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RESEARCH ARTICLE

EXPLORING CHALLENGES THAT INFLUENCE PREPARATORY STUDENTS PERFORMANCE ON MATHEMATICS AND SCIENCE EDUCATION: A CASE OF JIMMA ZONE PREPARATORY SCHOOLS

***Solomon Hailemariam Didu and Sisay Milkias Waza**

Department of Physics, College of Natural Sciences, Jimma University, Ethiopia

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ABSTRACT

This research aimed at exploring factors that contributed to the weak performance of students in science education (Biology, Chemistry, Physics and Mathematics). It focused on five randomly selected preparatory schools of Jimma zone, Oromia regional state, Ethiopia. The study employed a cross sectional research design, and both quantitative and qualitative data types were used. Accordingly, the data were collected through structured questionnaires, focus group discussions and interview. Descriptive statistics, inferential statistics, coding and thematic analysis were the data analysis techniques employed in the present study. The quantitative data were computed and analyzed using SPSS version 20 Software. The numerical results were displayed using tables and bar graphs, whereas the qualitative findings were summarized and listed thematically. The overall findings of the study revealed that, among other things, the students' performance were highly negatively affected by shortage of well-organized laboratories, declined interest and motivation of students to study basic science in general and their negative attitudes towards mathematics and physics in particular. Moreover, placing or assigning learners in the field of pure science by the 70/30 placement scheme found to be one of the major factors that contributed to learners' weak performance in science education. Accordingly, conclusions were drawn based up on the findings of the study. Finally, pedagogical implications and viable solutions were recommended.

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INTRODUCTION

Jimma Zone is found south western part of Ethiopia in Oromiya Regional state. It is 355Kms far from the capital of Ethiopia, Addis Ababa. This study was conducted in Jimma zone; out of 18 woredas of the zone, 5 preparatory schools (Sokoru, Limu-Genet, Agaro, Asendabo and Jimma preparatory schools) were selected and included in the study. It is evident that the declining interest to study science in general and the lack of enthusiasm to take physics course in school or avoiding physics as a major even at college level education in particular found to be major problems. In other words, the decline in enrollment and the decline of graduates in physics at all levels of education has been the case in many countries including the USA, UK, Germany, and the Netherlands (Tobias and Birrer, 1999; Osborne. Simon and Collins, 2003). Like any other developing country, Ethiopia needs rapid improvement of science education, and it appears to have been prepared to resolve issues of development in science and technology through its education and training policy. To make this practical, the Ethiopia's education policy has been implementing a 70:30 admission ratio at tertiary level, which is in favor of developing science and technology by Ministry of Education (MoE) (MoE 2008). In this scheme, 70% of students who have completed their preparatory education are made to join universities to study the hard science field, whereas the remaining 30% of students are assigned to fields under the social sciences stream. Thus, in the present study, an attempt has been made to explore the contributing factors to the weak performances of preparatory level students who are enrolled in science education.

Statement of the problem

Local studies revealed that effective implementation of science education is limited in Ethiopian schools. As a result, Ethiopian students in general perform poorly in science subjects (Samuel and Welflord, 2000). The main factors that contribute to the poor performance of students in science may include problems associated with attitude, teaching methods, teachers' capacity and resources. Moreover, literature shows that the students' achievements in science do vary across their grade levels, schools, residences and sex. For instance, a study conducted in the area uncovered that the overall science achievement for

****Corresponding author: Solomon Hailemariam Didu,***
Department of Physics, College of Natural Sciences, Jimma University, Ethiopia.

grade 11 was 40.30% and that of grade 12 was 48.48% which indicated that grade 12 students perform better than grade 11 students according to this particular study. (Applefield *et al*., 2000)

Similarly, the overall academic achievement in science for male students was 47.58% and for 39.70% for females. In all the cases, the mean scores of female were less than the mean scores of males. The mean differences were positive when compared with the results of male students with those of their female counterparts. That means males have scored higher than female students in those tests. This finding clearly supports the established fact that gender differences exist in science education achievement (Sanchez and Wiley, 2010). Moreover, the overall science academic achievement for urban background and rural background students were 45.23% and 44.09% respectively, and the result of T-test showed that these differences in academic achievement of science between urban background and rural background students were statistically significant at $p<.05$ ($p=.024$) and at $t=799$ (AJCE, 2014). Nevertheless, it was observed that the social and natural science courses being given at preparatory level may not provide students adequate knowledge though it is highly demanded and required at university level. Particularly, courses such as computer science, technology, mathematics, and physics are common and having a curriculum almost similar in the world (Education Sector Development Program II (ESDP-II) 2002/2003). Therefore, it was noted that conducting research is necessary to find appropriate set up at preparatory level and to uncover all the short comings identified by different researchers for the fact that research output will help students and other stakeholders significantly (Applefield et al., 2000). In light of this, the following basic research question was addressed in the present study:

To what extent Ethiopian preparatory level students, grades 11 and 12, are ready to meet the overall science education policy expectations both in terms of students' academic achievement, teachers' capacity, provisions of materials and human resources?

Research Methodology

Study Design: The researchers used cross sectional design, and both quantitative and qualitative data types were collected and analyzed.

Study Area and period: The study was conducted in Jimma zone, Oromia regional state in 2006 E.C/2014 G.C academic year.

Study Population: The populations of the study were all grades 11 and 12 preparatory level students who were enrolled at five purposively selected preparatory school of Jimma zone. Accordingly, one preparatory school was taken from each zone. Thus, 5 senior preparatory schools were included in the study. The selected preparatory schools were Jimma, Agarro, Limu-Genet, Assendabo and Sokoru preparatory schools. The total population was 2999 students, of which 1653 were male and 1345 were female. Moreover, 125 natural science teachers were also part of the population of the study.

Sample size and Sampling techniques: The researchers employed both purposive and simple random sampling techniques. Purposive sampling was employed to include all the teachers in the sampled schools since their number was few and manageable. Thus, thirty teachers were purposely taken and included in the study. On the other hand, random sampling was utilized to sample two hundred ninety-nine students from out of 2999 students in the target schools.

Instruments: The researchers employed students' and teachers' questionnaires which consist of both closed and open-ended items. Interviews were conducted with selected students, teachers, administrative staff and parents. Focused Group Discussion and observation were also used to collect data.

Data collection procedure: The researchers trained 2 data collectors for each school to collect data. First, informed consent was obtained from the sampled schools, and then the researchers made clear the objective of the study to the school principals and participants. Accordingly, the data were collected from the selected groups procedurally.

Method of Data Analysis: the data obtained through questionnaire were computed using SPSS version 20.0. Both descriptive and inferential statistical methods were employed in analyzing the quantitative data. The descriptive statistics produced frequency and percentage of the responses, and results were displayed using graphs and tables whereas the inferential statistics was used to compute mean differences. The qualitative data were analyzed using coding and thematic analysis, and the results were summarized and listed thematically.

RESULTS AND DISCUSSION

As pointed out, the total sample size of this study was 299 students and 30 corresponding teachers. Therefore, a total of 329 samples were respondents in this study. The results obtained through students' questionnaire are presented as follows.

Results and Discussions of Students' Questionnaire

As shown by the table and bar graphs above, the academic preparedness of students were good for those who were assigned in the department they had chosen whereas it was found to be poor and very poor for those who were assigned by the 70:30 placement policy under the same scored range of 2.00-2.50.

