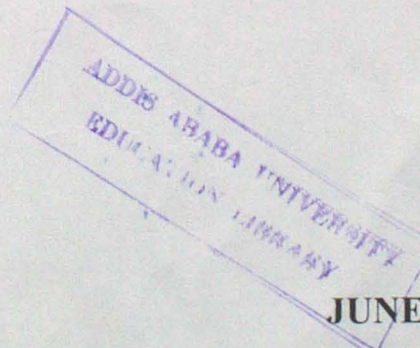
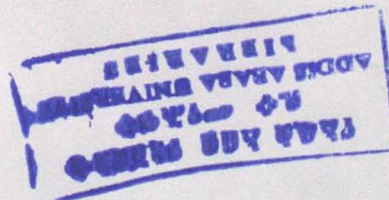


**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**FACTORS AFFECTING THE STREAM CHOICE OF STUDENTS IN
PREPARATORY SCHOOLS OF HORO GUDURU WOLLEGA ZONE
OF OROMIA REGION**

BY

GUDETA GUTA W/SEMAYAT.



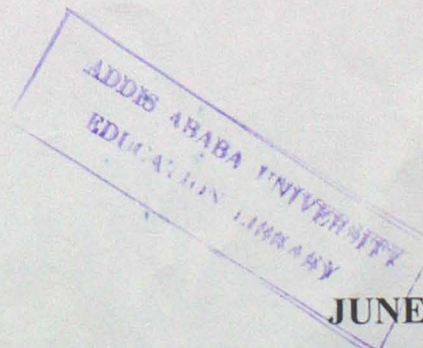
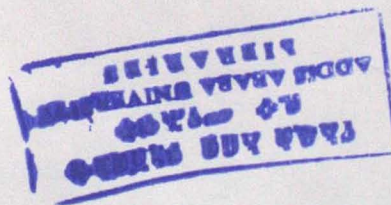
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REQUIREMENT FOR THE DEGREE OF MASTER OF ARTS IN
CURRICULUM AND INSTRUCTION**

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OROMIA REGION**

BY
GUDETA GUTA W/SEMAYAT

Approved by the Board of Examiners

Abdulaziz Hussien
Department Chairman

dc
Signature

K. FACHAVALLI
Advisor

Kigali
Signature

Dr. Desalegn Chalchisa
External Examiner

Chalchisa
Signature

Abdulaziz Hussien
Internal Examiner

Hussien
Signature

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TABLE OF CONTENTS

Acknowledgment.....	i
Table of contents.....	ii
List of tables.....	iv
List of figures.....	v
Acronyms.....	vi
Abstract.....	vii
CHAPTER ONE	
INTRODUCTION.....	1
1.1.background of the study.....	1
1.2. Statement of the Problem.....	3
1.3. Objectives of the Study.....	4
1.4. Significance of the Study.....	5
1.5. Delimitation of the Study.....	5
1.6 Limitation of the Study	6
1.7 Operational Definitions of Important Terms	6
1.8 Organization of the Study	6
CHAPTER TWO	
REVIEW OF RELATED LITERATURE.....	7
2.1.Factors Affecting the Stream Choice of Students in General and Natural Science in Particular.....	7
2.1.1.Out of School Related Factors	7
2.1.2. School Related Factors	10
2.2.Gender Gap in Enrolment in Natural Science	19
2.3.Measures to be Taken by Schools to Minimize the Decline of the Enrolment of Students in Natural Science.....	20
2.4.Science Education in the Context of the 1994 ETP.....	21
CHAPTER THREE	
RESEARCH DESIGN AND METHODOLOGY	24
3.1 RESEARCH DESIGN.....	24
3.2 Populations and Sampling	24
3.3 Tools for Data Gathering.....	25
3.4 Methods of Data Analysis	26

UNIT FOUR	
FINDINGS AND DISCUSSION.....	27
4.1 Findings	27
4.2 Discussion.....	44
CHAPTER FIVE	
SUMMARY, CONCLUSION AND RECOMMENDATION.....	55
5.1. Summary.....	55
5.2. Conclusion	58
5.3. Recommendation	60
REFERENCES	62
APPENDICES	69

LIST OF TABLES

Table 1: Respondents by School	27
Table 2: Teacher Respondents by Age, Sex and High School	28
Table 3: Qualification of Teachers	28
Table 4:- Teachers' Experiences	29
Table 5: Grades scored by sample students in grade 10 National Examinations	30
Table 6: Subjects that Students like Most	31
Table 7: Whether or not Enough Assignments were given by Science Teachers	32
Table 8: Reasons for Science Teachers not to give Enough Assignments	32
Table 9: Factors Affecting the Stream Choice of Students	33
Table 10: The views of Social Science Students Concerning the Discouraging Factors in Their Stream Choice	35
Table 11: Views of Teachers Concerning What Discourages Students during Their Stream Choice	36
Table 12: Learning from Televised Teacher through Plasma TV Instruction	37
Table 13: The Best Way to Teach Science Subject	38
Table 14: Teachers Response for Appropriateness of Teaching Subjects through Plasma TV by Televised Teacher	39
Table 15: Impact of Plasma TV Instruction on Science Teachers	39
Table 16: Enrolment of Student into Natural versus Social Science for the Academic year of 2000 E.C in the three Sample Schools	41
Table 17: Measures to be taken to improve the Enrolment of Students in Natural Science	43

LIST OF FIGURES

Fig.1. Enrolment of Students of Sample Schools across Streams.....	40
Fig. 2: The Percentage of Natural Science and Social Science Students of the three Sample Schools.....	42

Acronyms

AAAS	American Association for Advancement of Science
AAUW	American Association of University Women
ANBEET	Australian National Board of Employment, Education and Training
IBE	International Bureau of Education
MOCB	Ministry of Capacity Building
MOE	Ministry of Education
NETP	New Education and Training Policy
OECD	Organization for Economic Cooperation and Development
TGE:	Transitional Government of Ethiopia.
UNESCO	United Nations Educational, Scientific and Cultural Organization

ABSTRACT

The main purpose of this study was to investigate factors affecting the stream choice of students in general and natural science stream in particular. To put this into effect descriptive survey research method was employed. The subjects of the study were 38 teachers, 6 school principals, 8 education officials, and 277 students. Generally, a total of 329 respondents were included in the study. The schools were selected using availability sampling; teachers, school principals and education officials were identified by purposive sampling method and student respondents were selected by stratified and systematic random sampling method. The data were drawn from questionnaires, interview and observation checklist. The data gathered through questionnaires were analyzed using percentages, means, and descriptive statements. Descriptive narratives were used for the qualitative data gathered through open ended questions, interview and school observation. The study revealed that currently the enrolment of students in natural science stream is falling. The study also identified a number of discouraging factors which caused students to develop disinterest towards natural science subjects. These were difficulties of physical science subjects, lack of subject and/or career advices in the schools, lack of qualified science teachers, absence of practical laboratory activities, irrelevancy of science curricula to daily life, plasma TV dominated instruction (lack of maximum teacher student contact time), lack of encouragement from subject teacher, less efficiency of students in calculation, expansion of private colleges in social science areas, lack of future job opportunities low job and social status of natural science careers, and the lack of confidence developed in students due to falling of quality of education in lower grades. Moreover, the study showed that there is significant enrolment difference between females and males in natural science stream. Finally, recommendations were forwarded.

CHAPTER ONE

INTRODUCTION

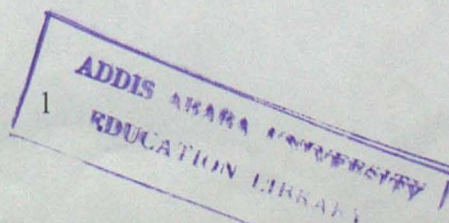
1.1. BACKGROUND OF THE STUDY

Education plays a significant role in molding the ideas, habits, attitudes, interest and values of the learner (Aggrawal, 1998). In addition to this, it is undeniable that education plays great role in the development of science and technology which in turn results in economic development of the country. But currently, some students of the world are showing disinterest towards science and technology subjects after their completion of high school.

The persistent declines in post-compulsory high school science enrolment over the last two decades have generated concern in many countries including Australia (Dekker & Delaeter, 2001), Canada (Bordet, et al, 2001), India (Garge & Gupta, 2003), Japan (Goto, 2001), USA (the National science foundation 2002) and every country in the European Union (Commission of European communities 2004:24). The increasing reluctance of students to choose science courses and physical science courses in particular in their final years of secondary education has important implications not only for the health of scientific endeavor in these countries, but for scientific literacy of future generation

No period in history has been more penetrated by and more dependent on the natural sciences than the twentieth century. Yet no period...has been less at ease with it. This is the paradox with which the historian of the century must grapple (Hobsbawm, 1995: 522).

The world generations are dominated and even 'driven' by ideas and products from science and technology and it is very likely that the influence of science



and technology on our lives will continue to increase in the years to come. Scientific and technological knowledge, skills, and artifacts 'invade' all realms of life in modern society: the work place and the public sphere are increasingly dependent on new as well as upon more established technologies. Scientific and technological knowledge and skills are crucial for most of our actions and decision, as workers, as voters, as consumers (UNESCO, 2000). Meaningful and independent participation in modern democracies assumes an ability to judge the evidence and arguments associated with the many socio-scientific issues that appear on political agenda (Ibid).

In short modern societies need people with scientific and technological qualifications at the highest level as well as a general public which has a broad understanding of the contents and methods of science and technology, coupled with an insight in to their role as social forces that shape the future. Science and technology are major cultural products of human history and all citizens, independently of their occupational 'needs' should be acquainted with them as elements of human culture (Sjøberg, 2002)

According to UNESCO (2000), a concern about unsatisfactory enrolment in science and technology is voiced by many interested groups. Industrial leaders are worried about the recruitment of a qualified workforce. Education authorities are worried about the already visible lack of qualified teachers of scientific and technological subjects. In some countries the difficulty of recruiting sufficient numbers of new entrants to the teaching profession has become a matter of national concern, especially when the level of recruitment does not even allow for the replacement of those who are retiring. This concern is often based on the comprehensive appraisals of the education and labor markets.

The concern is not confined to numbers. There is also more or less identifiable fall in the quality of the new comers. A lower quality may of course be a

consequence of the fact that very few candidate compete for places at institutions where the entrance qualification were previously very high. If especial measure will not be taken urgently by the concerned body, many institutions of higher education are unable to fill their places in science and technology with students of satisfactory quality.

According to a policy brief of (MOE &MOCB,2007)Ethiopia needs to expand its higher education base and focus on expanding science, technology and engineering fields to become competitive and accelerate its development towards becoming a middle income country in the coming two decades. To attain this goal, Ethiopia decided to adjust students' enrolment ratio to 70% natural science /engineering/technology and 30% social science/humanities fields in 2009/10 academic year (MOE & MOCB 2007 :3). But the current situation of Ethiopia, concerning students' enrolment in natural versus social sciences, doesn't seem it is promising to attain this ratio at the specified time. To succeed this ratio at university level, it needs to solve problems related to students' stream choice before grade 11 at high school level.

Consequently the participation of students in natural science appears to be an issue that needs investigation. In spite of this, however, in our country research on the tendency of students toward science is scant or almost none. Thus, this research was conducted to make preliminary investigation on the magnitude of enrolment imbalance in social versus natural science streams in selected preparatory schools of Horo Guduru Wellega Zone of Oromia Region. It was almost attempted to identify factors affecting the stream choice of students in high schools under study.

1.2. Statement of the Problem

One might expect the increasing significance of science and technology to be accompanied by a parallel growth in interest in the subjects and understanding of scientific ideas and ways of thinking. This does however, not seem to be the case in most countries of the world (UNESCO, 2000). "There is no question but

that our present world is a creation of modern science in application” (Lai & Azim, 1989: 271). This statement reminds us, the fact that the present society is one in which science in application is increasingly becoming important to both individuals and nations. It is during this time that the majority of students becoming reluctant to participate in scientific and technological development. This may affect the over all development of the society.

As a result enrolment inequality in the access of science and technology seems to be a problem that educational system should be concerned. Considering its potential effect to the overall societal development it is an issue that calls for immediate interventional measures. To do so, it is important to know what hinders students from pursuing their studies in natural science stream; because this is the first step in altering environments to eliminate the existing enrolment disparity in natural science.

