THE EFFECTS OF PHYSICS PRACTICAL ON HIGH SCHOOL STUDENTS' ACHIEVEMENTS IN PHYSICS IN RUBAGA DIVISION, KAMPALA CENTRAL UGANDA.

BY

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DECLARATION

I, Kabanda Yunusu, do hereby declare that this is my original work that has never been submitted in before for any academic award to any university.

Sign ..... date 04/10/2018

KABANDA YUNUSU

APPROVAL

This is to certify that this research report entitled the "effects of physics practical on High school students' achievements in physics in Rubaga Division, Kampala Central Uganda" has been written under the guidance of my supervisor.

Sign .....Ramiyan..... date ...04/10/2018.....

Supervisor.

ABSTRACT

In Ugandan secondary education schools, physics is compulsory to all students from form one to form four (Ordinary Level) but optional at the advanced level where students choose subjects to form combinations that will determine which courses they will take at the higher levels. Majority of students most especially female lack motivation for most activities related to the subject.

The conventional teaching method has often been reported as the main cause to this problem. This study investigated whether structured practical work can aid the process of learning the subject. Specifically, the study sought using intensive practical activities and those taught using conventional teaching methods. The findings were analyzed overall and gender wise. It involved two groups from sampled average performing high schools in Rubaga division, Kampala central Uganda. Two groups were formed i.e. the experimental group which was taught by intensive practical activities and control group which has taught theoretically. Both pre-test and post-tests were done on them. The study period covered term two from June to August (three months). The end of term one physics examination scores formed the pre-test. The cumulated results on the chosen topics at the mid of term two formed the post-test results for both groups. The instruments used to collect the data were end of term one exams, performance tests on the chosen topics, questionnaires and interviews. The performance on the pre-test result was comparable for both experimental and control groups. The results of the post-test were analyzed using the Z-test and analysis of variance (ANOVA). Experimental group recorded better performance than the control group. The study helped to determine the importance of experimentation in physics instruction. The performance of the male students was better than that of the female but still, there was an improvement in the performance for female students after experimentation and their interest in physics was also increased. The findings are formed on the basis of dynamic and creative instructional strategies since good learners' intelligence and skills can be expressed if better instructional methods are put in place

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CHAPTER ONE
INTRODUCTION

1.2 The background of the problem

Uganda follows a 7-4-2-3+ education system which includes seven years of primary education, four years of ordinary secondary education, two years of advanced level of secondary education which are all concluded by Primary Leaving Examinations (PLE), Uganda Certificate of Education (UCE) and Uganda Advanced Certificate of Education (UACE) after which students are expected to join various tertiary institutions of education for specialization in various professions. Among the institutions, we have universities, technical and vocational institutions, health education colleges, Teacher education colleges and business education colleges.

Scientific knowledge provides practical assistance in helping people make decisions and choices concerning life that best suits them (Hirschfield, 2012). The ordinary level secondary education requires all students to study seven compulsory subjects namely; Physics, Chemistry, Biology, Mathematics, Geography, English and History and at least two to three other optional subjects such as Computer studies, accounts, commerce, languages and many others. Making science subjects compulsory in Uganda is intended to promote Science and Technological education in secondary schools to be able to meet future science technological challenges in the dynamic world.

Physics one of the basic sciences generates fundamental technological advances that will continue to drive the economic engines of the world, (Amunga et al 2011, Nashon 1989). The subject also contributes to the development of technological infrastructure, provides trained personnel needed to take advantage of scientific advances and discoveries as well (Kun et al.,2012, Freeman,2012).

In Uganda, most Physics lessons are conducted by the traditional teacher-centered lecture (chalk and talk) approach in which emphasis is put on transfer of knowledge and memorization. In this approach, the teacher talks most of the time as students copy notes mainly for the purpose of passing exams. This has not been found to be effective for science instruction since performance in the subject has continued to be poor and low (Toplis et al 2012). This theoretical method of

transferring knowledge without handling content practically produces very little change in the students' understanding of how physics world works (Capains et al., 2010, Garmin et al., 2003).

