' learning of science subjects: the study of the novel **The River and the Source**. Other evaluative studies need to be done on other strategies that are already in place such as provision of female science teachers in girls' schools to act as role models.
- This study needs to be replicated in other districts in the country in order to give a general picture of girls' experiences, in the whole country. This will better facilitate decision-making regarding girls' science education for the entire nation.

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## APPENDIX I

### GIRLS' QUESTIONNAIRE

Dear Student,

Thank you for accepting to answer these questions. This questionnaire is to help the researcher gather some information on your learning of the novel **The River and the Source**. This is **not** a test. You do **not** need to write your name anywhere on this sheet. The information you give will be treated confidentially. Please answer all the questions in the spaces provided.

#### SECTION A

- (i) Did you like learning the science subjects you take before you started studying the novel **The River and the Source**? (Please tick (√) in the box next to the appropriate answer).  
YES [ ] NO [ ]
- (ii) If **NO**, now that you are studying the novel **The River and the Source** does it make you like the science subjects you take? (Please tick (√) in the box next to the appropriate answer).  
Yes [ ] No [ ]
- (iii) If **No** briefly explain why -----  
-----  
-----
- (iv) If **Yes**, which of the following aspects of the novel make(s) you like learning science subjects most? (Please tick (√) in the box (es) next to the appropriate answer(s) i.e. you can tick in two or more boxes).
- a) The author, Margaret Ogola is a doctor [ ]
- b) Vera excels in science and becomes a university graduate in electrical engineering. [ ]



- (a) The author Margaret Ogola is a medical doctor. [ ]
- (b) Vera excels in science and becomes a university graduate in electrical engineering. [ ]
- (c) Wandia excels in science and becomes a medical doctor. [ ]
- (d) The major female character is portrayed as a courageous and determined woman who eventually influences other characters' success in life including in science-oriented careers. [ ]
- (e) The events in the novel include most female characters succeeding in life including in science-oriented careers. [ ]
- (f) Most of the successful female characters in the novel represent women encountered in real life including in science-related professions. [ ]

**SECTION C**

(i) Were you aspiring to pursue science related careers e.g. Engineering, Medicine, pharmacy, computer science etc before you started studying the novel **The River and the Source**? (Please put (√) in the box next to the appropriate answer).

Yes [ ]

No [ ]

(ii) If **No**, do you aspire to pursue science related careers now that you are studying the novel? (Please tick (√) in the box next to the appropriate answer)

Yes [ ]

No [ ]

(ii) If no, briefly explain why -----  
-----  
-----

(iii) If Yes, which of the following aspects of the novel inspire you most to pursue science related careers (please put (√) in the boxes next to the appropriate answers) i.e. you can tick in more than two

boxes).

- (a) The author Margaret Ogola is a medical doctor. [ ]
- (b) Vera excels in science and becomes a university graduate in Electrical engineering [ ]
- (c) Wandia excels in science and becomes a medical doctor. [ ]
- (d) The major female character is portrayed as a courageous and determined woman who influences other characters' success in life including in science-oriented careers. [ ]
- (e) The events in the novel include most female characters succeeding in life including in science-oriented careers. [ ]
- (f) Most of the successful female characters in the novel represent women encountered in real life including in science-related professions. [ ]

#### SECTION D

Briefly state how you are taught the novel **The River and the Source** in class -----

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## APPENDIX II

### BOYS' QUESTIONNAIRE

Dear Student,

Thank you for accepting to answer these questions. The questionnaire is to help the researcher collect some information on your learning of the novel **The River and the Source**. This is **not** a test. You do **not** need to write your name anywhere on this sheet. The information you give will be treated confidentially. Please answer all the questions in the spaces provided.

1. (a) In your opinion do you agree that the role of women in the society is as important as the novel highlights?

(Please tick (√) in the box next to the appropriate answer)

Yes [ ]                      No [ ]

- (b) Briefly explain what in the novel makes you believe so -----  
-----  
-----

3. (a) Does studying the novel **The River and the Source** in any way make you believe that it is possible for girls to perform as well as boys in science subjects ?

(Please tick (√) in the box next to the appropriate answer)

Yes [ ]    No [ ]

- (b) If Yes, briefly state what in the novel makes you believe so-----  
-----  
-----

- (c) If No, briefly state what in the novel makes you believe so-----  
-----  
-----

- 4.) Briefly state how you are taught the novel **The River and the Source** in class -----  
-----  
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## APPENDIX III

### GIRLS' INTERVIEW SCHEDULE

1. Would you agree that the role of women in the society is as important as the novel highlights?
  - (a) Probe for role of women in science.
  - (b) Probe for self-perception of women.
  - (c) Probe for favourite characters and what they do.
  
2. Does studying the novel in any way make you believe that you are capable of excelling in science subjects?
  - (a) Probe for role modelling
  - (b) Investigate change of attitude
  - (c) Probe for change in career aspiration
  - (d) Probe for increased level of confidence
  
3. Do you think that your understanding of the novel is as result of the way you have been taught the novel in class?
  - (a) Probe for influence of pedagogical skills
  - (b) Probe for problems experienced with pedagogy
  - (c) Probe for other factors.

## APPENDIX IV

### BOYS' INTERVIEW SCHEDULE

- 1.) Would you agree that the role of women in society is as important as the novel highlights?
  - (a) Probe for role of women in science.
  - (b) Probe for self-perception of women.
  - (c) Probe for favourite characters and what they do.
  
- 2.) Does studying the novel in any way make you believe that girls are capable of learning science subjects?
  - (a) Probe for previous attitude towards girls' learning of science subjects.
  - (b) Investigate attitude before and after.
  