In Ethiopia, as long as the knowledge of the researcher is concerned no research had been conducted in the area so far. Thus, this research appeared to be timely and important to identify factors that hinder students from choosing natural science stream.

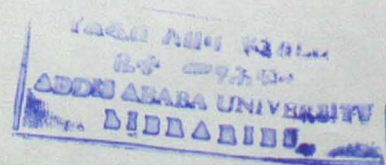
To fill this gap, the study was focused on answering the following basic questions.

1. Why students dislike natural science?
2. What are the factors affecting the stream choice of students?
3. What should schools do to minimize the decline of the enrolment of students in natural science?

1.3. Objectives of the Study

This research had the following objectives:

- To investigate factors affecting the stream choice of students at high schools



- To identify the reason why students dislike natural science
- To mention some measures to be taken by schools to minimize the decline of the enrolment of students in natural science.

1.4. Significance of the Study

The findings of this study were expected to have the following significances.

1. The findings of the study will contribute to the understanding of those factors that play major role in hindering students from enrolling in natural science stream in the schools of the country.
2. The result of the study will help all concerned bodies to realize the magnitude of the problem and attempt to tackle it.
3. The recommendation and suggestions given may help the schools, the zonal government, the Regional Education Bureau and the Ministry of Education to know as to what type of interventions might be made to improve the situation.
4. The out come of the study may also stimulate the interests of other researchers and serve as a stepping stone for further study in this area.

1.5. Delimitation of the Study

The main focus of this study was to identify the reason for decrease in enrolment of students in natural science stream in preparatory schools of Horo Guduru Wellega Zone. Although the study considered the case at preparatory schools of Horo Guduru Wellega Zone, the findings are believed to reflect the over all situation in the region as well as in the country as whole since the students under study are the products of centrally designed curriculum and partially the products of centrally designed instruction.

The subject of this study included students of grade 11 and teachers' and administrators of the schools under study, administrators of Wereda Education Offices and administrators of the Zonal Education Offices.

Although there were other variables that could affect students' participation in natural science stream, the depth of this study was mainly confined to school related barriers or factors and some out of school related factors.

1.6. Limitation of the Study

The research could have been more comprehensive and conclusive if it had been carried out at a national level. However, it was limited to preparatory schools (grade 11) at Horo Guduru Wollega Zone due to many factors such as financial and time constraints to undertake the research. Further more, this study would have achieved more details and beneficiary to the readers than the present had the researcher been more experienced in conducting educational research.

1.7 Operational Definitions of Terms

Stream choice:- the preference of students between social and natural sciences.

1.8. Organization of the Study

The study is divided in to five chapters. Chapter one forms a general frame work for the research work. It maps out the over all background, statement of the problems, basic questions, objectives of the study, significance of the study, limitation and delimitation of the study. The second chapter is devoted to the review of the related literatures. The third chapter deals with research methodology and procedure of the study. The forth chapter presents analysis and interpretation of data. The last chapter provides summary of the findings, conclusions and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Streaming is an important element of educational policy of one's own country. The proportion of students placed in each stream influences the outcomes expected from the policy.

There are different encouraging and discouraging factors, which influence students' stream choice. In this section the researcher focused on factors affecting the stream choice of students in general and Natural Science in particular, which in turn classified as school related factors and out of school related factors. Finally, the section was concluded up by discussing on measures to be taken by schools to minimize the decline of the enrolment of students in Natural Science and Science Education in the context of the Ethiopian Education and Training policy (TGE, 1994b).

2.1 Factors Affecting the Stream Choice of Students in General and Natural Science in Particular

Different researchers have classified factors affecting the stream choice of students in various ways. For example, Woolnough (1994) classified them as 1/encouraging and discouraging factors; 2/school related and out of school related factors and 3/teaching factors, curriculum factors and extra-curricular activities.

2.1.1 Out of School Related Factors

- **Job Opportunities**

Students become increasingly aware of career opportunities and the availability of vocational pathways during their final years of senior

schooling (Harvey 1984). While many career theorists caution against making early decisions in relation to careers, institutional and societal constraints often require that a choice be made by students when they are still relatively young (Watson & Stead 1994). According to the same authors, in Australia it is often the case that students are asked to identify future study and potential goals when choosing subjects for senior school.

For the majority of young people, decisions about their future are embedded in their decisions about school subjects and further education (ANBEET 1995). Specifically, in relation to subject selection, Sian, Light body, Nicholson, Tait and Walsh (1998) observed that the majority of students in their study chose subjects that they liked or that facilitated progression to a future career.

- **Career Status**

Much of the commentary on falling science enrolments in Australia has suggested that external issues, such as perceptions of the low status of science careers ...have been drawing students away from science courses (Werry 1998).

According to Woolnough (1994:29), perceived low salaries and status of jobs in science and engineering were factors, which most discouraged students from pursuing science fields.

- **Family Background**

According to Lyons (2004), most students choosing a natural science course described parents or other family members who advocated or encouraged an interest in science. This was done through the provision of

science related materials, such as books, magazines, kits and toys; frequent discussions of science related issues; help with science projects, and homework; and shared viewing of science TV documentaries. Several parents were also involved in science related occupations, such as medicine; engineering or science teaching, indicating to students that science was valued.

According to ANBEET (1995), for students from families without high levels of education, parents' advice often seems to increase rather than to clarify the confusion about desirable education and training pathways. Children from families where the parents have attained high levels of education are more likely to continue their education than those from families where parents' educational experience is more limited.

The difference in participations appear to come about because highly educated families understand how the 'system' works, have more useful networks, and are in general, better equipped to provide high levels of support for their offspring to continue in education than is the case in low-status families (ANBEET, 1995).

- **Students' Ability and Interest**

Students have specific interests and needs and they know what they want to do after they complete secondary education. Teachers should take into account these factors when streaming students into subject combinations as this determines their future Tawaiyole, (2002:12).

Hauser & Hoffman (2000) claimed that the disparity between the actual curriculum and students' interest might be largely responsible for the rather poor results of physics instruction. Or, stating this in a more positive way: A better fit between curriculum and students' interests

could lead to better results in terms of cognitive as well as affective outcomes (p.697). Attitudes associated with science appear to be affecting student participation in science as a subject (AAAS, 1989; Koballa, Crawley, & Shrigley, 1990) and impacting performance in science (IAEP, 1992; Weiss, 19987; Linn, 1992).

2.1.2. School Related Factors

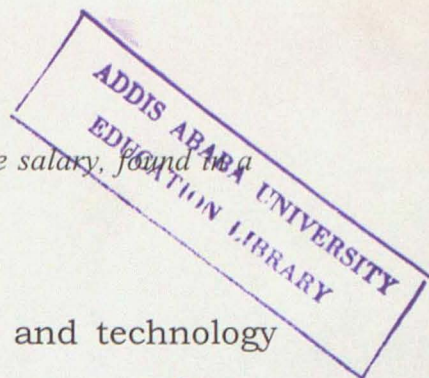
- **Teaching Factors**
- **Quality of Teachers /Teaching Effectiveness**

Schools need large numbers of well-qualified teachers, but many countries face a problem of both quality and quantity in recruiting science teachers. Well qualified and enthusiastic teachers are the key to any improvement in the teaching of science and technology in schools, not least in laying the foundations for the future development of the knowledge, interest, and attitudes of ordinary citizens once they have left school (Jenkins, 2002).

Students appreciated teachers who presented the content in an engaging manner (Lyons, 2003). According to UNESCO, 2000; OECD, 2001b, one of the underlying reasons for present difficulties in recruitment to scientific and technological studies, from the perspective of European countries is a lack of qualified teachers.

Science and technology are often poorly treated in the preparation of children of primary school age. Moreover, those students who choose to become primary school teachers are often those who did not study, or did not like, science themselves in school. The present decline in recruitment of science teachers in many countries is particularly evident in secondary schools. In part, it can be

attributed to a general decline in teachers' status and relative salary, found in a number of countries (UNESCO, 2000; OECD, 2001b).



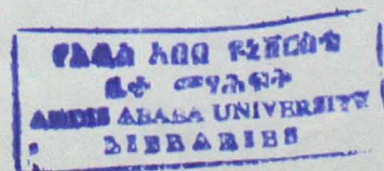
The long-term effects of a shortage of good science and technology teachers can be very damaging, although they may not be so immediately evident as a comparable shortage in industry and research (Jenkins, 2002). According to Woolnough (1994:34), as per the student responses, the most encouraging factors for pursuing a science career and studying science were the *quality of science teaching, encouragement of science teachers, the practical nature of science, the intellectual satisfaction in science lessons* and so on.

Qualified teachers, through *role model influence*, can encourage students to follow their science teachers in pure science Woolnough (1994:37). Under the topic "What the students say?" for question, "Do the teachers of science make a difference?" Woolnough reported the response of two girls as follows:

I was put off sciences wholly by dull, unenthusiastic teachers. Having teachers who were interested and enthusiastic about what they were teaching helped to develop my love of science and learning about science.

- **Teaching Methods and Means of Transmission**

In the teaching learning process, methods of teaching and means of transmission play a central role in attaining the intended objectives. According to Akalewold (2001), many investigators reported that cooperative learning methods enhanced students' academic achievement and self-esteem and improve their classroom-learning environment (p.33). Hegartz-Lazarwitz, et al (1984) in Akalewold (2001) reported that



laboratory settings produce the highest frequency of natural interaction and cooperation on task compared with other modes of instruction in science. This goal can be achieved when curriculum material is planned to encourage such cooperative interaction. The learning environment in the cooperative classroom was more flexible than the frontal classroom (Ibid). The approach facilitated more interaction among students and teachers and thereby created a positive learning climate.

Woolnough (1994) argues that the best method of effective science teaching is through student research projects, in which students take a problem of personal concern to themselves and tackle it, worry at it, persevere in it and meet its challenges, producing their own solution (p.9)

Woolnough further argues that;

Doing science should be a holistic and not a reductionist activity. It should involve the affective as well as the cognitive aspects of a students' life. It is not sufficient to be concerned only with what students know and can do; one must also be concerned with whether they want to do it. It is of fundamental importance to develop students' emotional involvement with their work; to develop their motivation, their commitment, and their enjoyment and creativity in science, for without this any knowledge and skill they acquire in the subject will be of no avail (p.9).

Concerning science students, Woolnough (1994) said that the more responsibility we encourage them to take for their own learning, the more their enormous potential will develop and the more they will appreciate, enjoy and mature in science.

Many of the organizational issues, which have dominated science teaching in England and Wales, have been based on the principle that learning science is about doing science and that the best way to learn science is by doing practical activities in science. Teachers have almost felt guilty if they have not had their classes doing practical work in any particular lesson (Woolnough, 1994:25).

- **Nature of Subjects (Curriculum Factors)**

Related to the curriculum factor Jenkins (2002) identified two main reasons for the reluctance of students in enrolling in natural science subjects.

- 1. Outdated and Irrelevant Curricula**

Many studies show that pupils perceive school science as lacking relevance. It is often described as dull, authoritarian, abstract and theoretical. The curriculum is often crowded with unfamiliar concepts and laws. It leaves little room for enjoyment, curiosity, and a search for personal meaning and significance. It often lacks a cultural, social or historical dimension and it seldom treats the contemporary issues related to science and technology.

- 2. Science: Difficult and Unfashionable**

Scientific knowledge is naturally abstract and theoretical and often contradicts common sense (Wolpert, 1993). It is often developed through controlled experiments in artificial and 'unnatural' and idealized laboratory settings. Learning science therefore, often requires hard work and considerable intellectual effort, although there is little doubt that school science could, and should, be better tailored to meet the needs

and abilities of pupils. Concentration and sustained hard work do not seem to be a dominant feature of contemporary youth culture. In a world where so many 'Channels' compete for the attention of young people, subjects such as science and technology are readily perceived as unfashionable.