With practical work, students are provided with opportunities for understanding and manipulating the complex and abstract nature of science in inducing effective conceptual change (Daramola,1987). For example, in electrical physics practical, learners after the lesson should be able to connect different circuits in reality, carryout own electrical projects as set objectives of the study.

The ministry of Education and Sports states that over the years the government of Uganda has made interventions to see that the performance in science and mathematics teachers, recruiting more science teachers, establishing teacher resource centers, introducing computer science and ICT skills to both teachers and students

This study intends to investigate how practical work can help students to learn, get interested and more motivated in physics at secondary schools. With that, Uganda will be able to produce students who can make own decisions, manipulate the complex and abstract nature of science in inducing effective conceptual change (Daramola,1987).

1.2 Problem statement

Science teachers are dwelling more on theoretical instruction while practical are given less attention which has led to low entries in sciences and this could have a negative impact on Uganda's plans to advance in science and technology (Janet Museveni, Minister of Education, 2018). Physics is one of the science subjects that students persistently fail and this is due to lack of interest and poor motivation to study the subject. In order to improve the country's technological standing in creation of social, technological and industrial transformation, the problem has to be solved through effective teaching of physics practical in secondary school because it's the central instructional technique that can influence the students' performance in Physics.

1.3 Aims of the study

To investigate the effects of physics practical on High School students' achievement in Physics in Rubaga Division, Kampala Central Uganda.

1.4 Specific objectives

i. To examine the overall difference in academic achievement by students taught using intensive practical activities compared to those taught using conventional teaching methods when learning physics.
ii. To determine the effects of physics practical on the performance of students based on gender.
iii. To expose the impact of physics practical on High School students' achievements in Physics in Rubaga Division.

1.5 Research questions

i. What is the overall difference in academic achievement by students taught using intensive practical activities compared to those taught using conventional teaching methods when learning physics?
ii. What are the effects of physics practical on the performance of students basing on gender?
iii. What are the effects of Physics practical on High School students' achievements in Physics in Rubaga Division, Kampala Central Uganda?

1.6 Significance of the study

The world moves about science. The better the quality of education in a country in terms of science, the more technological development society will achieve. It helps in the creation of jobs, fight against poverty hence reducing crime rates.

The study focuses on exposing the effects of physics practical on High School students' achievements in Physics. It will also help curriculum planners and implementers since it can guide them in identifying which areas to put more emphasis in order to make learners more motivated, interested and active for better performance in sciences most especially physics subjects.

Several research works have been reported and proposed recommendations, however the situation is getting even worse over the years, therefore, the most feasible and sustainable solution must be found.

1.7 Scope of the study

The study is aimed at exposing the effects of Physics practical on High School students' achievements in Rubaga Division Kampala Central Uganda. It examined various factors which includes availability of well-equipped laboratories in the schools, frequency of practical science lessons in a well- equipped laboratory, availability of well trained and qualified laboratory technicians. This research is limited to three months, from period of June 2018 to August 2018.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

In this chapter, an attempt is made to review the literature on physics as a science subjects, literature on effective teaching of physics practical on students' performance and interest in physics at both ordinary and advanced levels. Focus on the literature is on students' motivation, attitude and their level of achievement and availability of physics practical necessities as related to the students' level of performance in science subjects.

2.2. Conceptual Definitions

2.2.1 Science

This word comes from the Latin word sciatica which means knowledge. It's a systematic enterprise that builds and organizes knowledge in form of testable explanations and predictions in modern usage. It refers to a way of pursuing knowledge itself. It also refers to a body of knowledge itself of the type that can be rationally explained and reliably applied.

According to (Butis, DP 1977), a practitioner of science is known as a scientist. New pew research center surveys of citizens and a representative sample of scientists connected to the American association for the advancement of science (AAAS) show powerful cross currents that both recognize the achievements of scientists and expose stark fissures between scientists and citizens on a range of science, engineering and technology issues.

This report highlights these major findings: science holds an esteemed place among citizens and professionals. Americans recognize the accomplishments of scientists in key fields and despite considerable dispute about the role of government in other realms, there is broad public support for government investment in scientific research (by Cary F & Lee R, 2015) science has made life easier for most people and a majority is positive about science's impact on the quality of health care, food and environment.