These graphs revealed that the attitudes of students towards their stream were good with the score range of 2.00-2.50 which is for those who were assigned by their choice, whereas it was 'poor' and 'very poor' for those who were placed by the 70:30 policy; their score range was also 2.00-2.50.

Thus, it can be inferred that assigning students in science fields without their choice might negatively affect their attitudes towards the field they were assigned.

Table 1. Cross-tabulation of Academic preparedness and study * Respondents' Entrance Score * their placement in science stream

Your placement on science stream			Respondents Entrance Score				Total	
			2.00-2.50	2.51-3.00	3.10-3.50	3.51-4.00		
Based on my choice	Academic preparedness towards your study	Very poor	2	2	0	1	5	
		Poor	2	3	3	1	9	
		Undecided		4	3	3	2	12
		Good		31	11	18	14	74
		Very good		5	5	5	6	21
	Total		44	24	29	24	121	
Based on 70/30 policy	Academic preparedness towards your study	Very poor	38	11	3	1	53	
		Poor	65	22	12	7	106	
		Undecided		4	1	0	0	5
		Good		1	2	10	1	14
	Total		108	36	25	9	178	
Total	Academic preparedness towards your study	Very poor	40	13	3	2	58	
		Poor	67	25	15	8	115	
		Undecided		8	4	3	2	17
		Good		32	13	28	15	88
		Very good		5	5	5	6	21
	Total		152	60	54	33	299	

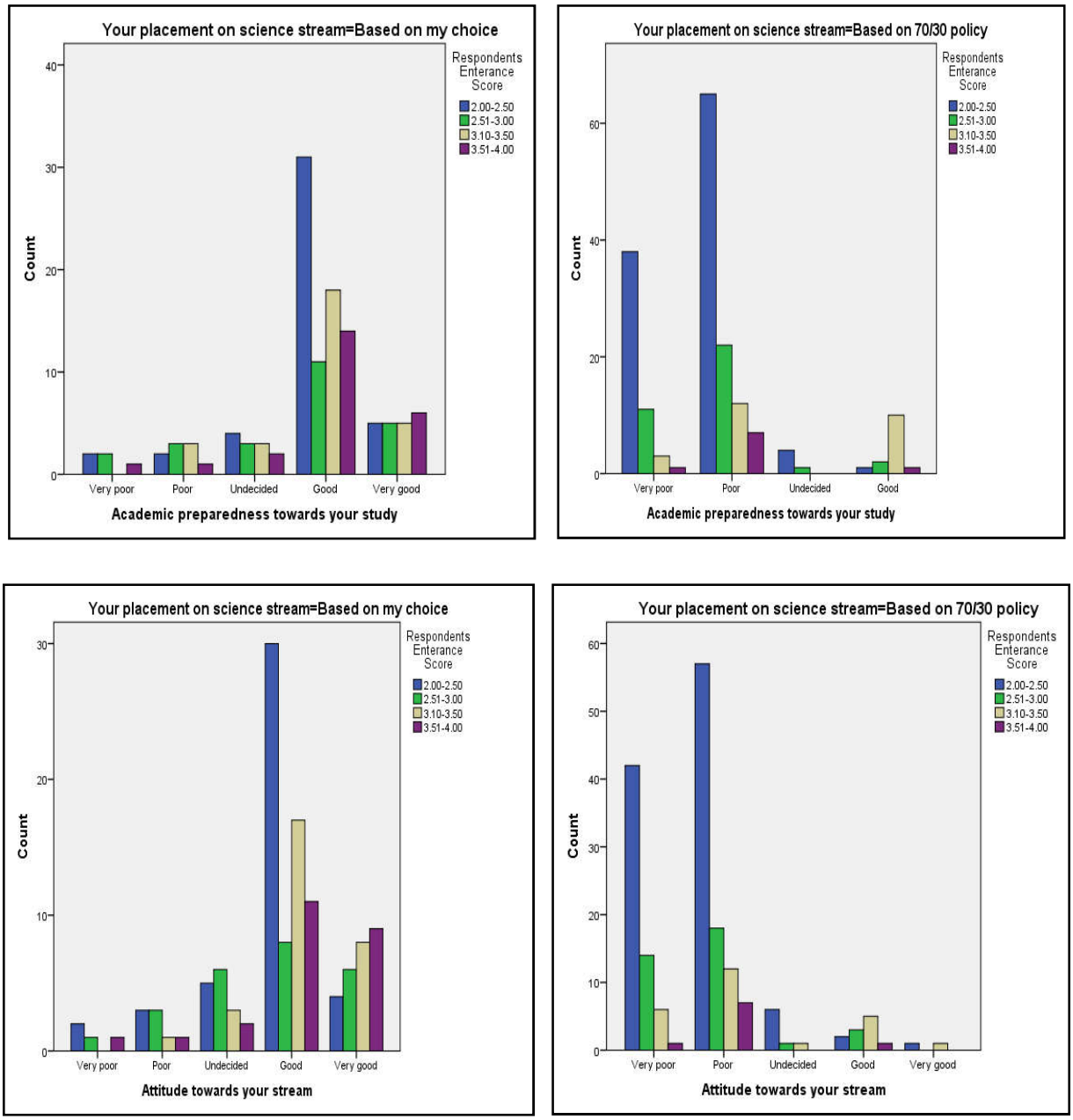

Fig. 1. Cross-tabulation of respondents' Attitude towards their stream * Respondents' Entrance Score * their placement on science stream

These graphs revealed that the attitudes of students towards their stream were good with the score range of 2.00-2.50 which is for those who were assigned by their choice, whereas it was 'poor' and 'very poor' for those who were placed by the 70:30 policy; their score range was also 2.00-2.50. Thus, it can be inferred that assigning students in science fields without their choice might negatively affect their attitudes towards the field they were assigned.