According to Lyons (2003) students were departing from school science in Australia due to the following four reasons:

1. *It was described as a subject that focused on facts, which were transmitted from expert sources-teachers and texts- to relatively passive recipients.*
2. *Curriculum content was often presented in a decontextualized manner, leading many of the students to consider school science irrelevant and boring.*
3. *The students considered physics and chemistry to be the most difficult of all science courses and generally more difficult than most other subjects.*
4. *Finally, physics and chemistry were regarded as subjects having a primarily strategic value, in that they would enhance the students' university and career options.*

Science curricula are key factors in developing and sustaining pupils' interest in science. There seems to be a broad agreement about the shortcoming of traditional curricula that still prevail in most countries. According to UNESCO (2000), the implicit image of science conveyed by these curricula is that it is mainly a massive body of authoritative and unquestionable knowledge. Most curricula and textbooks are overloaded

with detailed facts and information on a few big concepts and key principles.

UNESCO further argues that there seems to be an attempt to cover most, if not all, parts of established academic science, without any justification for teaching material in schools that cater for the whole age cohort. Many new words and 'exotic' concepts are introduced on every page of most textbooks (Jenkins, 2002). The same author further argues that, although very few pupils will pursue further studies in science, preparation for such studies seems to be a guiding curriculum principle. There is often repetition, with the same concepts and laws presented year after year. Such curricula and textbooks often lead to rote learning without any deeper understanding so that, not surprisingly many pupils become bored and developed a lasting aversion to science.

Moreover, this textbook of science is often criticized for its lack of relevance and deeper meaning for the learner and their daily life. (The content is frequently presented without being related to social and human needs, either present or past, and the historical context of discoveries is reduced to biographical anecdotes.) Moreover, the implicit philosophy of textbook of science is considered by most scholars to be a simplistic and outdated form of empiricism (UNESCO, 2000).

According to Woolnough (1994: 29), difficulty of the physical sciences in schools was mentioned as the most discouraging factor blocking students from pursuing studying science.

According to Ajeyalemi (1990), in Sub-Saharan African countries the current secondary science curricula are unsuitable for achieving the

objectives of producing scientifically literate graduates. Furthermore, Ajeyalemi (1990) argues, *most of the graduates from the system can only read and memorize scientific ...information but may not be able to think in do, or use science ... as their counterparts in developed countries* (P.12).

According to Temechegn (2000) in Amare et al (2000) the Transitional Government of Ethiopia (TGE, 1994a) documented the inadequacy of the education system to prepare the learner for useful participation in the community. Pointing out the fact that objectives and relevance of education became questionable in the last 30 years, the Education Sector strategy (TGE) stated that:

It is generally agreed that the impact of modern education on the day-to-day life of the society at large has been negligible. The science and cultural components are weak and inadequate to prepare the learner for useful participation in the community (p.3).

The Government thus developed the New Education and Training Policy (NETP) that states, among others, that the education system is entangled with complex problems of relevance, quality, accessibility and equity (TGE, 1994b: 2). Based on the NETP, new science curricula and textbooks are being developed for both primary and secondary schools.

There is a strong belief that students of science should know the practical applications of the science contents and the resulting social implications Temechegn (2000) in Amare et al (2000).

Socially relevant curricula have their own benefits. When students have exposure to socially relevant curricula, they can understand the role of science in their society, apply their science knowledge to real life situations and develop skills of decision-making and problem solving (George, 1988). Such exposure can be achieved by including indigenous knowledge and native technology in the science curriculum (George 1988, Ajeyalemi 1990, Swift, 1992; Temechegn, 1996; Ogunniyi, 1996).

- **Extra-curricular Activities**

Advocates of extra-curricular activities (Fretwell, 1931; Fozzard, 1967; Miller, Moyer & Patrick, 1956; Sybouts & Krepel, 1984) claim that this informal aspect of education has a good deal to contribute to developing good citizens, enabling pupils to communicate adequately, preparing them for economic independence, developing healthy minds in healthy bodies, preparing them for family life, directing their use of leisure time, developing a set of moral and ethical values, developing social competency, *discovering especial interests and capacities, and developing creative expression.*

According to Woolnough (1994: 29) schools using different extra curricular activities had relatively high degree of 'successes'. Schools which encouraged extra-curricular activities and student science projects, through clubs, competition, projects and school-industry links were the ones which sent a large proportion of their students on higher education to continue with their sciences or engineering.

Through extra-curricular activities, students gain knowledge, understanding and appreciation of the sciences, confidence and competence at doing science, and enjoyment, enthusiasm and

commitment to the science appropriate for their own lives (Woolnough 1994: 43).

- **Resources (Laboratory Facilities)**

Science teaching in upper secondary school level requires especial facilities. Showalter (1984) in Akalewold (2001: 30) showed that the importance of facilities by saying "Research can show that without adequate laboratory facilities and materials, most students can not learn biology in any meaningful way".

Davis (1972) also found that provision of equipment and materials had improved patterns of teaching science. In his research, science teachers also reported that adequate supply of materials made teaching more convenient and more effective, increased the amount of students' experimental work, and enabled teachers to broaden the science curriculum (Akalewold, 2001: 30).

Ainley (1978) found that better facilities were associated with what students perceive as an enriched learning environment, namely greater involvement in purposeful activities and more stimulation to study.

- **Career/Stream Choice /Advice**

It is obvious that students need detailed career and/or subject advice when making choices about selecting school subjects. Interestingly, while many schools provide a range of career related services and information resources to facilitate the decision-making process, only limited research addressed how useful and meaningful this assistance is for students (Chapman, 1993). Dellar (1994) also found that with regard to obtaining relevant information, students appeared to access *informal* channels such

as parents and siblings, rather than career education or counseling resources available in the school.

According to Siann et al (1998) most students choose subjects or career from a narrow viewpoint with short-term focus, often failing to fully consider their options beyond school. In the Australian context, Watron and Cooney (1997) found little evidence that subject choice by a school student was considered, planned exercise. According to their results, 30% of students indicated they had not received information booklet about subject choice, which had been distributed by all schools in the study.

2.2 Gender Gap in Enrolment in Natural Science

Gardner (1975:22) stated "sex is probably the most important variable related to pupils' attitudes to science." Many studies (e.g., Menis, 1983; Sjoberg, 1983; Francis & Greer, 1999) have reported that males have more positive attitudes to science than females while others found no statistically significant gender differences (Selim & Shrigley, 1983). Kale & Meece (1994) have published an extensive review about the gender issue related to students' science attitudes towards science subjects.

Ormerod & Dukworth (1975) indicated the importance of distinguishing between the physical and biological sciences when gender differences in attitudes to science are considered. Gardner (1974), in review of gender differences in achievement, attitudes and personality of science students stated that there are "clear differences in the nature of 'boys' and 'girls' scientific interest, boys expressing relatively greater interest in physical science activities, while girls are more interested in biological and social science topics" (P.243). These findings were corroborated by Sjoberg in 2002 study.

Studies on gender roles and school subjects reveal that the avoidance of additional science courses by females (Maple & Stage, 1991; Archer & McDonald, 1991). Schibeci (1984) reported that females exhibit more positive attitudes toward biology and males toward physics. As females progress through secondary grades they become less confident of their academic skills; thus their career aspirations are narrowed (AAUW, 1992, Linn & Hyde, 1989).

2.3 Measures to be Taken by Schools to Minimize the Decline of the Enrolment of Students in Natural Science

According to Jenkins (ed.) (2002), the growing importance, but increasingly problematic, enrolment in, and status of, science and technology in many countries provides the obvious background to a growing political concern about science and technology in schools, higher education, media and the public.

In many countries, the situation attracted political attention at the highest level, and in some cases, projects and counter-measures are planned or put in operation. The Swedish NOT-project and the Portuguese Ciencia Viva are examples of large-scale national programs. Some of these programs have also initiated research and prompted discussion and other effort directed at improving understanding of the dimensions of the problems.

According to UNESCO (2002) in science and technology in education, 'Less is more' has become a slogan for curriculum development in a number of countries. More attention is given to the 'great stories' of

science and technology and to presentation of key ideas and their development, often in a historical and social context. These key ideas replace attempt to present pupils with an encyclopedic coverage of the whole of science. UNESCO further argues that by adopting this so-called narrative approach, it is hoped to convey an understanding of the nature of science and technology, to nourish pupils' curiosity about and respect for work in these fields, and to avoid the *curse of an overcrowded curriculum* that currently leaves so *little time for reflection* and the search for meaning.

2.4 Science Education in the Context of the 1994 ETP

The Military Government was defeated and replaced by Transitional Government of Ethiopia in May 1991. Among other changes, the change in ideology brought the inception of a new Education and Training Policy, which was declared in April 1994. One of the major areas the policy brought was the curriculum. The previous curriculum was criticized for lacking relevance, clearly defied objectives and having too much concentration on theoretical knowledge with little concern to everyday life (MOE 1994). To alleviate this alleged shortcoming the policy addressed a major objective '...make education relevant by providing problem solving skills and all rounded education catering to the need of individual at all levels' (MOE 1994:13).

Based on the stated objectives; a new curriculum has been developed and implemented in most regions. Concerning the assessment and evaluation procedures to be used, the policy has stipulated establishment of national organization for educational measurement and evaluation and assessment would be continuous in academic and practical subjects including aptitude



tests to ascertain the formation on all-round profile of students. National examination will be given at grade 8 and 10.

The policy changed the educational structure from 6:2:4 to 8:4. Hence eight years of primary education is followed by four years of secondary education. The primary education is divided into basic education (grades 1-4) and the general primary education grades (grades 5-8). The secondary education is divided into general secondary education (grades 9-10) and the preparatory education (grades 11-12) this is where students are expected to choose between natural and social science streams. Though the aim of science education for the country are not explicitly stated in the policy document, Berhanu (1999) identified some objectives from the NETP that throw light up on science and technology education as:

1. To produce citizens capable of identifying and solving problems by strengthening individual's physical and mental potential beginning from basic education for all and at all levels.
2. To produce citizens that show positive attitude and contribute towards popularization, dissemination and development of science and technology in society, creativity and experimenting skills.
3. To produce citizens who are capable of knowing, observing, and understanding changes and who appreciate the environment by making education appropriate and relevant to environmental and social needs.

Science education, according to the 1994 ETP, starts from the primary school. Environmental science is offered in grades 1-4. Science, handicraft, agriculture, environmental issues etc. are integrated in environmental science. Science in grades 5-6 is split into basic and social

sciences. Linear approach to science starts at grade 7 and continues into the secondary education.

Science subjects are compulsory up to grade 10 for all students. Technology education is offered integral with the teaching of sciences. Practical activities, project work and social issues help the development of technological skills and attitudes (Berhanu 1999). Science is one of the top popularized subjects in the policy. Currently, in Sep. 2007 MOE designed new strategic plan for higher education for four years (2007-2010). One of the goals of this plan is to increase the student's enrollment in higher education in 2010 up to 110,000. The plan gives priority to the science and technology subjects, as they are the bases for the development of the country. But the question is "how to increase students' enrollment in science and technology subjects at grade 11 level?"

CHAPTER THREE

RESEARCH DESIGN AND METHODOLOGY

3.1 RESEARCH DESIGN

The aim of this study was to examine factors influencing the stream choice of students in general and natural science stream in particular. To secure the required information descriptive survey research design was applied.

3.2 Populations and Sampling

- **Populations**

The study populations included grade 11 social and natural science students, teachers and school administrators of schools under study, namely Hareto, Shambu & Amuru Preparatory Schools, Wereda and Zonal Education Officials.

- **Sampling**

The respondents (subjects) included in this study were directors and deputy directors (6 in no_), all natural and social science teachers (38 in numbers), two officials from each wereda of the location of respective schools under study and two zonal education officials (8 in no_), 277 social and natural science students. Generally, a total of 329 respondents were included in the study as source of information.

The researcher identified schools using availability sampling to include all preparatory schools in the zone under study. The researcher also applied purposive sampling to take officials from schools, wereda and zonal education offices, as they were believed to be rich sources of information for the study. Concerning student respondents, the researcher has taken 30% of social and natural stream students of grade 11 of respective schools under study using stratified and systematic random sampling.

3.3 Tools for Data Collection

The data collecting tools used for this study were questionnaires, interview, and observation checklist.