According to Carl Sagan (1951), science is a way of thinking much more than it is a body of knowledge. People under look science yet it's the most precious thing we have.

2.2.2 Physics practical

The branch of science concerned with the nature and properties of matter and energy is physics. The subject matter of this subject includes: mechanics, magnetism, heat, light, radiation, sound, electricity, magnetism and the structure of atoms (dictionary).

Experimental physics or practical physics is a category of discipline and sub disciplines in the field of physics that are concerned with the observation of physical phenomena and experiments. Physics is a practical science, practical activities are not just motivational and fun they can also sharpen student's powers of observation, stimulate questions and help develop new understanding and vocabulary. Good quality appropriate physics experiments and investigations are the key to enhanced learning and clarification and consolidation of theory.

2.2.3 High school students

These are students under the secondary education system. Uganda's secondary education system follows the education system of its former colonial masters, Britain. It's divided into the ordinary level and advanced level. Lower secondary consists of which students undertake ordinary level exams (O-level) in at least eight subjects with a maximum of ten subjects. Upper secondary consists of two years of schooling at the end of which students sit advanced –level exams (A-level) in at least three subjects.

A student is a person who is learning something. Students can be children, teenagers or adults who are going to school but the study puts more emphasis on high school students.

2.2.4 Achievement

Achievement is something done with effort, skill or courage. In order for students to perform, apply and achieve in physics, hard work is emphasized most especially through effective teaching of physics practical. A dream becomes goal when action is taken towards its achievement.

2.2.5 Traditional teaching approach

It's defined as teaching entirely by depending on text books where the teacher teaches the context and students just sit, read, do assignments and take notes (Ates & EryilMaz, 2011). Traditional classes look like a one person show where usually controlled by direct and one-party

instruction (Abida & Muhammed, 2012). This has got an effect of producing students who cannot solve own problems since they only listen and write without manipulating things. At the same time, students are just unresponsively receiving the information from the teachers (Liu, 2014) and without questioning the teacher (Sofflett, 1999). As a result, students could not form ideas and hard to involve themselves in discovery with building models (JesKova & Onder Ova, 20000).

2.2.6 Attitudes

They are the ability to handle with and manage the feelings, and it plays a role in leading human's behavior during the learning process (Kaya & Boyuk, 2011). Practical work should be well organized and planned either to develop positive attitudes (Musasia et al., 2012). Students who gain a positive attitude towards the subjects are more likely to be found in students who used practical work in their learning (Myers & Fows, 1992). When students develop a positive attitude towards physics, they are motivated to learn hence the two work hand in hand.

2.3. The impact of effective teaching of physics practical on high school students' achievement in physics

A background in science enables students to quickly learn and understand how things around them work. Learning experience in which students interact with materials or with secondary source of data to observe and understand the natural world is what practical work means according to (Lunetta, Hofstein & Clough,2007). Students will understand the science concept by conducting experiments in the laboratory (Brunner, 1990). Practical work makes an exceptional learning surrounding that help students to construct their knowledge, enhance logical, inquiry and psychomotor skills (Mashita, Norita & Zurida, 2009). When students learn by using all their senses together with manipulating and doing things by themselves, they develop psychomotor skills and hence become self-reliant. Moreover, practical work offers an interactive experience to the students where they can broaden the scope of constructivist learning (Umar, Ubramanian & Ukherjee, 2005). It's believed that by carrying out practical work, students' knowledge can be expanded to understand the real world. Teaching of objectives can be achieved easily by doing practical work especially in teaching physics (El- rabadi, 2013). For example if you want your students to be able to explain how pressure in liquids depends on depth by the end of the lesson, teach them practically by putting three small holes in a container at

different levels from the bottom but in a straight line then pour water in the container for them to observe for sure 70% of the class will be able to explain that in their own words. This is an indication of the impact of effective teaching of physics practical on the students' academic achievement in physics.

