Perception of Staff and Students on Factors that Influence Performance in Science Laboratory Technology in Institutes of Technology in Southern Nyanza Region, Kenya

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Abstract

Science Laboratory Technology training is considered the hub to Kenya's economy, as it is increasingly seen as a vehicle through which the country will build a competitive workforce for key industries within priority sectors identified in Vision 2030. Despite the importance of Science Laboratory Technology, students' performance in Institutes of Technology in South Nyanza, Kenya has been below expectations. For the period between 2006-2010, cumulative performance in Science Laboratory Technology course in Kenya National Examinations has been; Distinction 0 (0%), Credit 15 (2.63%); Pass 61 (10.63%); Referred 219 (38.29%); and 277 (48.45%) failed. This dismal performance has led to growing concern among stakeholders. The purpose of this article was to establish perception of students and staff on determinants of performance in science laboratory technology in institutes of technology in South Nyanza region, Kenya

The study adopted descriptive survey design. The study population consisted of 240 students undergoing the Science Laboratory Technology course, 26 lecturers, 3 Librarians and 3 Principals. Simple random sampling technique was used to select 120 students and 18 lecturers while saturated sampling technique was used to select the 3 Principals, 3 librarians and 3 laboratory assistants. The instruments for data collection were questionnaires, interview schedules, document analysis and observation. Face validity of the instruments was established by experts from the Department of Educational Management and Foundation whose

suggestions were incorporated. Reliability of the instruments was established using test re-test method using 5% of the students and lecturers who were not in the sample. Qualitative data collected using interview schedule were transcribed and then grouped into categories as they emerged for ease of analysis. Quantitative data collected using questionnaires were analyzed using descriptive statistics in form of means, frequencies and percentages. The study findings were presented using tables. The study established that low entry grades of students determined their performance in science laboratory technology. Insufficient laboratory equipments could determine the performance of students. The study concluded that despite the presence of qualified and experienced teaching staff, insufficient laboratory equipment and low entry grades for the students are the key determinants of the students' performance in science laboratory technology course in the Institutes of technology. The study recommended that the minimum entry grade of students aspiring for this course should be reviewed upwards from the current minimum entry point of D plain. The study also recommends that the entry requirements to the course be pegged on passing science subjects at form four level. The laboratory should be equipped sufficiently. The findings of this study hopefully will help the institutions management team to improve on their laboratories and raise the entry grade for students aspiring to study Science Laboratory Technology. This study also provides a basis for future research in the education sector particularly the Institutes of Technology. The Ministry of Higher Education Science and Technology may also use this study to re-evaluate the criteria for student admission into the course Science Laboratory Technology.

Background to the study

The achievements of a nation are based on advances in science, technology and raising the level of educational achievement in the general population (Hofstain & Lunetta, 2004). The United Nations recognizes this role and states that the development of effective technical and vocational education systems is at the heart of global education reform efforts (UNESCO, 2004). Chunghwa (2000) in Hong Kong suggested that, from a global perspective, the framework for technological education in any nation must be drawn from a widely recognized, acceptable, national conceptualization of the role of technology in national development.

In the United Kingdom, Tsang (2000) defined vocational training broadly as being any type of job- related learning that raises an individual's productivity. It includes learning that takes place in formal, vocational and technical schools, in training centers or institutes and in work place both on and off-the-job (Oliver *et al*, 2008). The objective of vocational training is to teach new skills or to upgrade existing skills in order to raise the trainee's capacity to handle the specific job being trained for (Oplatka, 2004). A primary goal of government training is often to meet the required manpower needs to boost economic growth both at grassroots and national level. Hoftain and Lunetta (2004) point out that the inputs to vocational training include the trainees' and the instructors' time, instructional materials, equipment and physical facilities. Chunghwa (2000) states that there are direct and indirect resources devoted to training which constitute the cost of vocational training. Outputs of training include its effects on the trainee and the benefits to the trainee and the society at large. Training effect on the trainee includes increment in cognitive and non- cognitive skills that are required in the work place which result in higher earnings (Soto & Sulekha-Anand, 2009). Training has benefits to the enterprises such

as providing lower rate of worker turnover, reduced downtime, reduced input cost and increased worker productivity. The society benefits in increased economic productivity and higher taxable earnings (MacLennan, 2008).Technical and vocational training systems that respond to the needs of the society, industry and individuals are a critical prerequisite to a country's economy (Chunghwa, 2000). Such training should be geared towards education that focuses on skills and technology.