- **Questionnaire**

Two sets of questionnaires were prepared to collect information from two groups of respondents. The members of the groups were 177 social science students, 100 natural science students and 38 natural social science teachers of the school under study. The questionnaire distributed to students has three parts whereas those distributed to teachers has four parts. The first parts in both cases were used to obtain relevant personal information about respondents. In case of students the second part dealt with information related to their education. The second part of questionnaire for teachers and the third part for that of students dealt with encouraging and discouraging factors in the stream choice of students. The third part of questionnaire for teachers was intended to secure information related to methods of teaching and means of transmission while the fourth part of questionnaire for teachers were intended to obtain information related to measures to be taken to increase the enrolment of students in natural science.

Before the administration of the questionnaires to the actual subjects in the study, Pilot study had been conducted to check the relevance of each item in the questionnaires. The subjects in the pilot study were 20 social science students (5 females and 15 males), 4 natural science students (1 female and 3 males), and a total of 24 students and 4 teachers. All subjects in the pilot study were from Neqamte Preparatory School. After the pilot study, modifications were made on few items and then questionnaires were administered to the actual subjects in the study.

The administration of the questionnaire was undertaken in two phases. The investigator did the distribution and collection of questionnaires for the teachers. On the part of the student respondents, since they were scattered in different sections, it was found more convenient to assemble them in groups according to their respective streams. So the respondents from the two streams made to gather together with the collaboration of school directors and their deputies. After this the researcher himself did the distribution and collection of the questionnaires.

- **Interview**

A series of open-ended questions were developed to address 6 School Principals, 6 Wereda Education Officials and 2 Zonal Education Officials. It was to find out about problems related to the stream choice of students and seek solutions for the problems. Unstructured interview was employed for each principal and education officials. The interview was done in Afan Oromo and then translated to English. This was done to have common understanding and to avoid any miss understanding between the informants and the interviewer. Notebook (log) was also used to record the information of the informants.

- **Observation Checklist**

Two foreign educational experts and two curriculum and instruction graduate students for its validity judged the observation checklist. Then observation was conducted in the schools under study to gather information about extra curricular activities, guidance and counseling, school laboratories and libraries.

3.4. Method of Data Analysis

The data obtained during the study have been analyzed by applying statistical techniques such as percentages, means and statistical significant tests as well as descriptive statements. This was done in order to answer the basic research questions set at the beginning of the research.



CHAPTER FOUR

FINDINGS AND DISCUSSION

The findings of the study were presented in five sections. These were 1) general characteristics of participants, 2) Information related to the education of student respondents, 3) Encouraging and discouraging factors in stream choice of students 4) Methods of teaching and means of transmission and 5) Suggested measures to be taken by schools and other concerned bodies.

4.1. Findings

- **General Characteristics of Participants**

This study was conducted in three preparatory schools (Hareto, Shambu and Amuru) in Horo Guduru Wollega Zone. The total number of participants was 329(260 males and 69 females), as shown below.

Table 1: Respondents by School.

School	Students								Teachers and principals				Wareda & Zonal Education Officials			
	Social science				Natural science											
	M	F	T	%	M	F	T	%	M	F	T	%	M	F	T	%
Hare to	28	18	46	14.00	21	2	23	6.99	12	1	13	3.95	2	-	2	0.61
Shambu	57	30	87	26.44	38	8	46	14.00	16	1	17	5.17	4	-	4	1.22
Amuru	39	5	44	13.37	27	4	31	9.40	14	-	4	4.25	2	-	2	0.61
Total	124	53	177	53.81	86	14	100	30.39	42	2	44	13.37	8	-	8	2.43

As observed from Table1 among the respondents 84.19% were students (63.83% males and 20.36 % females). From students respondents 53.81% were social science (37.69 Males and 16.11 females), while 30.39 % were from natural science (26.14% males and 4.25% females). Out of the 277 student

participants, 20.99% were from Hareto, 40.44% were from Shambu and 22.77% were from Amuru preparatory schools.

The following is information about the background of teacher respondents.

Table 2: Teacher Respondents by Age, Sex and High School

School	Sex	Age							
		21-30		31-40		41-50		Total	
		F*	%	F	%	F	%	F	%
Harato	M	9	23.68	1	2.63	-	-	10	26.31
	F	1	2.63	-	-	-	-	1	2.63
	T	10	26.31	1	2.63	-	-	11	28.95
Shambu	M	9	23.68	4	10.53	1	2.63	14	36.84
	F	1	2.63	-	-	-	-	1	2.63
	T	10	26.31	4	10.53	1	2.63	15	39.47
Amuru	M	11	28.95	1	2.63	-	-	12	31.58
	F	-	-	-	-	-	-	-	-
	T	11	28.95	1	2.63	-	-	12	31.58
Grand total of both sexes	M	29	76.32	6	15.79	1	2.63	36	94.74
	F	2	5.26	-	-	-	-	2	5.26
	T	31	81.58	6	15.79	1	2.63	38	100

F*= Frequency or number of respondents

As shown in Table 2 above most of the teachers 31(81.58%) were 21-30 years old. A small portion of the teaching forces (5.26%) were women teachers.

The qualification of the teacher respondents is as follows:-

Table 3: Qualification of Teachers

School	College Diploma		1 st degree	
	F	%	F	%
Hareto	2	5.26	9	23.68
Shambu	1	2.63	14	36.84
Amuru	1	2.63	11	28.95
Total	4	10.53	34	89.47

As indicated in Table 3, the majority i.e., 34(89.47%) of the teachers were first degree holders, 4(10.53%) were college diploma holders. Table 3 also indicates that the numbers of teachers with diploma holders were greater in Hareto Preparatory School than in the other sample schools

The work experience of teachers is indicated in table 6 below.

Table 4:- Teachers' Experiences

Service years	Percentage Giving the Response							
	Hareto		Shambu		Amuru		Total	
	F	%	F	%	F	%	F	%
1-5	8	21.05	9	23.68	5	13.16	22	57.89
6-10	3	7.89	2	5.26	5	13.16	10	26.32
11-15	-	-	-	-	1	2.63	1	2.63
16-20	-	-	1	2.63	1	2.63	2	5.26
21-25	-	-	3	7.89	-	-	3	7.89

Table 4 shows that majority of the teachers, i.e., 22(57.89%) were with service years of 1-5, of which 21.05% were from Hareto, 23.68% were from Shambu and 13.16% were from Amuru Preparatory School.

All of the school principals and their deputies selected for studies are males and all of them are first degree holders.

From three weredas, 6 education officials were asked their opinion about stream choice of students in preparatory schools. 2 education officials from zonal education office were also included to share their opinion concerning the topic under study. All of the respondents are males. With regard to their qualification 7 of them are first degree holders and only 1 diploma holder. (Currently he is attending distance education for his first degree.) The majority of the respondents (5) were served above 16 years.

Information Related to Education of the Student-Respondents

Table 5 below shows grades scored by sample students in grade 10 national examination in different subjects.

Table 5: Grades Scored by Sample Students in Grade 10 National Examinations.

	Natural science											Social science										
	Grades scored											Grades scored										
	A		B		C		D		F		Total	A		B		C		D		F		Total
F	%	F	%	F	%	F	%	F	%		F	%	F	%	F	%	F	%	F	%		
Physics	10	10	22	22	62	62	6	6	-	-	100	3	1.69	29	16.38	126	71.19	17	9.6	2	1.13	177
Chemistry	30	30	51	51	19	19	-	-	-	-	100	16	9.0	63	35.59	88	49.72	10	5.65	-	-	177
Biology	27	27	44	44	28	28	1	1	-	-	100	23	12.99	76	42.94	68	38.42	8	4.52	2	1.13	177
Mathematics	25	25	35	35	35	35	5	5	-	-	100	20	11.3	52	29.38	86	48.59	18	10.17	1	0.56	177
Geography	24	24	35	35	38	38	2	2	1	1	100	28	15.82	83	46.89	63	35.59	3	1.69	-	-	177
History	7	7	34	34	49	49	8	8	2	2	100	30	16.95	69	38.98	67	37.85	8	4.52	3	1.69	177
Civics	19	19	40	40	35	35	5	5	1	1	100	31	17.51	75	42.37	62	35.02	9	5.02	-	-	177

As can be observed from Table 5 above 81.92% of the sample students enrolled in social science stream have scored C, D and F in physics. This highly influenced students from enrolling in natural science stream.

59% of the sample students from natural science stream have scored A&B in geography while 62.71% of social science students have scored A&B. Generally, the impact of natural science subjects on social science students is more significant than that social science subjects influence natural science students. Subjects that student like most are depicted in the following table

Table 6: Subjects that Students like Most

Subject	Percentage Giving Responses				Grand Total	
	Social Science Students		Natural Science Students			
	F	%	F	%	F	%
Chemistry	2	1.13	30	30	32	11.55
Physics	1	0.56	5	5	6	2.17
Biology	4	2.26	32	32	36	12.9
Mathematics	1	0.56	27	27	28	10.11
Geography	66	37.29	-	-	66	23.83
History	24	13.56	-	-	24	8.66
Civics	61	34.46	3	3	64	23.10
English	5	2.82	1	1	6	2.17
Amharic	-	-	-	-	-	
Afan Oromo	13	7.34	2	2	15	5.41
Total	177	100	100	100	277	100

Table 6 shows that almost all natural science students and most social science students (95.48%) of the sample schools are currently learning their favorite subjects. But few social science students 8(4.52%) were misplaced against the subject they like most due to some external factors.

Table 7 below indicates whether sciences (Biology, chemistry & physics) teachers give enough assignments for students to exercise own their own.

Table 7: Whether Enough Assignments were given by Science Teachers or not

Item	Alternatives	F	%
When you were in grade 9 & 10, did your Chemistry teacher give enough assignments and activities for you to exercise on your own?	Yes	129	46.57
	No	148	53.43

As can be seen from Table 7, 48(53.43%) students said that while they were in grade 9&10 enough assignments were not given by chemistry teacher for them to exercise on their own.

Those students, who have said that enough assignments were not given, gave their reason in Table 8 below.

Table 8: Reasons for Science Teachers not to Give Enough Assignments

	Alternatives	Percentage giving responses	
		F	%
A	Teachers were not interested in giving assignments	24	16.22
B	Teachers were influenced by plasma TV instruction	62	41.89
C	Students disliked those teachers giving assignments	3	2.03
D	I don't know	59	39.86

According to Table 8 above the majority, i.e., 62(41.89%) of students reasoned that teachers were influenced by plasma TV instruction from giving a lot of assignments to students to exercise on their own. Again 39.86% of students replied that they don't know why there were not given enough assignments by their science teachers.

- **Encouraging and Discouraging Factors in the Stream Choice of Students**
- **Encouraging Factors**

Students were asked to rank in descending order factors they thought influenced (encouraged) them in choice of the stream they are currently attending. The following table shows their responses related to this.

Table 9: Possible Encouraging Factors in Stream Choice of Students

No	Possible factors	Rank																Summarized rank
		1 st		2 nd		3 rd		4 th		5 th		6 th		7 th		8 th		
		F	%	F	%	F	%	F	%	F	%	F	%	F	%	F	%	
1	High job opportunities in the future	76	27.44	94	33.94	25	9.0	21	7.58	27	9.75	15	5.42	6	2.17	13	4.69	1 st
2	High career status	60	21.66	61	22.0	53	19.13	30	10.83	23	8.3	29	10.47	15	5.42	6	2.17	2 nd
3	High salary to be earned in the future	6	2.17	19	6.85	68	24.55	53	19.16	43	15.52	37	13.36	27	10.11	23	8.3	4 th
4	Peer influence	20	7.22	14	5.05	16	5.78	35	12.66	46	16.61	45	16.26	50	18.05	51	18.41	7 th
5	Family advice	21	7.58	23	8.3	30	10.83	45	16.26	42	15.16	37	13.36	36	12.99	42	15.16	6 th
6	Encouragement from subject teacher	23	10.11	21	7.58	44	15.88	35	12.66	46	16.61	56	20.2	36	12.99	16	5.78	5 th
7	Simplicity of subjects in the stream	10	3.61	24	8.66	9	3.25	23	8.3	26	9.39	30	10.83	65	23.46	90	32.49	8 th
8	The experience obtained from extra curricular activities in the school	65	32.46	28	10.11	29	10.47	45	16.26	27	9.75	23	8.3	35	12.66	25	9.0	3 rd

Table 9 shows that during their stream choice students were highly influenced by high job opportunities in the future, high career status, the experience obtained from extra-curricular activities and the high salary to be earned in the future respectively in descending order.