2.4. The effects of physics practical on performance of students based on gender.

Since 2006, Uganda National Examination Board has reported a general poor performance of science subjects, but worse by female students. During the release of the 2016 UCE results for example, Dan Odong, the executive secretary UNEB, noted that "the percentage pass levels for all science subjects remain low, with almost 55 percent of the candidates unable to exhibit the minimum required competency....". And where more girls are enrolling at O-level, they still perform poorly in comparison to their male counterparts, he further noted.

Last year, female candidates performed marginally better at O-level in English where as their male counterparts performed better in all the other large entry subjects. Males did better in Christian Religious Religion (CRE), Islamic Religious Education (IRE), History, Geography, Mathematics, Agriculture, Physics, Chemistry, Biology, Art, and commerce, according to reports by UNEB. As would be expected, this culminates into meagre numbers of female students that offer sciences at A-level and consequently at university.

Physics is one of the science subjects that students persistently fail in Uganda at both ordinary and advanced levels but more girls than boys perform poorly in the subjects. As a result, few girls take combinations with physics at advanced level hence fail to take courses to do with physics at university level.

With practical physics, this problem can be solved due to the fact that laboratory experience promotes manipulative skills, cognitive abilities like critical thinking, problem solving etc. it enhances positive attitude towards science such as curiosity, interests, risk taking etc. It also helps the students most especially female to better understand physics. According to Miller, R (2004), practical work is essential for giving students a 'feel' for the problematic of measurement, and an appreciation of the ever presence of uncertainty (or measurement error).Practical work also helps the students to understand the content, get interested and as result pass physics most especially for the female students who fail to understand the physics concepts

theoretically. As a result, the issue of having few girls taking up physics courses at the university level will be solved.

CHAPTER THREE
RESEARCH METHODOLOGY

3.0 Introduction

These are different methods the researcher used to collect and analyze data that helped to solve the research problem. Research methodology defines measures on how to progress, how to proceed and how to make the research successful. It described the population of the study and the various instruments of data collection that were employed in conducting the research. The main sources of data that the researcher used to gather information. Were primary and secondary sources of data.

3.1 Research design

The study conducted through quasi-experimental design having pre-test, post-test nonequivalent group. After the pre-test, the experimental group was taught physics by intensive practical activities while the control group was taught by conventional teaching methods. The design was chosen because the mode of assigning participants involved nonequivalent whole class groups in that the class sizes were not equivalent.

3.2 Study population

The study population comprised of 84 participants purposively selected from the management of selected secondary schools, Namungoona High school and Chwa II Memorial College in Rubaga Division sub county, Kampala District Uganda.

3.3. Sample size

The sample size of the research study was determined according to Slovene's formula of sample determination. Under this a target population of 84 was reduced to a sample size of 69 respondents respectively as stated by Slovene's (1978). The Slovene's formula was used to determine the minimum sample size.

From $n = \frac{N}{1+N(e)^2}$

$= \frac{84}{1+84(0.05)^2}$

n =69

Were n = *number of sample*

N = *Total population*

e = *Level of significance (0.05)*

Two schools were selected and used in the study. Each school had two groups, experimental and control groups. This made a total of 69 students as shown in the table below.

Table 1 sample size

School	Number of students per group		Total
	Experimental	Control	
Chwa II memorial collage	15	17	32
Namungoona High School	18	19	37
Total	33	36	69

Out of 69 respondents, 33 formed the experimental group and 36 formed the control group.

3.4 Sampling techniques and procedures

The participants in the study were selected using purposive sampling method and simple random sampling method. Purposive sampling was the best because it involved selecting participants who possessed the required characteristics and qualities according to the researcher's interests (Gay, 2006). Simple random sampling made it possible for every member to have an equal chance of being selected

3.5. Data collection sources

The researcher used both primary and secondary data sources.

3.5.1 Primary data

Primary data is information collected specifically for the purpose of your research. It included questionnaires, interview guide to get opinions, view and suggestions of the respondents, pre-test inform of examination to determine the entry performance for both groups, class interaction and discussion led by the teacher after every practical and conventional teaching. Though being advantage of being specially tailored to the research needs.