- 3.) Do you think that your understanding of the novel is as result of the way you have been taught the novel in class?
  - (a) Probe for influence of pedagogical skills
  - (b) Probe for problems experienced with pedagogy
  - (c) Probe for other factors.

## APPENDIX V

### INTERVIEW SCHEDULE FOR TEACHERS OF INTEGRATED ENGLISH

#### SECTION A

The researcher records the following:

- (a) Sex of the interviewee
- (b) Professional qualification
- (b) Whether qualified to teach literature
- (c) Major areas of literature covered during the training e.g. Oral literature, Feminism, etc.
- (d) Teaching experience in English
- (e) Professional activities (e.g. seminars, workshops, in-service, symposium, etc) attended since he/she started teaching and how many times if any?

#### SECTION B

1. How do you usually teach the novel **The River and the Source** in class?
  - (a) Probe for manners of lesson preparation e.g. reference books used.
  - (b) Investigate actual teaching skills
  - (c) Probe for techniques of student-motivation
2. How do your students respond to the novel?
  - (a) Probe for enjoyment
  - (b) Investigate influence of the novel on role modelling
  - (c) Probe for influence on girls' liking of science
  - (d) Probe for influence on girls' confidence in science
  - (e) Probe for influence on girls' aspiration to pursue science-related careers
3. Do you experience any problem as a teacher with teaching the novel?

## APPENDIX VI

### INTERVIEW SCHEDULE FOR TEACHERS OF SCIENCE SUBJECTS

#### SECTION A

The researcher records the following:

- (a) Sex of the interviewee
- (b) Professional qualification
- (c) Science subjects taught
- (d) Teaching experience
- (e) How long he /she has taught the class

#### SECTION B

1.) Generally, what is your female students' attitude towards the science subject(s) that you teach?

- (a) Probe for change of attitude (compare attitude before and after the introduction of the novel).
- (b) Probe for particular features showing change or no change of attitude.
- (c) If the change is positive probe for other possible causes.

2.) Do your female students have confidence in learning the science subject(s) you teach?

- (a) Probe for change in level of confidence (before and after the introduction of the novel).
- (b) Probe for particular features showing change or no change in confidence level.
- (c) If the change is positive probe for other possible causes.

3) What is your female students' performance in the science subject(s) you teach?

- (a) Probe for change in performance (before and after the introduction of the novel).
- (b) Probe for particular features showing change or no change in performance.
- (c) If the change is positive probe for other possible causes.

## APPENDIX VII

### CLASSROOM OBSERVATION SCHEDULE (I) FOR LITERATURE

#### LESSONS

##### **Teachers' Behaviour in the Classroom**

- (i) What kinds of questions does the teacher ask? How do students respond to them?
- (ii) What kinds of questions does the teacher ask boys as opposed to girls (or vice versa)?
- (iii) What kinds of examples, comments or illustrations does the teacher give in class?
- (iv) Does the teacher give both boys and girls equal attention in co-education classrooms? How does this impact on students' response to the novel?
- (v) What is the atmosphere in the classroom? How does it contribute towards the learning process?
- (vi) How does the teacher deal with inappropriate contributions – are his/her comments sexist?
- (vii) How does this impact on the students' response to the novel?

##### **(b) Language of Instruction**

- i. Does the kind of language the teacher uses grant equal respect to both males and females? How does it impact on students' response to the novel?
- ii. Does the language encourage boys as well as girls to enjoy the novel? What are the examples?

##### **(c) Pupils Participation**

- i. Are both boys and girls given equal opportunity to participate in the learning process? How does this impact on their response to the novel?

- ii. Are pupils free to express their personal feelings? What are the examples? What do these feelings show of the influence of the novel on girls' learning of science?
- iii. How large a part do pupils take in the lesson? What does this show of the students' enjoyment of the novel?

## APPENDIX VIII

### CLASSROOM OBSERVATION SCHEDULE (II) FOR SCIENCE

#### LESSONS

The observation will focus on the following aspects:

- 1.) Girls' participation in class.
  - a) How inquisitive are girls during the learning process?
  - b) How do they respond to the questions asked?
  - c) How do they handle laboratory apparatus?
  
- 2.) Salient gendered discourses in the classroom.
  - a) How do boys perceive female students e.g. in class discussions?
  - b) How do teachers regard female students?

Source: KNFC (2001)

NB: Attainment is indicated by grades of which 'A' is the highest and 'E' is the lowest.

## APPENDIX IX

### KCSE NATIONAL EXAMINATIONS GRADING SCALE

GRADE	POINTS	REMARKS
A	12	} Very Good
A-	11	
B+	10	} Good
B	9	
B-	8	
C+	7	} Average
C	6	
C-	5	
D+	4	} Weak
D	3	
D-	2	} Poor
E	1	

**Source:** KNEC (2001)

**NB:** Attainment is indicated by grades of which 'A' is the highest and 'E' is the lowest.

## APPENDIX X

### THE 2000 KCSE MEAN GRADES OF THE TEN SCHOOLS SURVEYED

SCHOOL	TYPE	MEAN GRADE
Mama Selah	Girls only	7.281
Lwanda Rombo	"	6.341
Dr. Daniel	"	6.213
St. Phillips	"	6.039
St. Joel	"	5.981
St. Lazarus	Mixed	8.531
Obwanda	"	7.064
St. Marks	"	6.031
Kiumba	"	5.081
Ungoye	"	4.041

**NB:** (i) The optimum mean score should be 12.000 (see Appendix ix)

(ii) The names of schools are pseudonyms.