- **Discouraging Factors**

The following table shows what discouraged social science students from choosing natural science during their stream choice after their completion of grade 10.

The students were asked to rate on a five point Likert Scale how they had been influenced (discouraged) by the following numbered item in their stream choice from strongly agree(5) to strongly disagree(1). The higher the score the more the students agree with the statement. Score of three (3) corresponds to the mid point of the scale

Table 10: The views of Social Science Students Concerning the Discouraging Factors in Their Stream Choice

No of Item	Item	Frequency in each scale					Mean
		5	4	3	2	1	
3.3.1	Lack of job opportunities in the future	19	17	72	36	33	2.73
3.3.2.	Low career status in the fields	17	18	53	52	37	2.58
3.3.3.	Expected low salary to be paid with career in the fields	13	12	68	39	45	2.49
3.3.4.	Lack of qualified teacher	53	40	38	32	14	3.49
3.3.5.	Plasma TV dominated instruction	51	43	39	26	18	3.47
3.3.6.	Subject difficulty	64	56	28	15	14	3.80
3.3.7.	Lack of career/ subject advice	60	52	42	12	11	3.78
3.3.8.	Absence of practical laboratory activities	60	37	31	28	21	3.49
3.3.9.	Lack of encouragement from subject teacher	47	47	35	34	14	3.45
3.3.10.	Irrelevancy of science curricula to daily life	44	34	43	24	32	3.19
Aggregate mean							3.25

Table 10 shows that subject difficulties, lack of career or subject counseling, absence of practical laboratory activities, lack of qualified teachers, plasma TV dominated instruction and lack of encouragement from subject teachers were agreed up on by student as discouraging factors in stream choice in descending order. Teachers were also asked to indicate their opinion by rating on five point Likert Scale concerning what discourages students during their stream choice. The following Table 11 deals with this.

Table 11: Views of Teachers Concerning What Discourages Students During Their Stream Choice.

No of item (2.2)	Item	Frequency in each scale					Mean
		5	4	3	2	1	
1	Lack of job opportunities in the future	6	7	4	14	7	2.7
2	Low career status in the fields	5	7	6	17	3	2.84
3	Expected low salary to be paid with career in the fields	5	6	6	11	10	2.61
4	Lack of qualified teacher	2	9	7	10	10	2.55
5	Plasma TV dominated instruction	6	13	6	8	5	4.10
6	Subject difficulties	14	17	4	2	1	3.18
7	Lack of career/subject counseling	8	15	5	7	3	3.47
8	Absence of practical laboratory activities	7	17	5	7	2	3.53
9	Lack of encouragement from subject teacher	4	6	9	14	5	2.47
10	Irrelevancy of science curricula to daily life	3	8	9	9	9	2.66
Aggregate mean							3.05

In Table 10 above teacher respondents also identified plasma TV dominated instruction, absence of practical laboratory activities, lack of subject or career counseling and subject difficulties as discouraging factors in the stream choice of students.

To secure more information on what discourages students from choosing natural science stream, the school directors and their deputies, the wereda and zonal education officials were interviewed. They identified the following discouraging factors:- These were less efficiency of students in calculation, lack of qualified teachers(especially physics teachers) ,expansion of private college in social science areas, the lion share given to televised teacher, subject difficulty, peer influence, lack of future job opportunities, low job and social status of natural science careers, lack of maximum teacher student contract

time due to plasma TV instruction, and the fall of quality of education resulted in loss of confidence for students to choose natural science stream.

According to the interview respondents, students were not given orientation during their stream choice from directors, deputy directors or school teachers. No special attention was given from wereda and zonal education office during the stream choice of the students.

- **Methods of Teaching and Means of Transmission.**

The following table indicates the feeling of students towards learning from televised teacher through plasma TV Instruction.

Table 12: Learning from Televised Teacher through Plasma TV Instruction.

Alternative Items	Response in percentage	
	F	%
Appealing	87	31.41
Some what appealing	153	55.23
Boring	37	13.36

As can be seen from Table 12 above 240 (86.64%) of the sample student responded that learning from televised teacher through plasma TV instruction is appealing and somewhat appealing.

Only 37(13.36%) of student respondents said that learning from televised teacher through plasma TV instruction is boring.

In the following table students were asked to rank from the given list that the best way they think to teach science subjects (Biology, chemistry and physics).

Table 13: The Best Way to Teach Science Subject

Item (2,8)	Rank								Summariz ed rank
	1 st		2 nd		3 rd		4 th		
	F	%	F	%	F	%	F	%	
Through project works	29	10.47	54	19.49	82	29.60	112	40.43	4 th
Practical lab. Activities	91	32.85	91	32.85	65	23.46	30	10.83	2 nd
Through plasma TV instruction	31	11.19	73	26.35	84	30.32	89	32.13	3 rd
By subject teacher in face- to- face	112	40.43	81	29.24	47	16.97	37	13.36	1 st

In the Table 13 above student respondents gave more attention to learning in face to face within the class room by subject teacher and using practical laboratory activities. But they gave less attention to plasma TV instruction and project works. For the open ended question “what method of teaching do you suggest for teaching science as the preferred method?” teacher respondents replied that giving equal chance both for televise teacher and class room teacher so that active learning will be practiced, learning by doing and more practical oriented teaching will be appreciated. Teachers were asked to respond whether it is appropriate to teach science subjects through plasma TV by televise teacher. The response they gave for the alternative provided is given in the following table followed by the reason they forwarded for their response.

Table 14: Teachers Response for Appropriateness of Teaching Subjects through Plasma TV by Televised Teacher.

	F	%
Yes	19	50
No	19	50

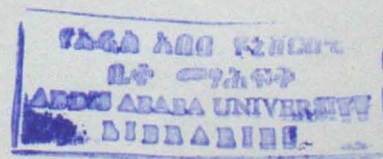
Table 14 shows 50% of the teacher respondents agreed with the appropriateness of teaching science subjects through plasma TV by Televised teacher while 50% of the teacher respondent said no. Those who have said 'No' gave their reason as: Students are not encouraged to do on their own especially in the laboratory, it does not facilitate collaborative learning and students are made passive receiver in stead of active participants which is against learning science subjects.

The following table deals with whether plasma TV instruction has a negative impact on science teacher or not.

Table 15: Impact of Plasma TV Instruction on Science Teachers

Item		F	%
Does plasma TV instruction have negative impact on science teachers?	Yes	22	57.89
	No	16	42.11

As can be observed from Table 15 above, 57.89 % of the teacher respondents agreed that plasma TV instruction has negative impact on science teachers. Those who have said yes gave their reason using the open ended question that followed the item. According to the teacher respondents the impact expected are 1) it makes teachers to avail themselves without preparation, 2) it makes teachers passive, 3) it makes teachers careless and dependent, and 4) it prevents teachers from discussing the subject matter in a class.



- **Enrolment Disparity between Males and Females in the Natural Science Stream**

The following bar graph shows enrolment of students for 2000E.C academic year across sample schools.

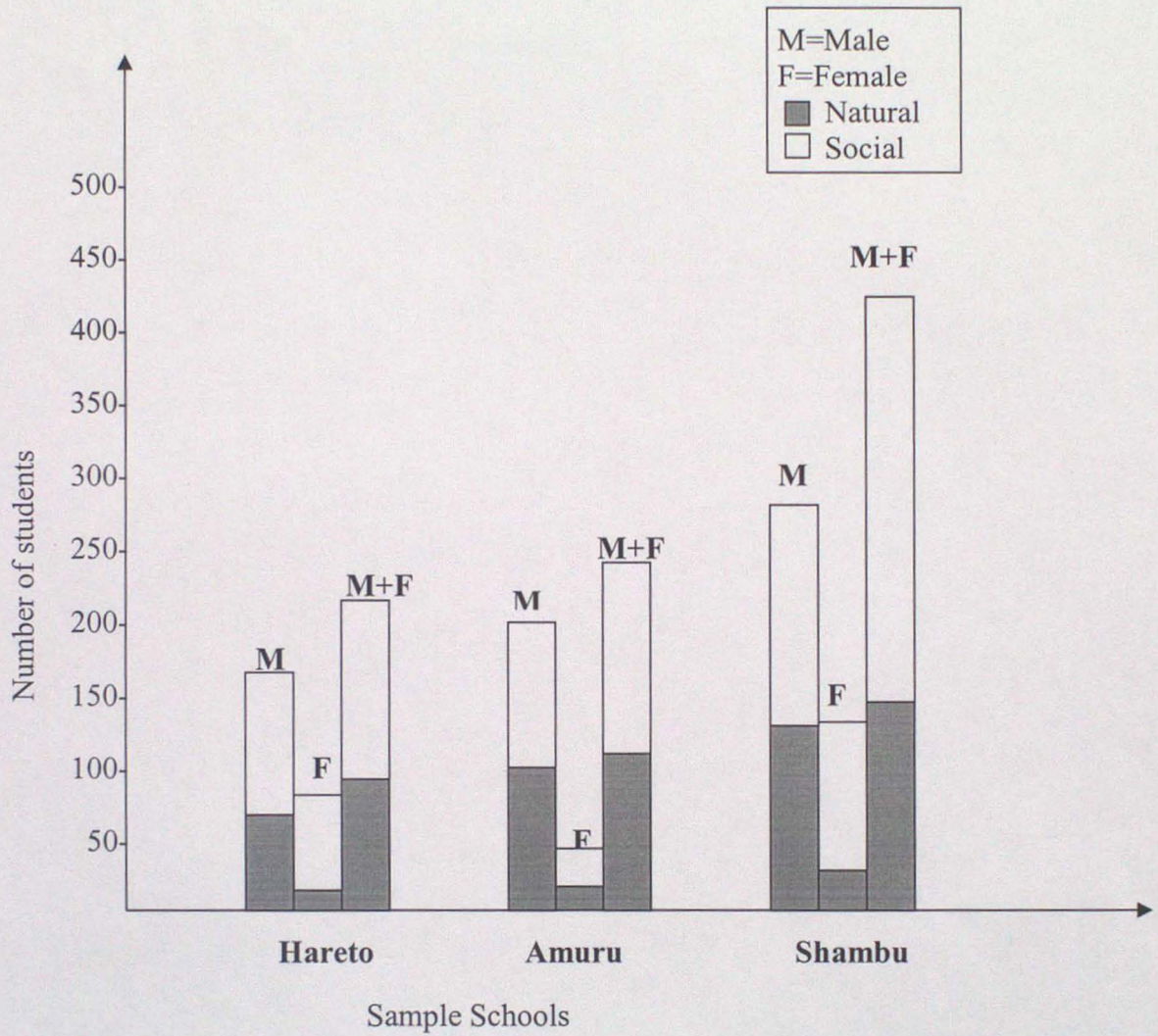


Fig.1. Enrolment of Students of Sample Schools across Streams.

Table 16: summarizes the enrolment of student in sample schools for academic year 2000 E.C.

Table 16: Enrolment of Student into Natural versus Social Science for the Academic Year of 2000 E.C in the Three Sample Schools

School	Enrolment in number and percentage													
	Natural Science						Social Science							
	Male		Female		Total		Male		Female		Total		Grand Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
Hareto	67	7.23	11	1.19	78	8.42	95	10.26	59	6.37	154	16.63	232	25.05
Shambu	130	14.04	24	2.59	154	16.63	174	18.79	116	12.53	290	31.32	444	47.95
Amuru	90	9.72	13	14.04	103	11.12	111	11.99	36	11.77	147	15.87	250	27.00
Total	287	30.99	48	5.18	335	36.18	380	41.04	211	22.79	591	63.82	926	100

Source: Record Office of the respective Sample Schools.

Table 16 indicates about half of the total population was from Shambu Preparatory School. Natural Science female students cover only 5.18% of the total populations. The ratio of natural science to social science students is expressed in the table as 36.18/ 63.82 respectively.