3.5.2 Secondary data

Secondary data sources is kind of information that the research study used which was already published in regard to the study topic. It included all written, audio and visual information that was readily available on the study. This included information from text books, internet, newspapers, reports, brochures and news prints.

3.6 Data collection methods

The researcher used pre-test, class interactions and discussions, performance tests, questionnaires and interviews as some of the data collection methods.

3.7 Research collection instruments

3.7.1 End of term one Exams

End of term one examination formed the pre-test that was taken by both the experimental and control groups. This was a standard examination which was administered to all the subjects at the end of term one for form three. It helped in determining the entry performance for both groups. The pre-test covered whole of the form one, form two and term one of form three physics syllabus. The topics involved included introduction to physics, measurements, force, pressure, particular nature of matter and thermal expansion. The concepts in these topics are best learnt through practical work.

3.7.2 Performance test

The experimental group was taught by intensive practical activities after every practical, there was a class interaction and discussion led by the teacher (Researcher). Data collection data manipulation and data analysis as experimental procedure were applied before writing an experimental report by the respondents. The control group was taught by the conventional

teaching methods. This majorly included theoretical lecture without much of practical activities. Demonstrations by the teachers were mostly used to show the aspects of the practical in the control group. Performance test on the chosen topics was then administered at the end of the study. The total score was evaluated from accumulation of specific tests generated from selected three topics. The three topics included pressure, density & force administered at the end of every selected topic. The same tests were given to all students in the selected study schools.

3.7.3 Questionnaire

These consisted of questions that were set in relation to the research objectives so as to get real answers to the set research questions. They were used because they are easy and convenient to use in collection of data from busy respondents.

Before practical work was implemented, the pre-survey questionnaire was used to measure student's interests towards learning physics for both experimental and control groups, to determine the challenges faced by those students during the teaching and learning of physics practical. There were six statements with a combination of positive and negative statements of interest towards learning physics.

The 5-point Likert scale was coded as 1,2,3,4 and 5 according to the responses of strongly disagree, disagree, neutral, agree and strongly agree. Example statements are given in table 2 below.

Table 2: example statements in the questionnaire

No	Statements
1	I don't understand what our teachers during physics practical
2	Some apparatus mentioned and I have never seen them
3	We normally have one practical lesson in physics per term
4	I hate to learn physics
5	I understand and memorize much of the content after practical
6	I enjoy studying from our laboratory

3.7.4 Interviews

For the purpose of obtaining deep-rooted and concise data, the researcher used interviews.

These were conducted in a period of 25 minutes per selected respondent the researcher based on an interview guide. The interview responses were transcribed, and table 3 showed the open ended question asked in experimental and control group.

Table 3: Open ended question

Group	Interview question
Experimental group	How and to what extents has the practical work influenced your interest in physics? What is your feeling?
Control group	How and to what extent has the traditional methods influenced your interest in physics? What's your feeling?

3.8 Validity and reliability

3.8.1 Validity

The researcher consulted and discussed validity of instruments with colleagues and other research experts to limit errors as much as possible.

Out of the total number of items of the questionnaire, the questions that were considered were very relevant and quite relevant were rated. The content validity indices for the questionnaire indicate 0.7 to confirm them valid since it was 0.74790 which meant that the instrument was valid.

Due to how students' English proficiency, the researcher translated all the questions into simple English language and verified by a qualified English teacher.

3.8.2 Reliability

It was the degree to which the instrument consistently measured what it was supposed to measure. This method was picked on a single pre-test group and shows the degree to which the items in the questionnaire are inter-correlated. That is a respondent who would have completed the questionnaire would be politely asked to complete another fresh questionnaire (re test) after

two weeks to prove the answers earlier filled for consistence or how close they relate (Amin 2005). Internal consistence of the items in the questionnaire was established using Cornbach's formulae to compute the alpha co-efficiency of reliability. To get the reliability, the data was entered in the computer and analyzed using the statistical package for social scientists' (SPSS), which are useful for providing a Cronbach co-efficient Alpha test for testing reliability.

3.9 Data analysis

Data collected was edited and coded. It was summarized and analyzed so as to make sense of the data to ensure completeness and consistence.