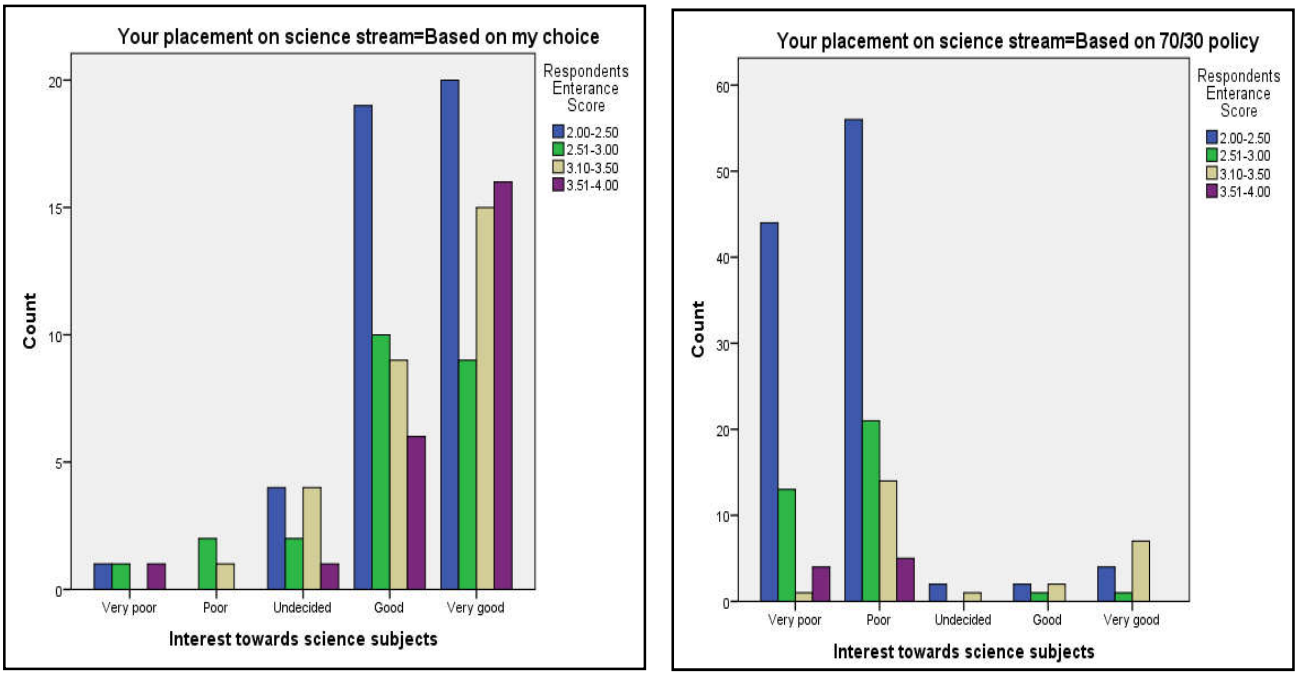

Fig. 2. Cross tabulation of Interest towards science subjects * Respondents Entrance Score * their placement on science stream

As the above graphs vividly illustrated, the interest of students towards their stream were 'very good' and 'good' for both students who were assigned by their choice and by the 70/30 placement policy respectively, with the score range of 2.00-2.50. Based up on this particular response it can be concluded that students who were assigned by their choice have a very good interest to the science field whereas those students who were assigned by the 70/30 scheme had a good interest towards the science field.

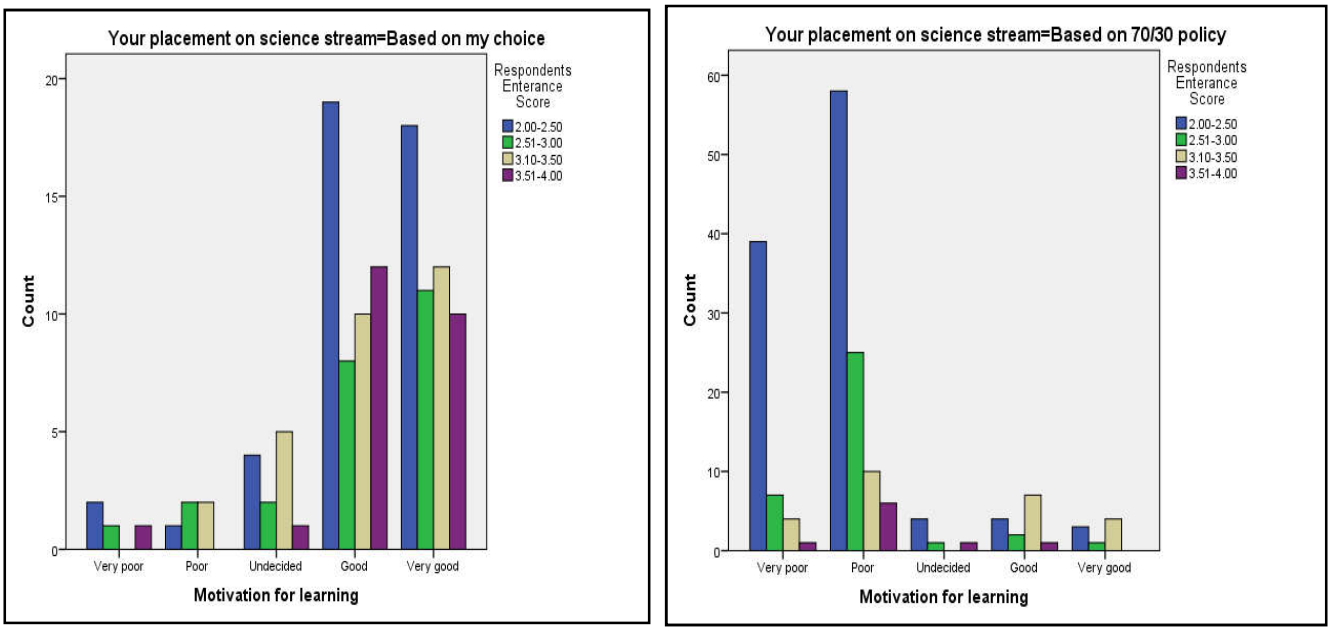

Fig. 3. Cross tabulation of respondents' Motivation for learning * Respondents' Entrance Score * their placement on science stream

The above graph shows the cross tab results of students' motivation for learning in terms of their stream. It was found that students' motivation was 'good' and 'very good' for those who were placed by their choice, whereas it was 'poor' and 'very poor' for those who were assigned by the 70/30 placement scheme, having the same score range of 2.00-2.50.This result implies that students' placement has an impact on their motivation for learning basic science education.

Table 2. Cross tabulation of respondents Level of engagement on the subjects they are taking * Respondents Entrance Score * their placement on science stream

Your placement on science stream			Respondents' Entrance Score				Total
			2.00-2.50	2.51-3.00	3.10-3.50	3.51-4.00	
Based on my choice	Level of engagement on the subjects you are taking	Very poor	1	2	1	1	5
		Poor	3	2	2	1	8
		Undecided	14	4	11	3	32
		Good	22	10	12	11	55
		Very good	4	6	3	8	21
	Total		44	24	29	24	121
Based on 70/30 policy	Level of engagement on the subjects you are taking	Very poor	13	1	1	1	16
		Poor	21	5	1	0	27
		Undecided	20	5	6	3	34
		Good	39	20	11	3	73
		Very good	15	5	6	2	28
	Total		108	36	25	9	178
Total	Level of engagement on the subjects you are taking	Very poor	14	3	2	2	21
		Poor	24	7	3	1	35
		Undecided	34	9	17	6	66
		Good	61	30	23	14	128
		Very good	19	11	9	10	49
	Total		152	60	54	33	299

As shown from table 6, the level of engagement of students who were placed by their choice and by the 70/30 assignment policy was found 'good' in their level of engagement on the subjects they were taking , and their scores also fall under the score range of 2.00-2.50. Thus, it can be inferred that the level of learners' engagement is almost the same to both groups of students.