In Kenya, when students join Institutes of Technology, they are expected to pass their national examinations and contribute to nation building, and by extension work towards the achievement of Vision 2030 and the Millennium Development Goals (MDG). Akelo-Misori (2008), suggests that, a clearly defined and articulate technical and vocational training system that responds to the needs of the society, industry and individuals is a pre-requisite for a country to become globally competitive. As a Millennium Development Goal, education that focuses on delivery of skills and technology is a priority sector for the World Bank lending program. In line with these priorities, Kenya in its industrialization strategy of Vision 2030 focuses on technological advancement. Institutes of Technology and vocational training institutions in Kenya are expected to play a leading role in the realization of this vision. One objective of the training is to prepare young people so that they are in a position to cope better with their jobs upon leaving school and that they may also gain the skills required to make the most of their work talents (Wolliams, 2006). In Kenya, students enrolled in Institutes of Technology for certificate courses in Science Laboratory Technology are Form four leavers who are required to have attained a minimum grade "D plain" in secondary school, while those who enroll for diploma should have attained 'C-' as minimum grade requirements. The subjects offered in this course are Physics Techniques, Biological Sciences, Laboratory Practical, Chemistry Techniques, and Project Proposal. Other support subjects are Mathematics and Technical Drawing. Successful students find the opportunity to offer essential services to other lab users. In schools they work as Laboratory Assistants, helping students learn without encountering the risks of chemical poisoning or explosions in the laboratory (Hofstain & Lunetta, 2004). To offer their services, the students must show their competence and qualifications by passing the college exams set by Kenya National Examinations Council (KNEC).

Institutes of Technology are an integral part of Technical Industrial and Vocational Training (TIVET). The improvement in student performance in Science Laboratory Technology course will contribute significantly towards attainment of the country's Industrialization Strategy outlined in Vision 2030. Table 1 shows the performance of students in the various courses offered in Institutes of Technology in the South Nyanza. As can be observed, Science Laboratory Technology is featuring in the last column showing that the performance in this course is poor.

The objectives of the study were to;
i) Assess the contribution of Science Laboratory facilities on the performance of students in Science Laboratory Technology in Institutes of Technology in South Nyanza, Kenya.
ii) Determine the contribution of student's entry grade on their performance in Science Laboratory Technology.

Table 1
Cumulative performance of students in different courses in the last 5 years (2006 -2010 in three Institutes of Technology

Courses	No. of students enrolled	No. of students with Distinction	Credit	Pass	Referrals	Fail	% Pass
Textile technology	300	2	118	170	6	4	96.67
Food &beverage	364	10	96	220	16	22	89.56
Social& comm. Dev	400	8	162	150	42	38	80.00
Building construction	180	-	-	120	40	20	66.66
Welding & fabrication	220	-	40	98	60	22	62.72
Carpentry & joinery	260	-	-	160	94	6	61.53
Business studies	597	-	106	249	120	122	59.46
Electrical engineering	175	-	-	98	40	37	56.00
Computer studies	280	2	24	164	41	49	50.00
Automotive engineering	180	-	-	97	53	30	49.44
Mechanical engineering	220	-	-	89	67	64	40.45
Food technology	230	-	-	30	180	20	13.04
Science Laboratory Technology	572	-	4	14	90	464	3.15
Total	**3615**	22	546	1649	849	549	61.33

Source: Moi Institute of Technology, Gusii Institute of Technology and Mawego Institute of Technology. Examinations (KNEC) results for the last five years, from 2006-2010

Table 1.2 shows how the students in this region have been performing in Science Laboratory Technology in the Kenya National Exams for the last five years in Science Laboratory Technology.