Quantitative data was analyzed inform of mean score,z-test and Anova tables. Qualitative data was analyzed through generalized summary of findings from observation and conclusion in the process of data collection

CHAPTER FOUR

PRESENTATION, DATA ANALYSIS AND DISCUSSION OF FINDINGS

4.1.Introduction

In this chapter, the presentation of data, data analysis, tables and figures were presented and interpretation made in accordance with the research objectives of the study.

The chapter was divided into 5 sections namely; difference in mean scores between experimental and control groups, comparison of post-test results, effectiveness of intensive practical activities in teaching and learning of physics over conventional methods. Emerging themes identified from students' interview in control group and emerging themes identified from students' interview in the experimental group.

4.1 Comparisons of pre-test and post-test results.

Analysis of the pre-test results showed that the difference in mean scores between experimental and control groups was decimal (0.9). The mean score of the experimental group was slightly above that of the control group. The post-test results showed that experimental group performed better than their counterpart control group by having a higher mean gain of 10.5 compared to 1.5 respectively. Table 4 below indicates the results of experimental and control groups on the pre-test and post-tests.

Table 4. Overall results for experimental and control groups on pre-test and post-test.

Group	Total number of students	Pre-test mean	Post-test mean	Mean gain
Experimental	33	17.3	27.8	10.5
Control	36	16.4	17.9	1.5

4.1.1 Comparison of post-test results

The post test results for both experimental and control groups were compiled and expressed in terms of mean scores and standard deviation. The Z-test was used to determine significance of difference of the means from the groups.

Table 5 shows the post-test results in terms of means, standard deviations and z-test.

Table 5: Comparison of post test results for experimental group and control group

GROUP	Total number of students	Mean score	Standard deviation	z-test
Experimental	33	27.8	6.3	
Control	36	17.9	7.2	6.09

α=0.05, $|z| > 1.645$

From table 5, the mean score for experimental group was 27.8. The mean score for control was 17.9. The z-test value was 6.09, this was greater than the tabulated z-value (1.645) which indicates that the control group and experimental group performance were significantly different from each other. The standard deviation for the experimental group was 6.3 and that of the control group was 7.2. This indicates that the experimental group had converged more in their understanding of the topics compared to the control group who still had a large spread in their understanding.

4.3 Effectiveness of intensive practical activities in teaching and learning physics over conventional methods

To provide a clear picture about effectiveness of intensive practical activities in teaching and learning physics over conventional methods, a one-way ANOVA was performed on the post test results. Application of the ANOVA test provided the results in table 6 below.

Table 6: Analysis of variance of the post test scores on performance

	Sum of squares	Df	Mean square	F
Between groups	1687.56	1	1687.56	34.3
Within groups	3294.92	67	49.2	
Total	4982.48	68		

Significant at $p<0.05$, critical value 3.13.

The result in table 6 indicate that the F-value of 34.3 exceeds the critical value of 3.13 at 5% significance level which shows that both experimental and control groups were statistically

different at post-test. This difference was evident enough to show that the teaching and learning of physics is more effective using intensive practical activities than conventional teaching methods.

4.4.1 Emerging themes identified from students' interview in control group

For example, qualitative data, two emerging themes were identified from students' interview in control group which were; lack of interest in learning physics and lack of understanding of physics as coded as E_1 and E_2 respectively as shown in table 7. Below are few direct quotes from students' interview.

Table 7:Emerging theme with code in control group

Code	Emerging theme
E_1	Lack of interest
E_2	Lack of understanding in physics

Table 8: Direct quotes from students' interview

Student		Quote
Male		Traditional teaching method did not affect my interest E_1
Male		In my opinion, this traditional methods did not affect my interest E_1because teacher only teach and students listen I could not even understand anything E_2
Female		The method did not affect my interest E_1 and 1 even felt bored
Male		Teacher's teaching methods made me bored and sleepy due to lack of interest E_1
Female		The method did not affect my interest E_1 and 1 even felt bored
Male		Teacher's teaching methods made me bored and sleepy due to lack of interest E_1
female		I was not satisfied with teacher's teaching methods it was boring. Therefore am not interested in this learning E_1

4.4.2 Emerging themes identified from student' interview in experimental group

6 emerging themes were also identified from students' interview in experimental group which were; gain more interest, understanding better in physics, gain new experience, getting excited, physics made easy and collaboration with friends.