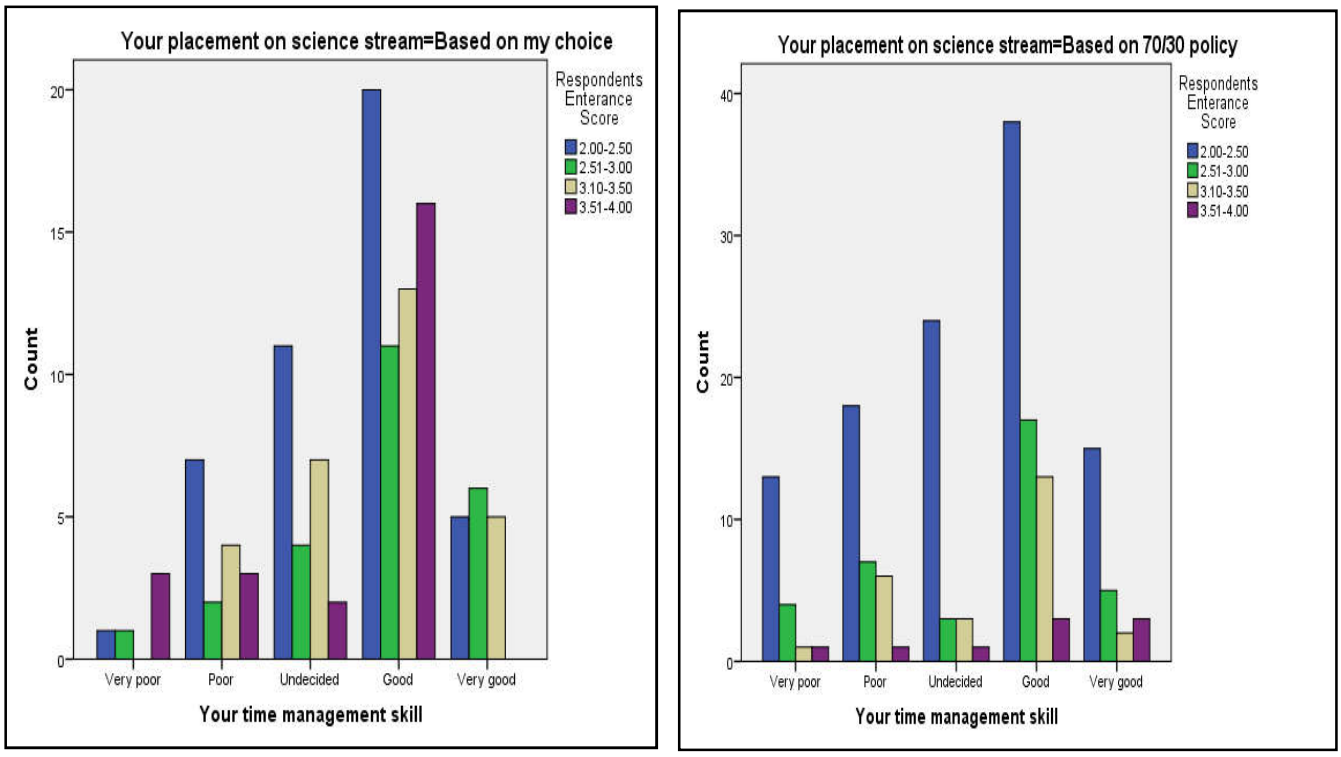

Fig. 4. Cross-tabulation of respondents' time management skill * Respondents' Entrance Score * their placement on science stream

The graphs show that students' time management skill were 'good' in average for both who were assigned by their choice and by 70/30 assignment policy and their scores on entrance examination were 2.00-2.50.

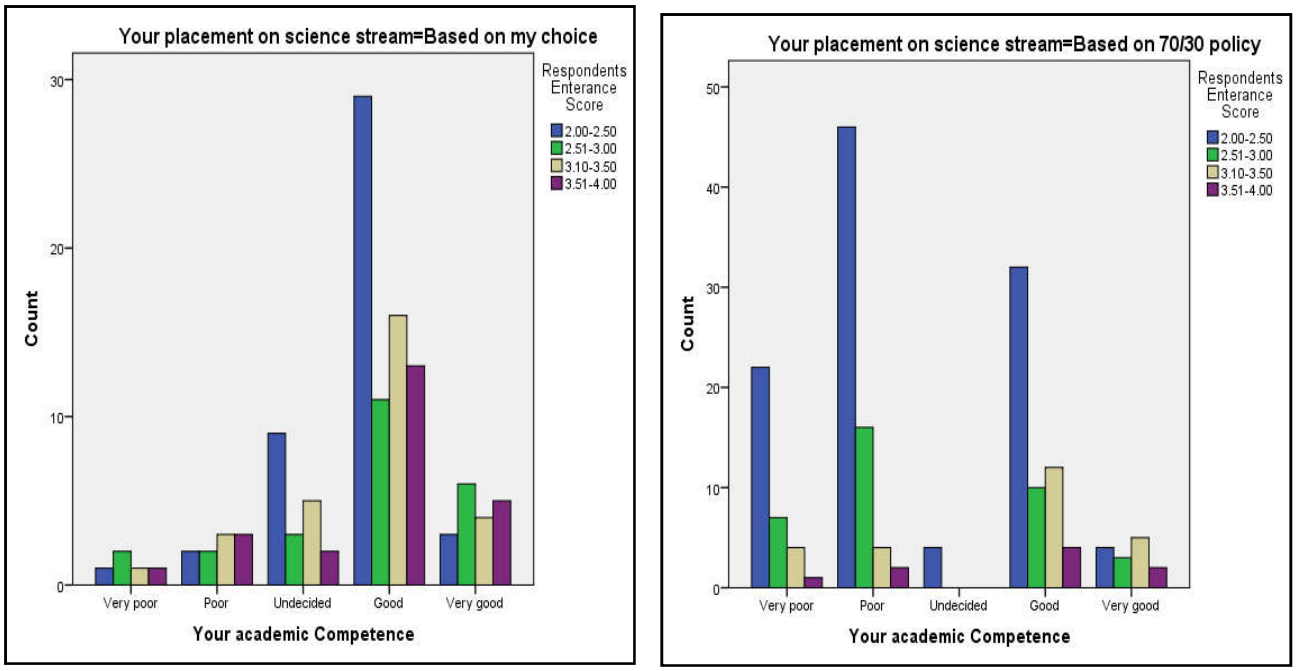

Fig. 5. Cross-tabulation of participants' academic Competence * their Enterance Score * their placement on science stream

AS we can see from the bar graphs above, most students' academic competence were 'good' for those who were placed by their choice whereas it was 'poor' for those who were assigned by 70/30 placement policy, under the same score range of 2.00-2.50.