Table 2

Performance for 5 consecutive years of students of SLT in 3 Institutes of Technology of South Nyanza , Kenya from 2006-2010 KNEC results

Year	Dist	Credit	Pass	Ref	Fail	Total No. of Candidates	% Candidates Passed
2006	00	02	06	54	63	125	0.064
2007	00	01	09	37	58	105	0.095
2008	00	02	12	41	45	100	0.14
2009	00	02	11	51	48	112	0.12
2010	00	08	23	36	63	130	0.24
Total	**00%**	**2.63%**	**10.63%**	**38.29%**	**48.45%**	**572**	**0.659**

Source: Moi Institute of Technology, Gusii Institute of Technology and Mawego Institute of Technology. Examinations (KNEC) results for the last five years, from 2006-2010

Through the years 2006-2010 performance in SLT in the sampled Institutes of Technology has been below average as can be seen in Table 1.2; 0% Distinction; 2.63%Credit; 10.66% Pass; 38.29% Referred; and 48.43% Fail. This dismal performance in which student wastage is 86.74% and those who passed were only 13.26% has led to growing concern among teachers, college administrations, and other stake holders. Therefore this study sought to find out the factors that influence performance of students in Science Laboratory Technology (SLT) in institutes of technology in South Nyanza, Kenya.

1.2 Statement of the Problem

Institutes of Technology offer technical as well as business courses at both diploma and certificate levels. In light of Vision 2030, Science Laboratory Technology training is considered pivotal to Kenya's economy, as it is increasingly seen as a vehicle through which the country will build a competitive workforce.

In the year 2006 only 8 out of 125 students got a pass grade, while 119 out of 125 failed. In the year 2007 only 10 out of 105 students passed while 95 out of 105 failed. In the year 2008; 14 out of 100 students passed, while 86 out of 100 failed. In the year 2009; 13 out of 112 passed while 99out of 112 failed and in the year 2010, 31 out of 130 students passed and 99 out of 130

students failed (see Table 2). This was of great concern to the stake holders. This study hence sought to find out the contribution of library, laboratory, Lecturers, Principals and students' past grades towards student performance in Science Laboratory Technology, South Nyanza, Kenya.

1.3   Purpose of the Study

The purpose of this study was to establish perception of students and staff on determinants of performance in science laboratory technology in institutes of technology in South Nyanza region, Kenya

The objectives of the study were;

1)   To assess the contribution of Science Laboratory facilities on the performance of students in Science Laboratory Technology in Institutes of Technology in South Nyanza, Kenya.
2) To determine the contribution of student's entry grade on their performance in Science Laboratory Technology.

   The research questions were;

1) What was the contribution of Science Laboratory facilities on the performance of
    Students of Science Laboratory Technology in Institutes of Technology in South Nyanza, Kenya?
2) What was the role of the student's entry grade on their performance in Science Laboratory Technology in Institutes of Technology in South Nyanza, Kenya?

The Concept of student performance

Different writers have defined performance in various ways. Mortimore (2002) defined performance as the achievement under test, while De Jager (2002) defined performance as the change that occurs after an individual has undergone training or planned experience, particularly with regard to individual behavior, knowledge or skill. He also stated that performance relates to student achievement and success in his/her course of study. Okemwa (2000) linked students' performance to effectiveness and described this as the ability of the individual to be productive after formal or vocational training or planned experience. Such effectiveness will be exhibited in individual behavior, knowledge or skill. These definitions depict performance as that which can be observed after training. One important reason behind the selection of this outcome lies in the fact that course grades represent the fulfillment of certain course standards listed in syllabi and known to all enrolled students (Mortimore, 2002). The course standards include various types of assessments such as passing examinations and writing lab reports; therefore, course grades serve as a summative evaluation of student performance (De Jager, 2002). In addition, employers and admissions committees frequently use course grades to gauge student past performance and predict future success. This study reviewed performance in Science Laboratory Technology as affected by the library, the laboratory, lecturer qualification and experience, role of principle's leadership style in provision of learning materials and co-ordination of personnel, and also determined the role of student's entry grade contribution to performance in Science Laboratory

Technology. Performance of the student was viewed as the achieved grade in Kenya National Examinations (KNEC) in Science Laboratory Technology course.

Determinants of students' Performance in learning institutions
Contribution of Science Laboratory facility on the performance of students
Researchers lament the lack of research on the effect of typical laboratory experiences on student performance in contrast to research into other variables focusing on student achievement or other cognitive outcomes (Hofstein and Lunetta, 2004). Linn (2007) did a historical overview on the role of laboratory in science learning in the United Kingdom. The study indicated that laboratories have been a part of science courses since the beginning of 1800s when science was introduced into the United States of America (USA) curriculum. Since then, science laboratories have grown in three phases: separation period, interaction period and partnership period, all featuring various relationships between the educators and the scientists.