Table 9: Emerging theme with code in experimental group

Code	Emerging theme
C_1	Gain more interest
C_2	Understanding better in physics
C_3	Gain new experience

C_4	Getting excited
C_5	Physics made easy
C_6	Collaboration with friends

Table 10: Direct quotes from students' interview for the experimental group.

Student		Quote
Male		With practical's I understand more C_1 I learnt new things C_3 I hope we are taught only by practical for physics
Male		Am now interested in learning physics C_1 physics is fun, I really enjoyed C_4
Male		After conducting experiments, my interest towards physics increasing C_1because of my understanding of physics C_2
Male		I gained interest in the subject C_1 gained new experience C_3. I can interact with classmates and other friends C_6
Female		I felt very happy C_4 doing experiments, I am interested in this C_1. it provided a good experience where I can collaborate with friends
Female		This physics practical activity attracted my interest towards physics subject C_1 and has given me many skills in physics learning C_3

Students in control group gave negative views during the interview on their perception towards traditional teaching method. Students in experimental group were able to give positive views during the interview on their perception towards the implementation of practical work.

CHAPTER FIVE
DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

In this chapter, discussion of findings, conclusion and recommendations of the study are presented. They are all reflected on the effects of physics practical on high school students' achievements.

5.2. Discussion of the findings

The determination to meet physics objectives requirements of practical task loads the students to take charge of the learning situation and develop an insight in the requirements of the task involved. These findings are similar to previous studies which have been reported by Kibirige and Tsmogo (2013) which stated that laboratory investigation would gradually develop students' behaviors such as positive attitudes, motivation and interest towards learning physics. They reported students who went through practical work would develop a positive attitude whereas those taught in traditional teaching methods showed negative attitudes in learning science.

Besides, practical work involved tasks that attract students' excitement and raised interests unlike traditional teaching method. Students who underwent practical work were excited to see the phenomenon, handle with the apparatus enjoyed in the science lesson and eventually will build up students' desire to learn science in future. However, the traditional teaching approach could not make students enjoy physical science and their attitude was negative towards the subject.

Musasia et al., (2012) also found that practical work can develop students' interest towards learning physics and build up students' motivation in learning as well. Students tend to learn effectively in activity-based lessons where they can touch and use the apparatus to increase their understanding towards physics (Kibirige & Tsamago, (2013); Musasia et al., (2012) Uwaifo 2012) found a statistically significant relationship between theory and practical scores on all science subjects. practical work makes the students take science learning seriously as demonstrated by Amunga et al., (2011). Lunetta et al. (2007) suggested that engaging in science

practical work provides simulation experiences which situate students' learning in states of inquiry which needs high mental and physical engagement.

In terms of gender, practical activities have been found to benefit girls tremendously (Amadalo et al.,2012). The performance in physics achievement tests for the girls improve when practical work was incorporated in teaching retinue of the girls. Benson & Nkiruka, (2013) have also found similar results when working with girls in Nigerian girls' secondary school. Both qualitative and quantitative results and findings in the study proved that practical work gives positive effects on students' interest towards learning physics.

5.3. Conclusion

The results and findings revealed that practical work can serve as a useful platform to develop positive effect on students' interests toward learning physics. It improves physics academic performance of the learners. This can easily be achieved if the learners are fully involved in the practical learning process. This was confirmed from post-test results in both experimental and control groups. At the beginning of the study, respondents from both groups scored low grades. By the end of the study, experimental group improved more than the control group and boys performed better than girls both in two tests. But this does not mean that the girls' performance wasn't improved, it was improved by more than a half.

5.4. Recommendation

Teachers should conduct practical work atleast twice a week to develop students' interests towards physics

The ministry of education and sports should also give training time to teachers on how to conduct experiments according to the module. with this, teachers' confidence to conduct experiment will be enhanced.