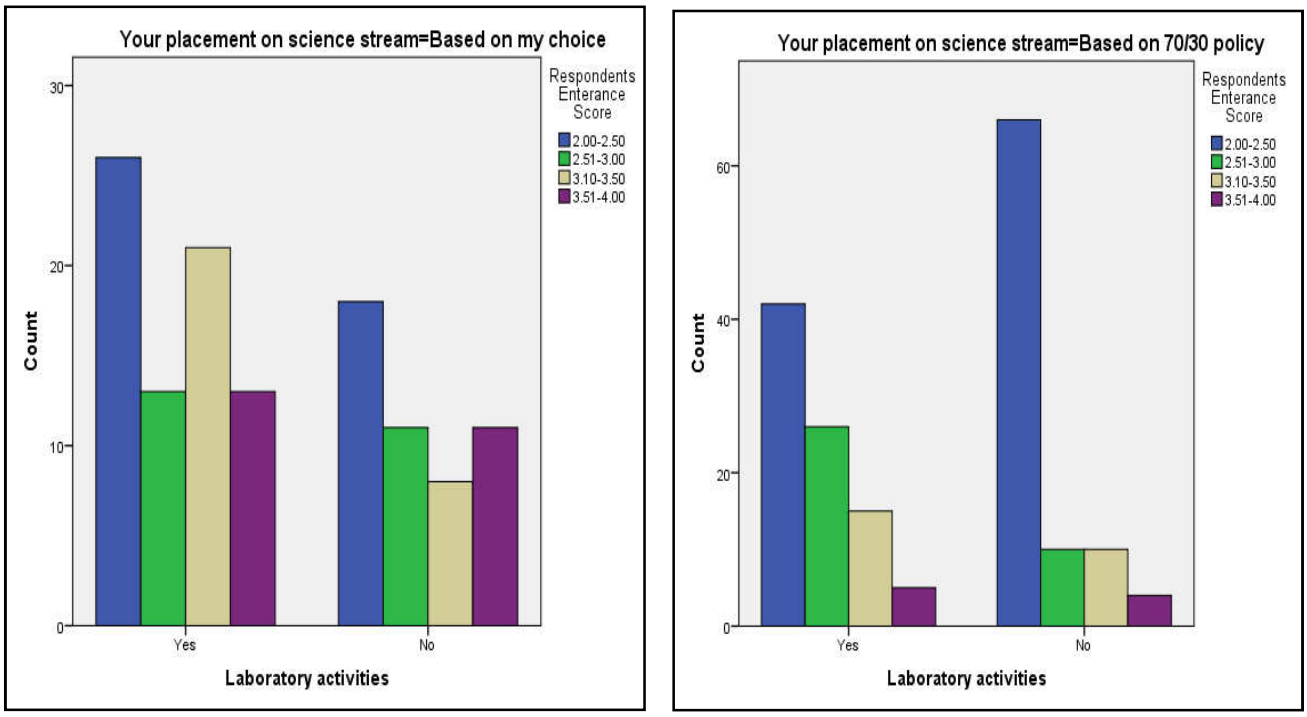

Fig. 6. Cross tabulation of Laboratory activities * Respondents Entrance Score * their placement on science stream

These graphs illustrated that most of the students who had joined the science stream by their choice were 'involved' in laboratory activities' whereas those students who had joined the stream p by the 70/30 quota placement policy 'did not involve' in laboratory activities.

Table 3. Cross tabulation of group assignments * Respondents' Entrance Score * their placement on science stream

Your placement on science stream			Respondents Entrance Score				Total
			2.00-2.50	2.51-3.00	3.10-3.50	3.51-4.00	
Based on my choice	In group assignments	Yes	39	24	28	21	112
		No	5	0	1	3	9
	Total		44	24	29	24	121
Based on 70/30 policy	In group assignments	Yes	98	31	22	8	159
		No	10	5	3	1	19
	Total		108	36	25	9	178
Total	In group assignments	Yes	137	55	50	29	271
		No	15	5	4	4	28
	Total		152	60	54	33	299

As can be seen from the above table, almost all the students who were placed by their choice and by the 70/30 placement policy participate in group assignments, with the same score range of 2.00-2.50.

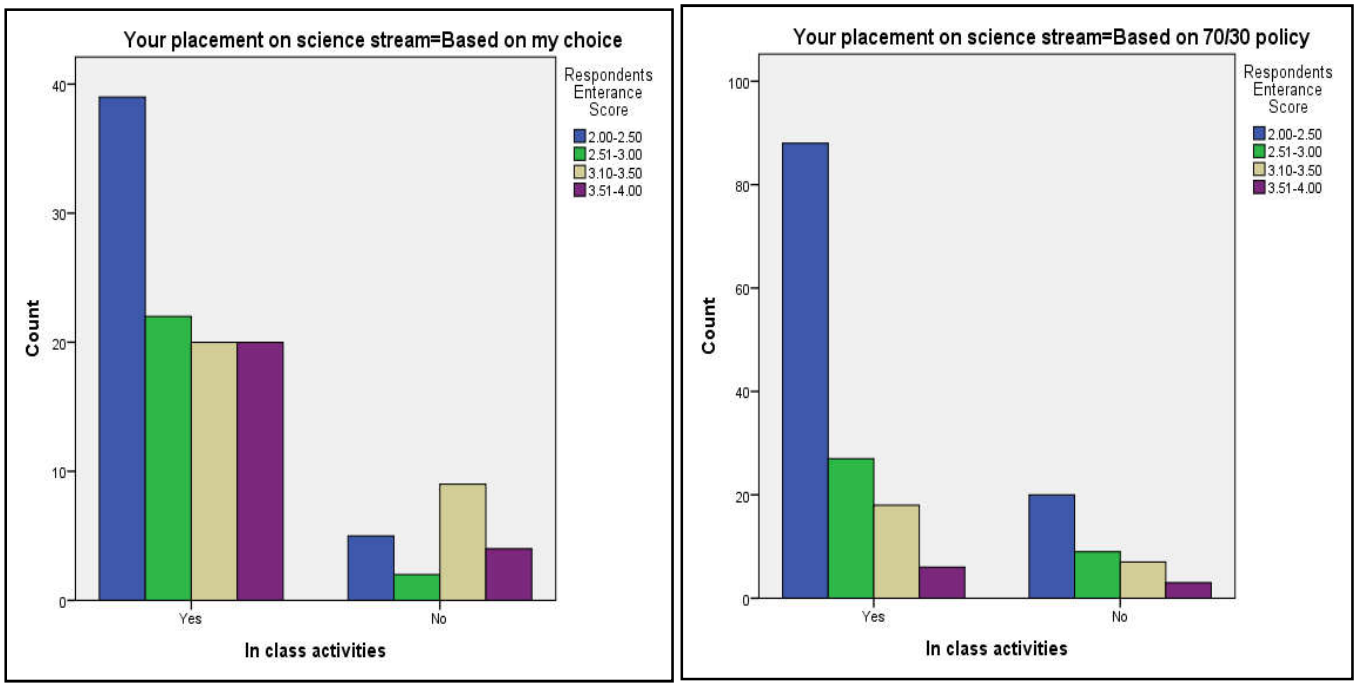

Fig. 7. Cross tabulation of class activities * Respondents Entrance Score * their placement on science stream

Table 4. Cross tabulation of respondents' participation in Science club * Respondents Entrance Score * Your placement on science stream

Your placement on science stream			Respondents Entrance Score				Total
			2.00-2.50	2.51-3.00	3.10-3.50	3.51-4.00	
Based on my choice	In Science club	Yes	12	4	11	11	38
		No	32	20	18	13	83
	Total		44	24	29	24	121
Based on 70/30 policy	In Science club	Yes	27	15	6	2	50
		No	81	21	19	7	128
	Total		108	36	25	9	178
Total	In Science club	Yes	39	19	17	13	88
		No	113	41	37	20	211
	Total		152	60	54	33	299

These graphs illustrated participants' class activities which was found to by their choice and by 7 'nice' for both groups, or actively participating on class activities, with the same score range of 2.00-2.50. As one can see from the above graphs, the participation of students in science club was almost similar, which was 'weak' for both students who joined the stream by their choice as well as by the 70/30 assignment policy.