 Laboratories are of many different types, they include; chemistry, biochemistry, biological, biomedical, physics, geography and behavioral research laboratories. In the different disciplines of science, the contents of subjects tend to overlap (Williams et al, 2006). Prior empirical literature indicates that students' perceptions of laboratory experiences may affect their interest and engagement in science
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Some researchers, Oliver et al (2008) have found that students often do not have clear ideas about the general or specific purposes of their work in typical science laboratory activities and understanding of the goals of the lessons they undertake during laboratory sessions. Frequently experiments do not match their teachers' goals for the same lessons (Schneider, 2003). When students do not understand the goals of experiments or laboratory investigations, negative consequences for learning occur (Oliver et al, 2008). Thus, in considering how laboratory experiences may contribute to students' interest in science and to other learning goals, their perceptions of those experiences must be considered.

Some seminal studies using the Science Laboratory Environment Inventory (SLEI) have demonstrated links between students' perceptions of laboratory experiences and student outcomes (Singer et al, 2005). SLEI, has been validated cross-nationally and measures five dimensions of the laboratory environment: student cohesiveness, open-endedness, integration, rule clarity, and material environment. Using the SLEI, Singer et al (2005) studied students' perceptions of chemistry and biology laboratories in several countries, including the United States. All five dimensions studied appeared to be positively related to students' attitude.

Using literature analysis, Hofstein and Lunetta (2004) did a study in USA on the influence of the Laboratory in Science Education. They used both observation and interview schedules. The variables for their research were: contemporary goals for science learning, current models of how students construct knowledge and information about how teachers and students engage in Science Laboratory activities. They found that it is important to provide support for the

teachers so that they teach in ways that will help students to enjoy the subject for continuity of science. They also found that laboratory activities have intuitive appeal as a way of allowing students to learn with understanding and at the same time engage in a process of constructing knowledge by "doing" science.

These studies reviewed focused on the relationship between science laboratory, the teacher and the student learning and used mostly the methodologies involving literature reviews, questionnaires and document analysis. The studies also concentrated on role of laboratory science in general and also on the effect of general school facilities on student learning, focusing on mathematics and English, and mostly on elementary schools. Further, the studies did not specifically research on Science Laboratory Technology or Institutes of Technology.

The present study adopted the descriptive survey design using questionnaire, interview and document analysis. Unlike the past studies that focused on elementary schools, this study will investigate the contribution of the laboratory to performance of students in technical colleges, specifically institutes of technology in South Nyanza, Kenya.

Role of students' entry grade on performance.
Entry grade refers to such factors such as: previous experience with quantitative problems, for example mathematics or physics background, achievement tests scores, intelligence, importance of previous general points aggregate (GPA), course prerequisites and general past academic performance (Woobman, 2003).

Soto and Anand (2009) conducted research to identify factors associated with students' success in a large, lecture and laboratory, lower division, undergraduate Cell Biology course. They sought to determine which pre-course variables were associated with student performance, and which in-class behaviors ,such as attendance and completion of homework, are associated with student performance. They found that a higher GPA prior to enrolling in the course was associated with passing the course. Similarly, Woobman (2003) examined course pre-requisites, past grades, and answers to survey questions to examine factors that influence success in college chemistry. Their findings, among others, were that previous grades had the greatest effect on helping students perform well in college chemistry. In the same vein, using a linear regression model, Freeman et al. (2007) showed that previous GPA could be used as a predictor of students' grades in an introductory biology course sequence.

Drennan and Beck (2001) examined teaching quality performance indicators and their influence on universities scores of students in the United Kingdom. The hypothesis of their study was that teaching quality assessment scores may be influenced by the quality of student's intake or student entry standards. The study used document analysis to collect data. Variables of the study were: student entry standards, library and computing the ratio of students to staff. The findings were that students with better entry grades to the university were more articulate, better performers and more confident. Cybulski et al (2005) also found that college level student achievement would in most cases reflect the entry grade. Despite the established role of entry grades as a criterion for student performance, no study has been done in Institutes of

Technolofy in Kenya. In response to calls by researchers for further research into this area, this study sought to find out the role of student entry grade on Science Laboratory technology performance. Using descriptive survey method, Questionnaires, interviews and observation schedule were the instruments of data collection used to find out the contribution of the students entry grade on performance in Science Laboratory Technology Institutes of Technology in the South Nyanza, Kenya. The study focused on the previous academic performance in science-related subjects at high school as the entry grade to the course.