The study to be repeated based on expanded sample of schools in the country, regional and national secondary schools.

A similar study should be carried out in other science subjects in the secondary schools.

With technological advancement similar research to be carried out by involving learners in physics learning practical through electronic work bench.

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APPENDICES

Appendix A: Questionnaire for respondents

I am Kabanda Yunusu final year student of Bachelor of Science with education of Kampala International University carry out a study on the title, the effects of physics practical on high school students' achievement in physics in Rubaga Division, Kampala Central Uganda. Your feedback is very important as your inputs will be used for academic purposes only. I greatly appreciate if you could take a few minutes to provide me with information. Your response will be kept confidential and it will not be divulged to any person or institution outside this corporation.

Thanks in advance.

SECTION A GENERAL INFORMATION

1. Gender

   Male ☐ Female ☐

2. Age ☐

Direction: please respond to the options and kindly be guided with the scoring system below

Rating	Score response	Description
1	Strongly agree	(you agree with no doubt)
2	Agree	(you agree with some doubt)
3	Not sure	(you doubt)
4	Disagree	(you disagree with some doubts)
5	Strongly disagree	(you disagree with no doubt at all)

SECTION B: EFFECTS OF PHYSICS PRACTICALS ON HIGH SCHOOL STUDENTS' ACHIEVEMENTS IN PHYSICS.

Please evaluate the statement by ticking in the box with the number that best suits you.

No	Scale	1	2	3	4	5
1	I don't understand what our teacher teaches during physics practical					
2	Some apparatus are just talked of and I have never seen them					
3	We normally have one practical lesson in physics per term					
4	I hate to learn physics					
5	I understand and memorize much of the content after practical					
6	I enjoy studying from our laboratory					

APPENDIX B: Structured interview questions for respondents

Research question: What are the effects of physics practical on high school students' achievements in physics in Rubaga Division, Kampala, and Central Uganda?

Interview questions for the control group

- Please help me better understand what physics is?
- Did the traditional teaching method affect your interest in learning physics?
- Did the traditional teaching method help you understand the content?

Interview questions for the experimental group.

- Please help me better understand what physics is?
- Did the conventional practical activities help you gain more interest and experience?
- Did the conventional practical activities help you in understanding physics better?
- Did you get excited?

APPENDIX C: Performance Tests

TEST 1 2018

TOPIC: DENSITY

Name of School.....

Name of Student.....

Time allowed 30 minutes.

Question 1.

a. What is density?

.....

.....

b. Describe an experiment with aid of diagrams to measure the density of:

i. A regular bock of wood.

.....

.....

.....

.....

.....

.....

ii. An irregular stone.

.....

.....

.....

.....

.....

.....

c. What is the density of a cube of volume 20 cm3 and mass 5 g in

i. g/cm3

ii. kg/m3

.....

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.....

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.....

TEST 2: 2018

TOPIC: FORCE

Name of school:.....

Name of student:.....

Time allowed: 30 minutes

Question 1.

a. What is a force?

.....

.....

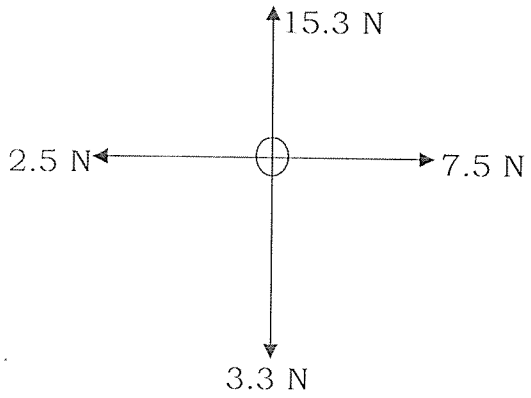
b. State any three examples of forces

.....

.....

.....

c. Four forces act on a body of mass 260 g as shown in the figure below?



Calculate the

i. Magnitude of the resultant force?

.....

.....

.....

.....

ii. Acceleration of the doll?

.....

.....

.....

.....

d. With the aid of a well labeled diagram, describe an experiment to measure the co-efficient of frictional force of a wooden block?