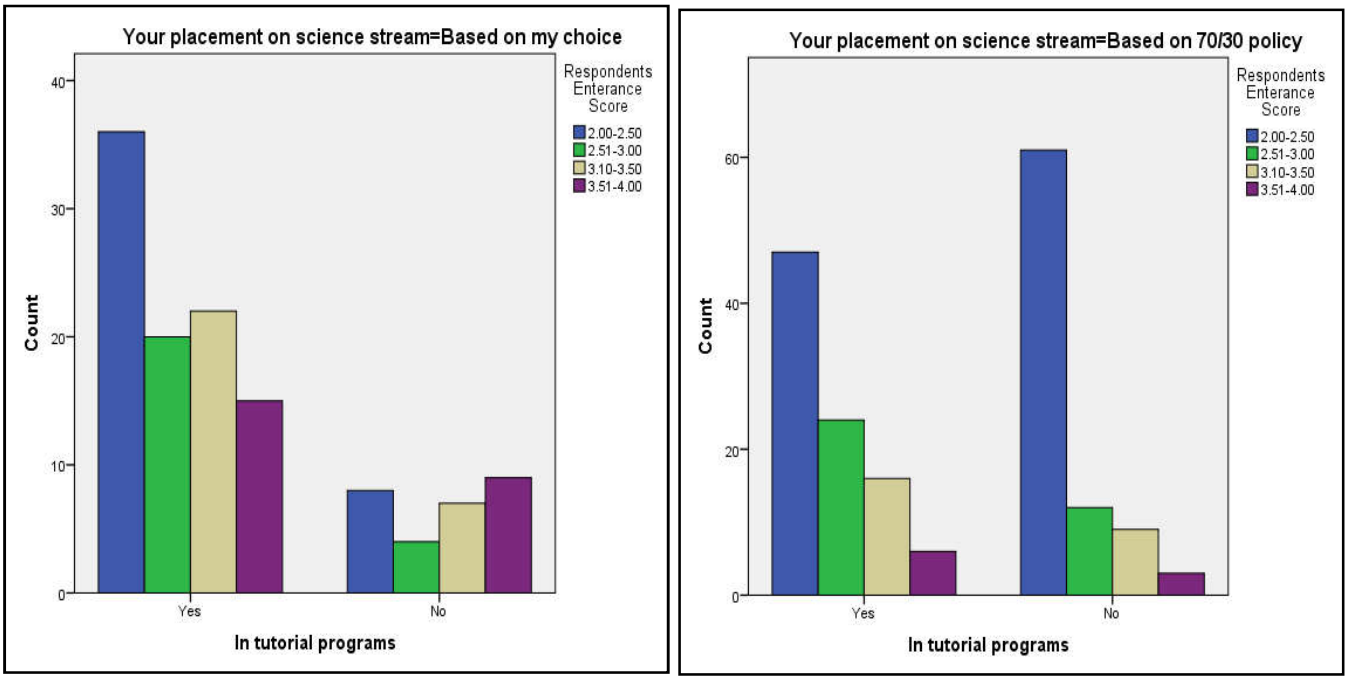

Fig. 8. Cross tabulation of involvement in tutorial programs * Respondents Entrance Score * their placement on science stream

As shown by this graph, the students responded that their involvement in tutorial programs were high for those who were placed by their choice whereas it was low for those who were assigned by the 70/30 placement system, with a score range of 2.00-2.50.

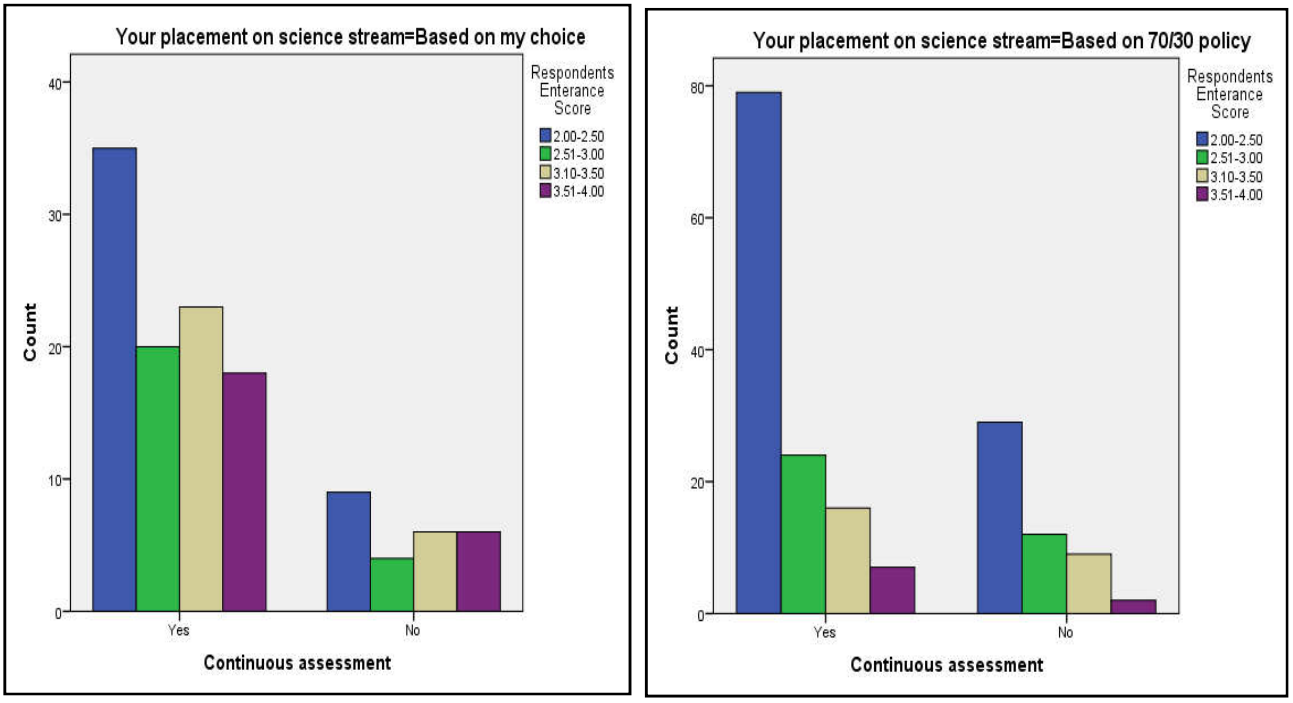

Fig. 9. Cross tabulation Continuous assessment * Respondents Entrance Score * Your placement on science stream

As can be seen from the above table, most students responded that for both placements there was continuous assessment.

Group work * Respondents Entrance Score * Your placement on science stream Cross tabulation

Table 5. Group work * Respondents Entrance Score * Your placement on science stream Cross tabulation

Your placement on science stream			Respondents Entrance Score				Total
			2.00-2.50	2.51-3.00	3.10-3.50	3.51-4.00	
Based on my choice	Group work	Yes	33	20	27	17	97
		No	11	4	2	7	24
	Total		44	24	29	24	121
Based on 70/30 policy	Group work	Yes	94	28	20	9	151
		No	14	8	5	0	27
	Total		108	36	25	9	178
Total	Group work	Yes	127	48	47	26	248
		No	25	12	7	7	51
	Total		152	60	54	33	299