The present study sought to find out the perception of students and staff on determinants of performance in Science Laboratory Technology in institutes of technology in South Nyanza region, Kenya. The determinants investigated were the role of library, the laboratory, Principals' management style, the Lecturers' qualification, experience and the role of the students' entry grade effect on performance. The study also used descriptive survey design.

Research Design
The study adopted descriptive survey research design. The purpose of this research design was to obtain pertinent and precise information concerning the current status of phenomenon and whenever possible to draw valid general conclusions from facts discovered. Descriptive survey is the means through which opinion, attitude and suggestions for improvement of educational practices and instructions and other data can be obtained (Gall et al, 2007). In addition, they are of immense value in solving problems in school organization, supervision and administration (Koul, 2004).The descriptive survey research design was suitable for this study because the descriptive study determines and reports the way things are. The researcher adopted this descriptive research design to be able to describe the phenomenon as it is on the ground.

Data collection procedures
Permission was sought from the National Council of Science and Technology through the School of Graduate Studies (S.G.S) and Department of Educational Management and Foundation, Faculty of Education. The Principals of the institutes, the heads of departments concerned and the lecturers were informed and notified two weeks before the date of data collection. The researcher administered the questionnaires to the students, lecturers, librarians and the laboratory assistant. The interview with the principals was administered by the researcher and taped by the researcher.

Methods of Data Analysis
The questionnaires, document review, interviews schedules and observation schedules yielded both quantitative and qualitative raw data. Quantitative data were analyzed and summarized using descriptive statistics in form of means, percentages and frequencies. Qualitative data were recorded then transcribed and organized into categories as they emerged from the study (Mugenda, 2008).

RESULTS AND DISCUSSION

Contribution of Science Laboratory Facilities on Performance of Students in Science Laboratory Technology course in South Nyanza, Kenya

The research question responded to was: what was the contribution of Laboratory facilities on the performance of students in Science Laboratory Technology course. The responses to this research question were as shown in Table 4.2 The responses have been calculated on a 5 point likert –scale (see appendix G) and the results can be seen on Table 4.2. The five point Likert-Scale values were as follows; Strongly Agree(SA) = 5; Agree (A) = 4; Undecided (UD) = 3; Disagree (D) =2; Strongly Disagree(SD) =1

Table 3

Contribution of the science laboratory facilities to the students' performance as indicated by; Students (n=120); Lecturers (n=18); Laboratory Technicians (n=2)

Laboratory based factors	Students	Lecturers	Lab Technician
	Mean rating	Mean rating	Mean rating
Safe working environment	2.58	2.33	4.00
Has appropriate equipments for carrying out the experiments	2.75	2.44	4.00
Weekly practical lessons	2.50	2.56	2.00
Integrating theory and practice	2.50	2.56	3.00
All theory lessons are coupled with laboratory experiments	2.50	2.56	3.00
Regular repairs and replacement of broken equipment	2.50	2.44	5.00
Sufficient apparatus, specimens and chemicals	2.33	2.33	3.00

Key-(Strongly Agree)SA=5;(Agree) A=4; (Undecided)UD=3; (Disagree)D=2;(Strongly Disagree) SD=1

Table 4.2 shows the results of the investigations on laboratory facilities;
Safe working environment was rated 2.58 by students; 2.33 by lecturers and 4.00 by the laboratory assistant. For the safety of students, and for learning to take place effectively the students need to be safe in the laboratory, the ratings show the laboratories are not very safe. From observation the students were to bring their own lab coats, gloves were not provided when handling biological specimens. Gas masks to stop breathing-in of harmful gases were also not provided.

Laboratory has appropriate equipment for carrying out the experiments was rated 2.75 by students; 2.44 by lecturers and 4.00 by laboratory assistants. These ratings show that the Laboratory does not have appropriate equipment according to the students and the lecturers. Lack of appropriate equipment will hinder carrying out some experiments and this may contribute negatively to performance. Most used equipment are like; Autoclave, Freezers, Incubators, Analytical balance and PH Meters. These were rarely available but very important.