Pictorially, the ratio of natural science to social science students of the three sample schools is expressed as follows:

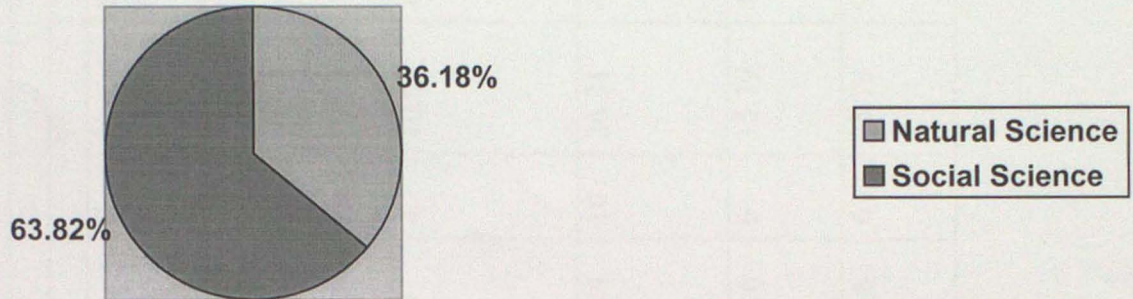


Fig. 2: The Percentage of Natural Science and Social Science Students of the three Sample Schools.

- **Suggested Measures to be taken by Schools and Other Concerned Bodies**

Teacher respondents were asked to rank the possible measures to be taken to improve the enrolment of students in natural science

The following table deals with this.

Table 17: Measures to be Taken to Improve the Enrolment of Students in Natural Science

Item (4.1)	Frequency percentage												Summarized rank
	Rank												
	1st		2 nd		3 rd		4 th		5 th		6 th		
	F	%	F	%	F	%	F	%	F	%	F	%	
Increasing teacher student contact by minimizing the plasma TV center approach	13	34.21	8	21.05	3	7.89	2	5.26	6	15.79	6	15.79	3 rd
Giving students the use of school science laboratories	9	23.68	8	21.05	11	28.95	4	10.53	2	5.26	4	10.53	1 st
Expanding science related extra curricular activities in the lower grades especially in grades (7-10)	8	21.05	9	23.68	11	28.95	3	7.89	4	10.53	4	10.53	2 nd
Improving life relevancy of science curricula at different level	2	5.26	3	7.89	2	5.26	17	44.74	10	26.31	4	10.53	4 th
Strengthening career/subject advice within schools	3	7.89	3	7.89	6	15.79	5	13.16	6	15.79	15	39.47	6 th
Improving the quality of science teachers by giving on job training	5	13.16	7	18.42	6	15.79	5	13.16	6	15.79	9	23.68	5 th

As can be seen from Table 17 above, teacher respondents gave due attention to giving students the use of school science laboratories, expanding science related extracurricular activities in the lower grades, increasing teacher student contact time by improving the life relevancy of science curricula at different level respectively in descending order.

Concerning the measures to be taken, for the interview made with them the Zonal and Woreda educational officials and the school directors and their deputies agreed upon the following points.

- Giving enough orientation for awareness creation before students choose stream
- There should be encouragement from subject teachers
- There should be enough qualified science teachers, especially at lower grades
- Time allotted for plasma TV instruction should be minimized so that classroom teachers get enough time
- School science laboratory should have its own specific schedule
- Practical oriented education should get due attention at lower grades
- Expanding science related clubs in schools especially at lower grades
- Re observation of school curricula by policy makers and other concerned bodies should be done
- Avoiding automatic promotion at grades 1-3 which is the cause for falling of quality of education (as per the interview respondents).

4.2 Discussion

The present study is concerned with the investigation on factors affecting the stream choice of students in general and natural science stream in particular and on measures to be taken by schools and other concerned bodies to enhance the enrolment of students in natural science in the sample school. Questionnaires were completed by 315 respondents (teachers and students) in

the three sample schools in Horo Guduru Wollega Zone. Interview was carried out with 6 school directors and their deputies, 6 Woreda and 2 Zonal education officials. The researcher conducted observation on different school facilities and activities, and students' school office records were analyzed.

It is obvious that streaming is an important element of education policy of our country. The proportion of students placed in each stream influences the outcomes expected from the policy. Therefore, there should be planned continuous activities to identify the different factors affecting students' placement in various streams and to make the streaming policy fruitful as it is intended.

Along this line, the discussion in this section focuses on the results reported earlier. In this section, the sub-topics, information related to the education of the student respondents, encouraging and discouraging factors in the stream choice of students and methods of teaching and means of transmission try to answer the first and the second research question that guided the study. While the 3rd basic research questions were related to the measures to be taken by schools and other concerned bodies.

- **Information Related to the Education of the Student Respondents**

Table 5 shows 62.7 % of students enrolled in social science have scored A&B in geography but 81.92% of them scored C.D or F in physics. This shows that students were influenced by the grade they scored in lower grades in choosing stream for further learning.

In Table 6 students were asked to identify their favorite subject and in Table 11 they were asked to give their reason for developing interest towards that specific subject. The result revealed that all students of natural science and most students of social science stream are attending (have chosen) the subject

they are interested in it most. They are interested in the subject because it has life relevancy & have got good result in it. This agrees with the literature review (Tawaiyole, 2002). According to the author, students have specific interests and needs and teachers should take in to account these factors when streaming students in to subject combinations as this determines their future. Sian Lightbody, Nicholson, Tait and Walsh (1998) in their study observed that the majority of students chose subjects that they liked which directly agree with this study.

However, as indicated in Table 6 few students of social science were misplaced against their favorite subjects due to some external forces. Peers or school friends' influence was one of the external factors that hindered students from joining the stream or subject they were most interested in it. .

The study revealed that that the role played by subject teacher and school guidance and counseling office was very small. It is obvious that students need detailed subject and /or career advice when making choices about selecting school subjects or stream. But this was not done in the sample schools under study. This agrees with what Dellar(1994) said. The author found that with required to obtaining relevant information, students appeared to access *informal channels* such as parents and siblings, rather than career education or counseling available in the school.

According to the opinion of student respondents mentioned in Table 8, while they were in grade 9 and 10, chemistry teacher did not give them enough assignments and project works so that the students exercise and try on their own.

Among those students who have said that teacher did not give enough assignments, the majority of them reasoned out that teachers were influenced by plasma TV instruction from not giving ample exercises.

- **Encouraging and Discouraging Factors in the Stream Choice of Students.**

Student respondents identified job opportunities in the future as number one (1) encouraging factor during their stream choice. This agrees with the review literature especially with Harvey (1998) and Sian, Lightbody, Nicholson, Tait and Walsh (1998).

In his study Harvey (1984) reported that students become increasingly aware of career opportunities and the availability of vocational path ways during their final years of senior schooling. Sian, light body, Nicholson, Tait and Walsh (1998) identified in their study that students chose subjects that facilitated progression to a future career.

According to sample student respondents, high career status was the second encouraging factor identified. Most of the time every body wants to be high ranks in the society. Another encouraging factor was extracurricular activities in the schools. Advocates of extracurricular activities (Fozzard 1967&Sybouts & Krepel, 1984) claim that this informal aspect of education has much to contribute to developing special interests and capacities and developing creative expression in students.

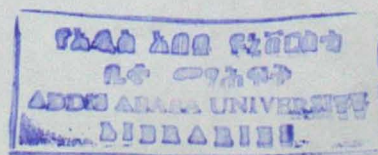
Further more, according to responses given from the interview made with directors and their deputies, wereda and zonal education officials, students will be encouraged to pursue learning science subjects if science related extracurricular activities are expanded in lower grades. This goes inline with what Woolnough (1994) said. According to the author, through extra-curricular activities, students gain knowledge, understanding and appreciation of the sciences, confidence and competence at doing science, and enjoyment, enthusiasm and commitment to the science appropriate for their lives.

Students of social science had identified subject difficulties, lack of career/subject advice, lack of qualified teachers, absence of practical laboratory activities, plasma TV dominant instruction, lack of encouragement from subject teacher and irrelevancy of science curricula to daily life as discouraging factors for them to continue to study (choose) natural science stream.

Most scholars agree that science curricula play key factors in developing and sustaining pupils' interest in science. Currently, difficulty of physical science subjects plays great role for students to leave studying physical science. This agrees with what Lyons (2003) reported. According to this author, students were leaving school science in Australia because they considered physics and chemistry to be the most difficult of most other subjects. Again in literature part the research report of Woolnough (1994) agrees with this. The author reported that difficulty of physical sciences in schools played key role in blocking students from pursuing science studies.

Interview made with education officials and the opinion of teachers on five point Likert scale coincide with the above concept. That is, they all agreed that subject difficulty played discouraging role in minimizing the enrolment of students in natural science stream.

Another issue related to school curricula was relevance of school science. The result showed that students were discouraged to pursue studying sciences due to their life irrelevancy. Many studies show that pupils perceive school science as lacking relevance. For example, Jenkins (2002) identified irrelevance of curriculum as one of the reason for reluctance of students to enroll in natural science subjects. According to this author, most science curricula are crowded with unfamiliar concepts and laws. They leave little room for enjoyment, curiosity and search for personal meaning and significance. He further argues that they lack a cultural, social or historical dimension and they seldom treats the contemporary issues related to science and technology. According to George



(1998), socially relevant curricula have their own benefits. When students have exposure to socially relevant curricula, they can understand the role of science in their society, apply their science knowledge to real life situations and develop skills of decision making and problem solving.

Lack of subject counseling was also motioned as one of the top discouraging factors to pursue studying science. Teacher respondents highly agreed with this concept. According to the interview result made with school and education officials, there was no systematically designed follow up from these officials to students concerning their stream choices for further study. Even, there was no short term awareness creation orientation related to students' stream choice.

According to the researcher's observation in all sample schools, there was no vocational guidance and counseling office to support students. The research result shows encouragement from subject teachers was very low. This is against what Woolnough(1994) reported. According to this author, encouragement of science teachers plays a great role for pursuing a science career and studying science.

Another discouraging factors identified by social science student respondents was lack of qualified teachers in science subjects. It is unquestionable that schools need large number of well -qualified teachers. Well qualified and enthusiastic teachers are the key to any improvement in the teaching of science. According Lyons(2003), students appreciated who presented the content in engaging manner.

In other words, teachers who are interested and enthusiastic about what they are teaching help the students to develop love of science and learning about science. In line with this Woolnough (1994) claim that qualified teachers through role model influence, can encourage students to follow their science teachers in pure science.

The interview made with school directors and their deputies and Wereda and zonal education officials, showed that lack of qualified science teachers especially physics teachers was one of the frustrating discharging factors putting off students from continuing to engage in science stream. Observation made by the researcher confirmed this. According to the researcher's observation and interview result of education official, there was a great shortage of qualified physics teachers. In one of the sample schools, Mathematics major and physics minor diploma was teaching a grade 10 and grade 11 physics. In another sample school the researcher observed that, physics major diploma teacher was teaching grade 11 physics. From this, it can easily be judged that this lack of qualified physics teachers contributed in discouraging students from pursuing studying sciences.

- **Methods of Teaching and Means of Transmission**

In teaching learning process, methods of teaching and means of transmission play a central role in attaining the objectives intended. Student respondents suggested that the best way to teach science subjects are by subject teacher in face-to-face and practical laboratory activities. For the open-ended question related to this, teacher respondents suggested that the best methods to teach biology, chemistry and physics subjects are learning by doing, practical laboratory activities, & any activity which enhances cooperative learning between students.

Most scholars agree with what teachers and students suggested as preferred methods of teaching science above. For example, Akalewold (2001) underlined that corporative learning enhances students' academic achievement and self-esteem and improve their classroom environment.

Hegartz-lazarwitz, et al (1984) gave high emphasis to laboratory setting. According to these authors, laboratory settings produce the highest frequency of natural interaction and cooperation on task compared with other modes of instruction in science.

Woolnough (1994) gave more attention to practical activities and learning by doing. Concerning science students he said that the more responsibility we encourage them to take for their own learning, the more their enormous potential will develop and the more they will appreciate, enjoy and mature in science.

Woolnough when he explained the practice prevailed in England and Wales, he said that there is a principle that learning science is about doing science and that the best way to learn science is by doing practical activities in science.