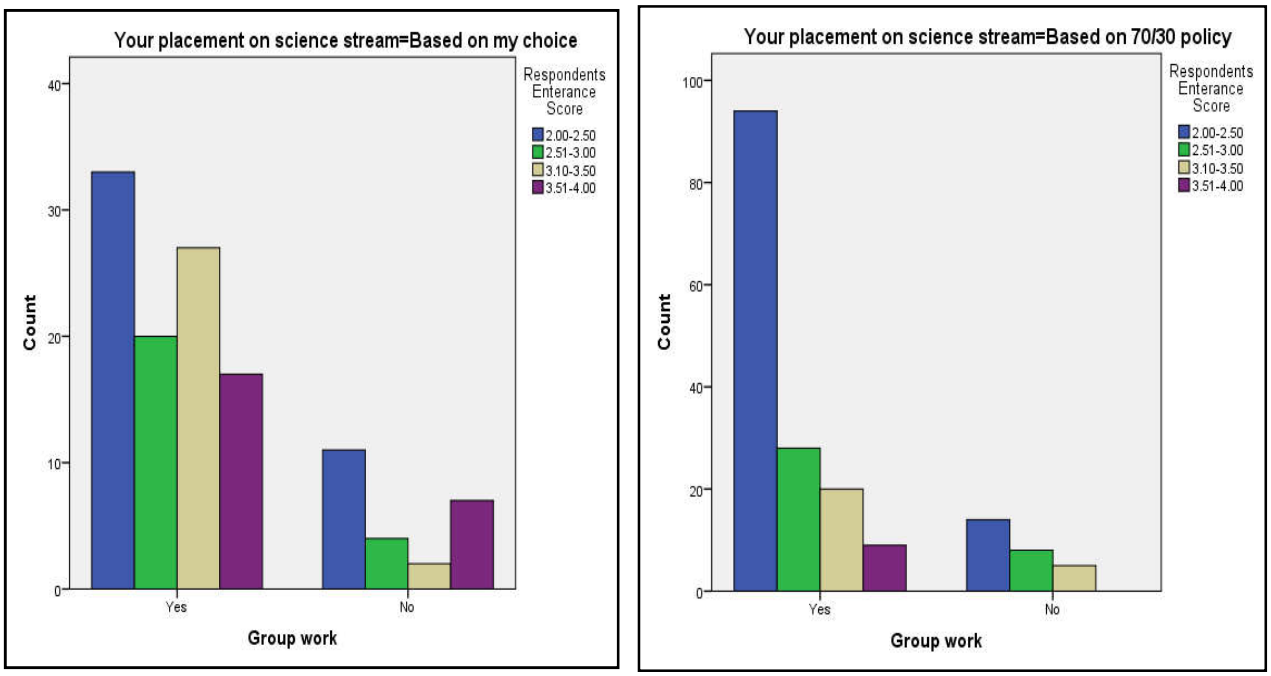

Fig. 10. Cross-tabulation Group work * Respondents Entrance Score * theirr placement on science stream

As we can see from these graphs, most students said that there were group works given in common for students from both types of placements, and their responses were distributed in almost all the score ranges. But few students said 'no' to show that they did not involve in the group work given by their teachers.

Results of Open Ended Questions: Students' Responses

The responses obtained through open ended questions were analyzed, coded and listed thematically in the following way. Accordingly, the major factors that result in weak performance of students on mathematics and science education is twofold: students and teachers related factors

i)Students Related Factors

- Learners lack capability in terms of basic science knowledge, English language skills (proficiency), and lack of interest and motivation
- Students lack of interest and failure to participate in science clubs; there is no smooth relationship between teachers and students to facilitate such co curricular activities
- Poor studying plan and time management skill of students
- Less understanding capacity of students because of lack of language skill,
- Assuming mathematics and science subjects as difficult and challenging
- Learners intentional planning and preparation for cheating on exams instead of devoting their time to study
- Socio-economic problems of students (finance, long distance and less family support
- Learners' lack of confidence during Tests and Examinations
- Not to give special consideration for Science stream students for the entrance examination result with its level of difficulty.

Table 6. Results that show the extent students are satisfied on the following issues related to the science field of study

		Case Number	Leadership commitment	Teachers commitment	Teachers involvement	Teacher recruitment	Teaching, learning
1		1	very dissatisfied	very dissatisfied	very dissatisfied	Dissatisfied	dissatisfied
2		2	satisfied	very satisfied	Satisfied	Satisfied	very satisfied
3		3	satisfied	Satisfied	very satisfied	Satisfied	satisfied
4		4	satisfied	very satisfied	very satisfied	Satisfied	very satisfied
5		5	very satisfied	Satisfied	Satisfied	Satisfied	satisfied
6		6	satisfied	Satisfied	Satisfied	Satisfied	satisfied
7		7	satisfied	Satisfied	Satisfied	Satisfied	satisfied
8		8	satisfied	Satisfied	Satisfied	Satisfied	satisfied
9		9	satisfied	Satisfied	Satisfied	Satisfied	very satisfied
10		10	very satisfied	very satisfied	very satisfied	Satisfied	very satisfied
11		11	satisfied	Satisfied	dissatisfied	very satisfied	satisfied
12		12	dissatisfied	Satisfied	satisfied	very satisfied	satisfied
13		13	satisfied	Satisfied	satisfied	Satisfied	satisfied
14		14	very satisfied	Satisfied	satisfied	Satisfied	very satisfied
15		15	satisfied	Satisfied	satisfied	very satisfied	satisfied
16		16	satisfied	very satisfied	very satisfied	Satisfied	very satisfied
17		17	satisfied	Satisfied	satisfied	Dissatisfied	very satisfied
18		18	satisfied	Satisfied	satisfied	very satisfied	very satisfied
19		19	very satisfied	very satisfied	satisfied	Satisfied	satisfied
20		20	satisfied	very satisfied	satisfied	very satisfied	dissatisfied
21		21	satisfied	Satisfied	satisfied	very satisfied	satisfied
22		22	dissatisfied	Satisfied	dissatisfied	Satisfied	very satisfied
23		23	satisfied	Satisfied	satisfied	Dissatisfied	very satisfied
24		24	satisfied	very satisfied	satisfied	Satisfied	satisfied
25		25	satisfied	Satisfied	dissatisfied	Satisfied	very satisfied
26		26	satisfied	Satisfied	satisfied	very satisfied	satisfied
27		27	satisfied	very satisfied	very dissatisfied	Dissatisfied	satisfied
28		28	satisfied	Satisfied	satisfied	very satisfied	very satisfied
29		29	satisfied	Satisfied	satisfied	Satisfied	satisfied
30		30	satisfied	Satisfied	satisfied	Satisfied	satisfied
Total	N		30	30	30	30	30
	Sum		117.00	125.00	112.00	120.00	128.00
	Mean		3.9000	4.1667	3.7333	4.0000	4.2667

1 = Very dissatisfied
2 = Dissatisfied
3 = Not decided
4 = Satisfied
5 = Very Satisfied

ii)Teachers Related Factors From The Students View Points

- Teachers failure to encourage and appreciate outstanding students
- Lack of good teaching methods and missing of class
- Less attention given for continuous assessment
- Lack of organized tutorial programs, giving less attention for regular program classes much emphasis for classes with incentives
- Teachers seldom miss classes but not compensate those classes
- No adequate preparation for teaching the content in good manner
- No affirmative or supporting activities for female students
- Teachers' lack of interest to prepare work sheets, group assignment and group work for mathematics and physics subjects
- Not covering contents of a unit on its time with appropriate methods and dominant use of teacher centered

Others

- Shortage of materials: guide books, laboratory instruments, equipments and relevant reference books

Therefore, student respondents suggested the following points as ways to improve their weak performances on mathematics and science education.

- Arranging tutorial class and organizing group/team works and assignments
- Increasing the time and usage of laboratories for better understanding and internalizing science
- Raising students' interests on mathematics and science by organizing discussions, scientific presentations, and application of technology based teaching methods
- Giving training for teachers
- Preparing relevant work sheets and assignments that encourage both group works and self-learning
- Giving orientations and counseling services for fresh students
- Increasing and improving study habits and time management skill of students through trainings.
- Implementing the principle of continuous assessments
- Use appropriate and selective teaching methods.
- Improving learners' English language skills through training
- Using relevant references and teaching materials for better understanding.
- Creating discussion forums with students parents to support their children education

- Give opportunity for further education and training for teachers to update themselves with innovative teaching methods
- Giving equal emphasis for theoretical and practical aspects of the subjects in accordance with the course contents and objectives
- Reconsidering the entrance examination result cut point by considering the level of difficulty of learning natural sciences
- Implementing student centered approach and arranging different activities for students
- Organizing and fulfilling libraries with updated and relevant references, guide books and additional teaching materials
- Appreciating and rewarding hard working teachers and students
- Arrange meetings with parents, students and teachers to explicitly discuss and solve the problems of the students' weak performance on mathematics and science education

Results of Open-ended Questions: Teachers' Responses

According to teachers' responses, the main factor for the students' weak performance on mathematics and science include internal and external factors.