Weekly practical lessons were rated 2.50 by the students; 2.56 by the lecturers and 2.00 by The laboratory assistant. This means the students are not exposed to laboratory experiments every week. This could be due to lack of specimens in the laboratory or due to lack of sufficient apparatus, specimens and chemicals which was rated 2.33 by the students; 2.33 by the Lecturers and 3.00 by the laboratory assistants. Another reason as stated by the lecturers is the lack of a laboratory assistant. The technician will assist in; setting up experiments; sweeping the laboratory, arrangement of the laboratory for the practical classes, writing requisitions for needed items, taking stock of equipment and reagents, ensuring safety of students in the laboratory; and preparing reagents for practical classes. The foregoing findings are in agreement with Hofstein and Lunetta (2004) who did a study in USA, on, "The Laboratory in Science Education; Foundations for the Twenty-First Century They found that it is important to provide support for the teachers so that they teach in ways that will help students to enjoy the subject for continuity of science. They also found that laboratory activities have intuitive appeal as a way of allowing students to learn with understanding and at the same time engage in a process of constructing knowledge by "doing" science.

Contribution of student's entry grade on their performance in Science Laboratory Technology course.

The research question responded to was: What is the role of the students' entry grade on their performance in Science Laboratory Technology in Institutes of Technology in South Nyanza, Kenya?

To achieve this objective the student entry grade was analyzed in terms of their performance in the Kenya Certificate of Secondary Education KNEC examinations, which is the entry requirement for the Science Laboratory Technology course. The subjects considered were English, Mathematics, Biology, Chemistry and Physics. These are the core subjects in the Science Laboratory Technology course and English is the media of communication. Table 4.5 shows the findings.

Table 4.5 shows that most of the students enrolled for SLT scored low grades at four KNEC examinations which form the basis for admission to the Science Laboratory Technology course. This is a technical course involving a lot of mathematical calculations. Students with poor background in the sciences like physics and mathematics find it difficult to understand the concepts. Physics is also one of the core subjects in Science Laboratory Technology .Without physics at the basic level of education or secondary schools the students will not understand the concepts fast enough to be ready for end of college exams from the KNEC. It was observed that 37.5% of the student sample population did not take physics at form four level. The study also found that students admitted to the Science Laboratory Technology course performed better in biology as compared to all other science subjects as can be observed in Table 4.5.

Student performance in physics shows lack of basic knowledge in physics and this may explain why students perform poorly in Science Laboratory Technology course examinations. One of the subjects is physics techniques and without a background in physics or a poor background in physics the student is disadvantaged, because they will take time to understand the concepts and the reasoning behind the concepts. As the students learn the basic on the subjects, the examination time come, and they do examinations when not fully prepared. The foregoing findings about the students entry behavior are in agreement with previous studies by Woobman (2003),& Freeman et al (2007) who came to the conclusion that mathematics and physics background will influence academic performance and especially with quantitative problems .They also found that a higher GPA prior to enrolling in a course was associated with passing the course. Similarly Woobman (2003) concluded that past grades in chemistry and biology will influence the performance of the students in the said courses.

Table 4
Performance of students in KNEC per subject at the time of enrolement to the course

Subjects/Grades	B	B-	C+	C	C-	D+	D	D-	E	X
ENGLISH			12	17	20	22	25	20	4	
MATHEMATICS			0	12	13	23	24	23	25	
BIOLOGY	3	9	12	14	16	21	20	15	10	
CHEMISTRY			0	12	13	23	24	23	25	
PHYSICS			0	0	7	14	13	19	22	45

Key: X was the number of students in the sample who did not take the subject at form four level KNEC Examinations. In Physics they constitute (45)37.5% of the students' sample population.

Table 4.6 shows that the lecturers perceive that the students with a mean score of "C-" perform better than students with "D" plain or "D+ as shown by the "rated 4.72, while Students with a mean score of "D "plain perform poorly given a mean rating of 3.33

Lecturers also perceive that students who fail the science subjects at form four KNEC Examinations, cannot perform above average in the final examinations, this is shown by a mean rating of 3.22. The lecturers perceived that students who are self motivated get better grades as shown by the mean rating of 3.22.