What was observed by the researcher and what was responded by school directors and their deputies and educational officials related to laboratory activities was against what is forwarded by scholars above. Currently school laboratories are not functioning and students are dependent fully on plasma TV instruction. In one of the sample school there was an attempt to schedule laboratory activities in the opposite shift to the normal class. But, since teachers were not voluntary to come in the opposite shift, it was not succeeded except in manner cases.

The avoidance of the use of school laboratories has negative impact not only on students to pursue studying science subjects but also on environmental health conditions. The researcher observed that most chemicals were expiring and exploding (breaking) the containers in which they were contained. Unless some corrective measures will be taken concerning the use of school laboratory by policy makers or curriculum designers it will be hazardous and harmful for human health and environment.

Concerning using plasma TV for instructional purpose, different concepts were forwarded. For example, in Table 14, 50% of the teacher respondents supported

teaching science subjects through plasma TV by televise teacher whereas 50 % opposed the case. 57.89% of the teacher respondents responded that plasma TV instruction has negative impact on science teachers. Most of the student respondents, said that learning from televise teacher through plasma TV instruction is some what appealing.

Those teachers who have opposed using plasma TV instruction for science subjects reasoned out that it doesn't encourage cooperative and collaborative learning among students, whereas other teachers and most students found it some what appealing. To reconcile these opposing ideas, most teachers and students, in the open ended question part they suggested that the lion share given to plasma TV instruction should be minimized and teacher student contact time should be increased. In other words, plasma TV instruction should not replace teachers, rather it ought to play supportive role to improve effectiveness and productivity of teaching and learning process. In this way the negative impact of plasma TV on teachers will be minimized and active learning can be enhanced.

- **Enrolment Condition of Students in Natural versus Social Science**

Enrolment analysis (for the academic year 2007/8) of the three sample schools shows that the percentage of students enrolled in natural science is much less than that of social science stream. The ratio of natural science to social science students was expressed cumulatively as 36.18/63.82. This is much less than what the government of Ethiopia currently mentioned in the policy brief (MOE & MOCB, 2007). In this policy brief, the government gave much attention to expanding science, technology and engineering fields to become competitive and accelerate the country's development towards becoming a middle income country in the coming two decades. To attain this, according to the policy briefs, Ethiopia decided to adjust higher education student ratio to 70:30 natural to social science respectively in the academic year 2009/10. This ratio will be successful if corrective measures are taken at grade 11 level. Otherwise,

it may result in failing of many social science students at grade 12 in entrance examination and allowing to passing most natural science students with low grade in entrance examination. This in turn can cause production of less qualified natural science students or high dismissal rate of science students.

- **Measures to be Taken by Schools and Other Concerned Bodies**

This part was intended to answer the forth basic research question.

Teacher respondents, the interview result made with directors and their deputies, Wereda and Zonal Education Officials agreed on some measured to be taken to minimize the decline of the enrolment of students in natural science. These are:

- Designing systematic means of orienting students for awareness creation in lower grades (9 & 10) about their future career and stream choice condition. One mechanism of attaining this could be by formulating subject or career advice service office. This will be successful if education officials are concerned about stream choice of students for the benefits of generations as well as the country.
- There should be enough qualified science teachers especially at lower grades. Jenkins(2002) argues that the long term effects of a shortage of good science and technology teachers can be very damaging, although may not be so immediately evident as a comparable shortage in industry and research. Woolnough (1994) also reported that one of the most encouraging factors for continuing science career and studying science was the quality of science teacher. As it was mentioned earlier, qualified sciences teachers through their role model, can influence their students to pursue studying science fields. This demands the attention of policy makers and higher education officials especially concerning recruitment and training of science teachers for lower grades (grades 1-10)

- The time given for televisive teacher to teach through plasma TV should be minimized so that class room teacher student contact will be maximized. 53.43% of students said that they were not given enough assignments to exercise on their own in science subjects in grades 9 and 10. One reason they mentioned for this was the less time given for class room teacher. Again this calls for attention of higher officials.
- Avoiding automatic promotion and self contained class room system at grades 1-4. As per most of the interview respondents, automatic promotion & self contained class room are among the root causes of falling of the quality of education which in turn resulted in lacking confidence for students to study science subjects in upper grades. As far as the knowledge of the researcher is concerned, both automatic promotion and self contained class room have their own advantages and disadvantages. If cautions are not taken, their disadvantages may dominate over their benefits. Generally these debatable areas need special focus and solution from policy makers.
- School science laboratories should have their own specific schedules. As mentioned earlier, currently in the schools under study, science laboratories are not functioning. This is against the principle of learning science. Woolnough (1994) in his study of science teaching in Wales and England said that teachers have almost felt guilty if they have not had their classes doing practical work in any particular lesson. It is obvious that giving chance for student to use sciences laboratories can develop their motivation, commitment and creativity in science. So, students should be given the use of science laboratory either by minimizing plasma TV instruction period per week or giving additional periods for laboratory purposes for science subjects.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

This chapter deals with summary conclusion and recommendation of the study.

5.1. Summary

The purpose of this study was to investigate factors affecting the stream choice of students in general and natural science in particular and measures to be taken by schools and other concerned bodies to enhance the enrolment of students in natural science in preparatory schools of Horo Guduru Wollega Zone. Therefore, in order to achieve the purpose of the study the following basic research questions were raised.

- Why students dislike natural science?
- What are the factors affecting the stream choice of students?
- Is there any significant difference between females and males in enrolment in natural science?
- What should schools do to minimize the decline of the enrolment of students in natural science?

In this study, to secure the required information the descriptive survey method of the research was employed. To collect the necessary data, questionnaires, interview, observation checklist and official records of students' enrolment from record offices of respective schools under study were used as an instrument for the study.

The study was conducted in three preparatory schools in Horo Guduru Wollega Zone. The subjects of the study were 38 teachers, 6 school principals, 8 education officials and 277 students. The schools were identified using availability sampling, and teachers, school principals and education officials were identified by purposive sampling method and the student respondents were selected by stratified and systematic random sampling method. Generally,

a total of 329 respondents were included in the study and all of them (100%) participated in giving response.

The data obtained were analyzed using descriptive statements and various statistical methods such as percentage, means, and chi square test. According to the analysis made the following major findings were obtained.

- As the findings of the study indicate the enrolments of students in natural science was found to be dropping.
- Concerning the experience of teacher respondents, most of them have less than 5 years service.
- The finding of the study indicates that students were highly influenced by the grades they scored in lower grades in choosing stream for further learning.
- The result revealed that all students of natural science and most students of social science streams are attending (have chosen) their favorite subjects. But few students of social science were misplaced against their favorite subjects due to some external forces. Peers or school friends' influence was one of the external factors that hindered student from joining the stream or subject they were most interested in it.
- There was no support rendered to students from subject teacher and school guidance and counseling office during their stream choice or in the lower grades while they were attending class.



- While they were in grade 9&10 students were not given enough class room activities and home take assignments by their biology chemistry and physics teachers due to plasma TV instruction influence.
- High job opportunities high career status and science related extracurricular activities in lower grades, were identified as encouraging factors in stream choice of students.
- Students of social science have identified subject difficulties; lack of subject or career advice, lack of qualified teachers, absence of practical laboratory activities, plasma TV dominated instruction, lack of encouragement from subject teacher and irrelevancy of science curricula to daily life as discouraging factors for them to pursue studying natural science.
- In all sample schools, there was no vocational guidance and counseling office to support students and there was no long term and short term awareness creation rendered to students concerning their future career and stream choice.
- Learning by subject teacher in face-to-face, learning by doing, practical laboratory activities and any activity which enhances cooperative and collaborative learning between students were mentioned as preferred method for teaching biology, chemistry and physics.
- The finding showed that, school science laboratories are not functioning and students are dependent fully on plasma TV instruction. Inline with this, the researcher observed that most chemicals were expiring and breaking the containers in which they were contained. This will be hazardous and harmful for human health and environment.
- Concerning using plasma TV for instructional purpose, most respondents agreed that the lion share given to plasma TV instruction

should be minimized and teacher student contact time should be increased so that active and cooperative learning will be enhanced.

- The enrolment analysis of the three sample schools (for the academic year 2007/08), showed that the percentage of students enrolled in natural science is much less than that of the social science stream. In ratio, it is about 36:64 respectively. This is against what the government of Ethiopia decided to attain in 2009/10 academic year in higher education (i.e. 70:30 natural to social science respectively).
- Concerning the measures to be taken by schools to minimize the decline of enrolment of students in natural science, most educational officials, school principals and teacher respondents agreed on designing systematic means of orienting students for awareness creation in lower grades, availing enough and qualified science teachers at lower grades, increasing teacher student contact time, avoiding automatic promotion and self contained class room at grades 1-4, allowing school laboratory to have its own specific schedule, expanding science related clubs in lower grades, and re observation of school curricula by policy makers and other concerned bodies should be done.

5.2. Conclusion

Based on the analysis and interpretation made the following conclusion were drawn.

- A great number of research findings showed that some students of the world are showing disinterest towards science and technology subjects after their completion of high school. The result of the research undertaking indicated that currently the enrolment of students in natural science is falling.
- It is obvious that students need detailed subject and/or career advice when making choices about selecting school subjects or stream. But in

all sample schools, there was no vocational guidance and counseling office to support students and even, there was no short term awareness creation rendered to students concerning their future career and stream choices. Therefore, it can easily be concluded that absence of guidance and counseling service from school side highly exposed students to access informal channels such as parents and siblings with regard to obtaining relevant information.

- The result showed that students were discouraged to pursue studying science due to the following major factors.
 - Difficulties of physical science subjects
 - Lack of subject and/or career advice in the schools
 - Lack of qualified science teachers
 - Absence of practical laboratory activities
 - Irrelevancy of science curricula to daily life
 - Plasma TV dominated instruction (lack of maximum teacher student contact time)
 - Lack of encouragement from subject teacher
 - Less efficiency of students in calculation
 - Expansion of private colleges in social science areas
 - Lack of future job opportunities
 - Low job and social status of natural science careers
 - The fall of quality of education resulted in loss of confidence for students to choose natural science stream

- As to the use of plasma TV for instructional purpose (for science subjects), the majority of the respondents supported the case, except its dominance over class room teacher and its hindrance to active learning. From this, it can be concluded that plasma TV can play encouraging role if its time is minimized and it acts as supportive to classroom teacher rather than replacing him/her.

- Currently, the cumulative ratio of natural to social science of the schools under study is 36:64. But in the policy brief (MOE and MOCB, 2007), the government of Ethiopia intended to attain 70:30 ratio by the beginning of academic year 2009/10 in higher educations. From the existing condition, it can be concluded that the intended ratio can not be attained smoothly. Even in the future, unless much attention is given to lower grades, the intended policy will not be fruitful.

5.3. Recommendation

Based on the findings of the study and conclusion drawn, the following recommendations, which are thought to be feasible, were forwarded.

- The research result showed that difficulty of physical science subjects and their irrelevance to daily life of students made them to be reluctant to enroll in natural science stream. Most scholars agree that science curricula are key factors in developing and sustaining pupils' interest in science. When students have exposure to socially relevant curricula, they can understand the role of science in their society, apply their science knowledge to real life situations and develop skills of decision-making and problem solving. Therefore, it seems there is a need to revise science curricula by concerned bodies.
- The long term effects of a shortage of well qualified and enthusiastic science teachers can be very damaging although they may not be as immediately evident as comparable shortage in industry and research (Jenkins, 2002). Teachers who are well qualified, interested and enthusiastic about what they are teaching help students to develop love of science and learning about science. But the research result showed that schools are suffering from the lack of qualified science teachers. Therefore, it calls for concerned bodies to pay special attention to the recruitment and training of science teachers starting from lower grades.

- In many countries, the reluctance of students' enrolment in science and technology subjects attracted political attention at the highest level, and in some cases, projects and counter measures are planned or put in operation. But the research result showed that there was no systematically designed follow up from schools and higher officials to students concerning their stream choice for further study. Therefore, it seems the situation needs political concern in schools, higher educations, media and the public.
- The lion share given to televise teacher through plasma TV instruction becomes debatable among science teachers, education officials and students in that it hindered class room teachers from using school science laboratories and creating collaborative and cooperative learning class room environment. Thus, it calls for some amendment to be made concerning the time allotted for televise teacher and school science laboratory issues.
- In all sample schools, there was no vocational guidance and counseling office to support students and there was no long term and short term awareness creation rendered to students concerning their future career and stream choice. Therefore, it calls for schools to alleviate these problems.
- Advocates of extracurricular activities claim that they have much to contribute to developing special interests and capacities and developing creative expression in students. But the researcher observed that in sample schools the expansion of science related clubs were very weak. So, let the schools work towards the expansion of science related extracurricular activities.