1. Internal factors

- Lack of commitment of some teachers (interests, motivation and academic preparedness) particularly in mathematics and physics teaching
- Shortage of reference books, conducive class rooms, tutorial class, and laboratory rooms, instruments, equipment's and set ups
- Lack of good administration system and facilities for smooth teaching (e.g. overcrowded class rooms).
- Lack of internet access in majority of the schools
- Not separate high school from preparatory schools.
- Poor controlling, guiding and management systems of students in the schools
- Missing Class of students, miss behaving of students, less participation in students activities
- Lack of confidence on tests and examinations of students
- Negative attitudes of teachers towards the teaching profession for its unfair salary and other incentives
- Lack of continuous supervision and feedback
- Lack of strong background knowledge of students from lower grades
- Lack of unwanted emotional condition and forgetting
- Decrease of practical base teaching practices from time to time
- Majorities of students are involved in income generating activities and hence there is frequent absence of students from schools.
- Assuming the science subjects are difficult to understand
- Workload (overburden) of some teachers
- Being less responsible (teachers)

2. External Factors

- Lack of awareness of students families that educating in science education has lots of job opportunities
- Influences of addictions (like "chats, alcohol and shisha").
- Lack of positive attitudes towards the teaching profession for its unfair salary
- Social and economic problems of the community (like economic scarcity, low income).
- Lack of strong relationships between schools and NGO's and different supporting organizations
- Divergence of student's attention to business since the zone is cash crop areas.
- Large class size in lower grades
- Weak assessments and pass and fail parameters of the educational policy

Therefore, the participant Teachers Suggested the following points as ways to improve students' weak performance on mathematics and sciences subjects (physics, Biology and Chemistry).

- Organizing and fulfilling schools and libraries with up to dated reference books, guide books, and additional teaching materials.
- Arranging organizing tutorial class, functional and equipped laboratories and additional learning class rooms
- Improving the teaching learning process of lower grades specially starting from elementary schools give due attention for mathematics and science subjects
- Reorganizing students group activities, team works and group assignments to facilitate independent learning
- Creating conducive teaching-learning environment for mathematics and science subjects
- Arranging further education and special training for teachers, develop positive attitudes for teaching profession in general and for mathematics and science in particular
- Changing the teacher centered reproach of teaching to student centered approach
- Planning and scheduling counseling and guidance for students miss-behavior and facilitating their learning
- Organizing structured and strong management system in the schools
- Participating actively the community for school affairs issues of the teaching learning process
- Giving special attention to raise the interests of students towards mathematics and science
- Checking the promotion policies and entrance examination result of students and revise
- Controlling the cheating attempts of the students seriously and raise awareness of students about the non-necessity of it
- Inviting families and stake holders to make open discussion to improve students study skill, group work and usage of different teaching and learning materials

Results of Interviews and Focused Group Discussions

Based up on the responses obtained from the group discussion made with teachers, the factors which contributed most for weak performance of preparatory students on mathematics and science education were summarized as follow:

- Students' lack of mathematical background knowledge
- Self-contained teaching system at primary schools has great impact when they join high schools.
- Free promotion policy at primary has great impact when they join high schools
- Lack of laboratory activities
- Problems on the contents of some text books for some subjects
- Lack of knowledge which results from poor graduate teachers from different privet and teachers training colleges
- Lack of plasma education guide line (Not well organized plasma guide line CD's)
- Confusion between plasma and non plasma classes
- Psychological fear for mathematics and science subjects
- Weak and ineffective promotion policy at grade eight (8) which is pass mark is 35% for females and 40% for male students out of 100%.
- Most students focus on cheating rather than studying science subjects
- The education policy focuses on quantity, not on quality
- Most schools principal as well as education bureau officers just work to report accomplishments, not give emphasis on the teaching learning process.
- Most student joined science stream without their interest
- Decentralizations of examiners (invigilators from the same area) for high school leaving certificate exams that leads for cheating and which gives chance for poor performing students to join preparatory schools easily
- Lack of continuous assessment
- Students' parents give priority for business and farming rather than schooling
- Large class sizes has impact on science teaching
- Most principals and students consider passing from grade 11 to 12 as a free promotion
- Most students are hopeless on their education
- Low salary and or equal payments for science teachers and teachers from other streams, non-hard science
- Lack of encouragement and reward for science students and teachers

Suggestions for improvement of student's weak performance on mathematics and science education (physics, Biology and Chemistry) from the group discussion made with teachers were summarized as follow:

- Training students to hate and avoid cheating
- Identifying weak performing students from the very beginning and tutoring them extensively
- Revising the curriculum continuously
- Continuous evaluation of the capabilities of teacher training institutes
- Revising free promotion policy at primary level
- Establishing and equipping laboratories
- Furnishing and suiting classrooms for science education
- Giving continuous and short term trainings for teachers at primary and high schools
- Utilizing resources appropriately and avoiding corruption
- Rewarding best teachers and best performing students
- Salary increment and special payment for teachers, especially for science and mathematics teachers
- Giving emphasis for quality rather than quantity
- Applying continuous assessment effectively as per the national curriculum guidelines

Conclusion

It was found that shortage of well-organized laboratories, declined interest of students to study science, students less involvement in group activities, lack of tutorial classes, shortage of materials like guide books, laboratory equipments, instruments, reference books, and students negative attitudes towards mathematics and science fields, and weak perception of students to study science were the main factors that contribute for the weak performance of students in pure science education. Equally important, lack of commitment of some teachers particularly in mathematics and physics to encourage students creativity, together with less interest, less motivation and less academic preparedness of teachers, poor controlling, guiding and managing systems of schools had negatively influenced learners' achievement and performance in science education. Not only this, students' lack of confidence on tests and examinations and lack of good administration system in the schools were among the dominant factors. Generally, it can be concluded that the aforementioned points were the major factors that result in weak performance of students in mathematics and science fields as far as the respondents and the findings of the present study are concerned.

Recommendations

The researchers recommended the following points to enhance the quality of science education in general and improve students' weak performance on mathematics and science fields in particular. Adequate support from stakeholders such as zone education bureau officials is highly needed so as to fulfill facilities that required in science education. Students' families should support students in moral and materials, and teachers should also help students in tutorials, group works, and assignments. Not only this, they should also let students engage actively in the class, develop good time management and independent learning skills. As far as school administrative bodies are concerned, they have to create conducive classrooms and school environment, create good managing, guiding, and counseling facilities and personnel. Equally important, the researchers strongly recommended that the science laboratories should be re-organized in well manner with optimal utilization of locally available resources, and school principals should request laboratory equipments and chemicals from respective bodies. The declined interest of students should be also appropriately treated through

counseling from respective professionals (psychologists and educational professionals). The 70/30 policy should be reconsidered, and it must be based on research findings to keep students interest and let them succeed in their education. Generally, the researchers are optimist that applying the aforementioned suggestions might help to solve the problems that students are facing in science education so that they can achieve better than their current performances.

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