The performance of students in English was below average rated at 1.94 as perceived by the lecturers. Poor performance in English language may result in poor communication between the lecturer and student because the student will not take instructions readily. This will affect performance of students. Not all the students who enrolled for the course had taken the three core science subjects at form four KNEC rated 3.33. This means the students may join the course with one or two sciences this causes a problem to the student, on matters of understanding the new subjects while in SLT course. Without a background in a subject it becomes a challenge when the student has to study the subject at a higher level.

The lecturer's perceptions on the performance of students in the sciences at form four levels were rated as Biology rated 1.67, Chemistry 1.17 Physics rated 1.11 and mathematics was rated 1.06 .These results indicate that the students' entry grade is low and this could contribute negatively to the students performance in Science Laboratory Technology. These findings are in agreement with those of Woobman (2003) who concluded that past grades in subjects will influence the performance of students in the next level of academic endeavor.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1   Introduction
This chapter presents summary conclusions and recommendations of the study. This study set out to examine the probable factors that contribute to the performance of students taking science laboratory course in Institutes of Technology in South Nyanza, Kenya. The objectives of the study were to; Find out the contribution of Science Laboratory facilities on the performance of students; To establish the contribution of student's entry grade on their performance in Science Laboratory Technology.

Summary
The findings of this study were summarized as follows;

Contribution of Science Laboratory Facilities on Performance of Students in Science Laboratory Technology Course in South Nyanza, Kenya

The study set out to find out the contribution of Science Laboratory facilities on performance of students in Science Laboratory Technology in Institutes of Technology in South Nyanza. The study found that the Science Laboratories of the institutes of technology had insufficient equipment and materials. The Laboratories lacked protective clothing for students and lecturers thus making user vulnerable to accidents. Weekly practical lessons are at times not conducted. The study also found that the ill-equipped science laboratory could have been responsible for the poor performance recorded in the institutes of technology.

Role of Students' Entry Grades on Students' Performance

The study set out to determine the role of students' entry grade on performance of students in SLT. The study revealed that for a student to be admitted to the course the only consideration was the mean grade or score of 'D' plain, nothing else was looked at. The study found that 95% of the enrolled students had poor entry grades in the science subjects; Chemistry, Biology, Physics and Mathematics. The study also found that 37.5% of sample population did not attempt Physics at KCSE, yet physics is one of the core subjects in Science Laboratory Technology. Generally if a student's background is poor because he stopped learning the subjects at form two especially physics then it becomes difficult to perform well in the course.

Conclusions

Based on the findings of this study, the following conclusions were made.

5.3.2 Contribution of Science Laboratory Facilities on Performance of Students in Science Laboratory Technology Course in South Nyanza, Kenya

Based on the findings the following conclusions were made about the laboratories, the laboratories were not well equipped and lacked some essential equipment making the laboratory not fulfill its functions for which it was set aside. The laboratory was not very safe as it lacked protective clothing and there was less frequency of practical classes.

Role of Student's Entry Grade on performance

Based on the findings that majority of the students scored a mean grade of 'D' in the KNEC examinations, and only 5% of the students scored a mean of 'C-'; the following conclusions were made; That the entry grade had an effect on performance. Students who had a mean grade of 'C'- performed better than students who had a mean grade of 'D' plain. The students who had a background in sciences especially physics also performed slightly better than those who did not have physics at entry point. The study also concluded that without a background in science, the students' performance in Science Laboratory Technology was affected negatively. In a nutshell minimum entry grade influences students' performance in the final examinations.

Recommendations

Based on the findings and the conclusions of the study the following recommendations were made

Contribution of Science Laboratory Facilities on Performance of Students in Science Laboratory Technology course in South Nyanza, Kenya

Based on the findings and conclusions, this study recommends that deliberate effort should be made to equip the laboratories with reagents, protective clothing and equipments so that the students can have sufficient practical aimed at enriching their skills before sitting for the final examinations.

The role of the Student's Entry Grade on Performance in SLT course

Based on the findings and conclusions the study recommends that;

i) The entry grades to the Science Laboratory Technology course at Certificate level should be reviewed upwards.
ii) There is need to lay more emphasis at enrollment on science subjects such as Mathematics, Physics, Chemistry and Biology which are key they subjects in the area

Suggestion for Further Research

Comparative study may be carried out to establish the contribution of better laboratories versus poorly equipped laboratories on performance of students Science Laboratory Technology course in Institutes of Technology.

Comparative study may be carried out to establish the performance of students with better previous GPA, versus performance of students with lower previous GPA

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