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Appendix A
ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

**DEPARTMENTS OF CURRICULUM AND TEACHERS'
PROFESSIONAL DEVELOPMENT STUDIES**

***An Interview Scheme to Zonal and Wereda Education Officers and
School Directors and Deputy Directors***

This interview scheme is administered with the aim of gathering first hand information on issues related to student stream choice at grade 11 level.

Expressing his heartfelt gratitude in advance for your cooperation, this researcher brings to your attention the fact that secrecy as to your identity is guaranteed and your responses will be reported anonymously.

I. General Information

Age _____

Sex _____

Qualification _____

Office _____

II. An Interview Guide

1. Currently, the enrolment of students in Natural Science at grade 11 level is falling. What do you think is the reason?
2. Is there any mechanism through/ by which your office controls or facilitates students' stream choice?
3. Most school science laboratories in the zone are not functioning. Is your office aware of this? What do you think is the reason?
4. What effect do you anticipate from school laboratories not functioning?
5. Is there any shortage of teachers? If yes in what field?
6. What measures do you think should be taken to improve student's enrolment in Natural Science?

Appendix B
Addis Ababa University
School of Graduate Studies
Department of Curriculum and Teachers' Professional
Development Studies

***Questionnaire to be filled by Social and Natural Science Students
of Hareto, Shambu and Amuru Preparatory Schools***

The main purpose of this questionnaire is to investigate factors affecting stream choice of students in general and Natural Science in particular and measures to be taken to enhance the enrolment of students in the Natural Science stream.

- ❖ All your responses will be confidential.
- ❖ All the responses will be used only for academic purposes.
- ❖ You are not responsible for the research outcome.

You are kindly requested to complete all questions in the questionnaire carefully and honestly. It is only your kind cooperation and honesty that will make the study reliable and beneficial.

Since the success of this study depends on your responses, please read all the instructions before attempting to answer the questions.

Thank you in advance.

Gudeta Guta.

I. Respondents' background

1.1 Sex _____

1.2 Age _____

1.3 Stream _____

1.4 Father's occupation _____ Mother's occupation _____

1.5 School name _____

1.6 Your parent's level of education

No	Level	Mother	Father
1	No schooling of any kind		
2	Read & write		
3	Primary (1-8)		
4	Secondary (9-12)		
5	Certificate, Diploma or above		

II. Information related to the education of the respondents

2.1 What grade did you score in the following subjects in grade 10 national examination?

1. Physics _____ 2. Chemistry _____ 3. Biology _____ 4.
Mathematics _____ 5. Geography _____ 6. History _____
7. Civics _____

2.2 Which subject do you like most? _____

2.3 Why do you like the subject you mentioned on 2.2 above?

Rank the following possible answers for question 2.3 in descending order, beginning with no_1 as most preferred.

_____ Due to a good and qualified teacher

_____ I get good result in it.

_____ Easiness of the subject.

_____ Has application in daily life.

2.4 Who helped you most in choosing the stream after your completion of grade 10?

- A. Your family B. Peers (school friends) C. Subject teacher
D. School guidance and counseling office

2.5 When you were in grade 9 & 10, did your Chemistry, Physics & Biology teachers give enough assignments and activities for you to exercise on your own?

- A. Yes B. No

2.6 If your answer for question 2.5 above is "No", what do you think is the reason? Choose from the following possible answers.

- A. Teachers were not interested in giving assignments and class works.
B. Teachers were influenced by plasma TV instruction
C. Students disliked those teachers giving assignments & class works.
D. I don't know.

2.7 Learning from televised teacher through plasma TV instruction is

- A. Appealing B. Some what appealing C. Boring

2.8 What do you think is the best way to teach science subjects (Biology, Chemistry, Physics)? Rank the following possible answers, beginning with no_1 as the most preferred:

- _____ Through project works
_____ Practical lab. activities
_____ Through plasma TV instruction
_____ Face-to-face lecture method

III. This section focuses on encouraging or discouraging factors in stream choice of students.

3.1 Direction: Rank in order the following factors according to their level influence on your stream choice at grade 11 level (that encourages you to choose the stream you are learning currently at grade 11 level). Put No_ '1' beside the factor with the strongest influence.

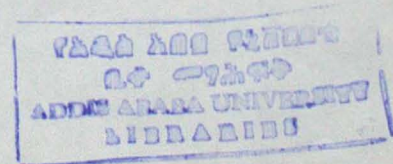
No	Possible factors	Rank
1	High job opportunities in the future	<input type="checkbox"/>
2	High career status	<input type="checkbox"/>
3	High salary to be earned in the future	<input type="checkbox"/>
4	Peer influence	<input type="checkbox"/>
5	Family advice	<input type="checkbox"/>
6	Encouragement from subject teacher	<input type="checkbox"/>
7	Simplicity of subjects in the stream	<input type="checkbox"/>
8	The high experience obtained from extra curricular (club) activities in the school	<input type="checkbox"/>

3.2 Please mention other factors (if any) that helped you in choosing the stream you're attending now. _____

3.3 This section is intended to identify what discourages students from enrolling in Natural Science at grade 11 level.

❖ Only students of Social Science are expected to fill this part.

Direction: Put a mark with tick (✓) to indicate your opinion with respect to each statement in only one of the five alternatives i.e.



5= strongly agree 4 = agree 3= undecided
 2= disagree 1= strongly disagree

What discourages you from enrolling in natural science stream?

No	Possible discouraging factors	strongly agree	agree	undecided	disagree	strongly disagree
1	Lack of job opportunities in the future	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Low career status in the fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Expected low salary to be paid with career in the fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Lack of qualified teacher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Plasma TV dominated transmission	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Subject difficulties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Lack of career / subject counseling	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Absence of practical laboratory activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Lack of encouragement from subject teacher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Day to day life Irrelevancy of science curricula	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.4 Please mention any other discouraging factors influenced you not to choose Natural Science stream. _____

Appendix C
ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF CURRICULUM & TEACHER'S
PROFESSIONAL DEVELOPMENT STUDIES

OBSERVATION CHECKLIST

* This observation checklist is intended to gather information about extra curricular activities in the schools under study and some science related school facilities.

Name of school _____

Date of observation _____

Time of observation _____

I. Information related to extra or co curricular activities.

No	Name of clubs or co-curricular or extra curricular activities	Their status in the school		
		Adequate	Not adequate	Does not exist
1	Red Cross			
2	HIV/AIDS			
3	Chemistry			
4	Physics			
5	Biology			
6	Science & Technology			
7	Environmental conservation			
8	Other science related clubs			
9	Other non-science related clubs			

II. Information related to science laboratories.

2.1 Is there any Natural Science (Biology, Chemistry or Physics) Lab in the school? A. Yes B. No

2.2 If it exists, is it functioning?

A. Yes B. No

2.3 Material facilities in the science lab:

A. Fully equipped B. Somewhat equipped
C. Poorly equipped

III. Information related to guidance and counseling service/office.

3.1 Is there a guidance and counseling office? A. Yes B. No

3.2 If yes, (for 3.1 above), is it functioning properly? A. Yes B. No

C. poorly functioning

IV. Information related to reference books in the school libraries.

4.1 Natural Science books

A. Adequate B. Not adequate

4.2 Social Science books.

A. Adequate B. Not adequate

APPENDIX D
ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES
DEPARTMENT OF CURRICULUM AND TEACHERS' PROFESSIONAL
DEVELOPMENT STUDIES

Questionnaire to be filled by Social and Natural Science teachers of Hareto, Shambu and Amuru Preparatory Schools

The main purpose of this questionnaire is to investigate factors affecting stream choice of students in general and Natural Science in particular and measures to be taken to enhance the enrolment of students in the Natural Science stream.

- ❖ All your responses will be confidential.
- ❖ All the responses will be used only for academic purpose.
- ❖ You are not responsible for the research outcome .

You are kindly requested to complete all questions in the questionnaire carefully and honestly. It is only your kind cooperation and honesty that will make the study reliable and this study reliable and confidential.

Since the success of this study depends on your responses, please read all the instructions before attempting to answer the questions.

Thank you in advance.

Gudeta Guta.

I. General Information and personal Date.

Direction: Indicate your response either by using a tick mark (✓) in the box provided or by giving short answers on the space provided.

1.1. School's name _____ -

1.2. Sex Male Female

1.3. Age 20 -30 years

 31-40 Years

 41-50 years

1.4. Level of Education

 Diploma

 1st degree

 2nd degree

 If any other, specify _____

1.5. Qualification Major _____ Minor _____

1.6. Subject(s)you are currently teaching

1.7. Experience: 1 - 5 years

 6 - 10 years

 11 - 15 years

 16 - 20 years

 21 - 25 years

 26 and above

II. This section focuses on encouraging/discouraging factors in stream choice of students.

Direction: The following are some possible factors currently expected to encourage students in stream or subject choice at grade 11 level.

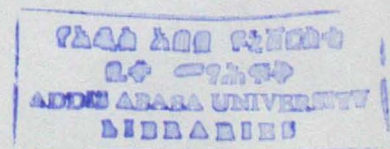
Rank them in descending order by giving No 1 to the most encouraging factor.

No	Possible factors	Rank
1	High job opportunity in the future	<input type="checkbox"/>
2	High career status	<input type="checkbox"/>
3	High salary to be earned in the future	<input type="checkbox"/>
4	Peer influence	<input type="checkbox"/>
5	Family advice	<input type="checkbox"/>
6	Encouragement from subject teacher	<input type="checkbox"/>
7	Simplicity of subjects in the stream	<input type="checkbox"/>
8	The experience obtained from extra curricular (club) activities in the school.	<input type="checkbox"/>

2.1.1. Please, mention other factors (if any) that you think encourage students in stream choice.

Direction: Put a tick mark (✓) to indicate your opinion with respect to each of the possible answers mentioned below for the question “What discourages students from choosing Natural Science at grade 11 level?” in only one of the five alternatives, i.e.

- 5 = strongly agree 4= Agree 3= Undecided
 2= disagree 1= strongly disagree



No	Possible discouraging factors	strongly agree	Agree	Undecided	disagree	strongly disagree
1	Lack of job opportunities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
2	Low career status in the fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3	Expected low salary with career in the fields	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
4	Lack of qualified teacher	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
5	Plasma TV dominated transmission or instruction	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
6	Subject difficulties	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
7	Lack of subject /career advice	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
8	Absence of practical laboratory activities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
9	Lack of encouragement from subject teachers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	Irrelevancy of science curricula in day-to-day life	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

2.3 Please mention any other discouraging factors (if any) you think influence students from choosing Natural Science stream at grade 11 level.

III. Information related to methods of teaching/means of transmission.

3.1. Do you think that it is appropriate to teach science subjects through plasma TV by Televised teacher? A. Yes B. No

3.2. If your answer for question 3.1 above is No, what is your reason?

3.3. Do you think plasma TV instruction has an impact on science teacher?
A. Yes B. No

3.4. If your answer for question 3.3 above is yes, what type of impact do you expect?

3.5. What method of teaching do you suggest for teaching science as the preferred method?

IV. Information related to measures to be taken by schools and other concerned bodies to increase the enrolment of students in Natural Science stream.

4.1 Rank the following possible measures to be taken to improve the enrolment of students in Natural Science in descending order by giving No '1' for the measure you think very important No '2' for the next and so on.

_____ Increasing teacher-student contact by minimizing the plasma TV center approach.

_____ Giving students the use of school science laboratories

_____ Expanding science related extracurricular activities in the lower grades (especially in grades 7-10).

- _____ Improving life relevancy of science curricula at different levels
- _____ Strengthening career/subject advice within schools
- _____ Improving the quality of science teachers by giving on job training.

Please mention other measures to be taken by schools to improve the enrolment of students in Natural Science.
