

A STUDY ON KNOWLEDGE AND ACHIEVEMENT IN PHYSICS PRACTICAL AMONG HIGHER SECONDARY STUDENTS

^[1]Selvakumar S

^[1]M.phil Scholar ,Institute of Advanced study in Education (A) Chennai.

^[1]selvahindi@gmail.com

Abstract: *The purpose of this research study is to assess the knowledge and achievement in Physics practical among higher secondary school students in Villupuram and Thiruvallur districts of Tamil Nadu State. Normative survey method was employed to collect the data from 270 students studying in higher secondary by adapting simple random sampling techniques. A self-constructed tool on knowledge in Physics practical Inventory was used in this research study. The objectives of the study aimed to find out the relationship between the knowledge and achievement in Physics practical and to find out the significant difference between knowledge in Physics practical. The major findings of the research study indicate that there exists a significant relationship between knowledge and achievement in Physics practical of higher secondary school students. Further it has been found that there exists significant difference between gender, medium and locality.*

Keywords: *Knowledge, Achievement and Physics practical*

I. INTRODUCTION

Physics has been as the most utilized basic science subjects in most technology and technology-related professions. Hence the gigantic role that Physics plays in the socio-economic development of a nation must not be undermined. The word science comes from a Latin word “scientia” which means ‘to know’. Science is nothing but the knowledge gained through the systematic observations and experiments. Scientific methods include the systematic observations, reasoning, modeling and theoretical prediction. Science has many disciplines, physics being one of them. The word physics has its origin in a Greek word meaning ‘nature’. Physics is the most basic science, which deals with the study of nature and natural phenomena. Understanding science begins with understanding physics. With every passing day, physics has brought to us deeper levels of understanding of nature. Physics is an empirical study. Everything we know about physical world and about the principles that govern its behaviour has been learned through observations of the phenomena of nature. The ultimate test of any physical theory is its agreement with observations and measurements of physical phenomena. Thus physics is inherently a science of measurement. Boyo (2010) viewed 2 Physics as a course of study which is perceived to be experimental and that almost all aspect of life science, both living and non-living has something to do with Physics, ranging from Engineering to Mathematics, Biology and Chemistry. The understanding of practical Physics may help students to learn Physics concepts. Such is necessary as modern society requires some understanding of the nature of scientific knowledge in order to evaluate claims that may affect their everyday decisions (for example, about energy resources and environment) and to reach informed views on public policy matters (for example, methods of generating electricity). Practical knowledge, according to James (2000), refers to that knowledge that is connected with reality rather than ideas and theories. It is the knowledge acquired through the practical approach to carrying out scientific investigation and teaching. In the words of Mankilik (2011), Technology is the application of the doctrines in physics for practical purposes. The invention of steam engine had a great impact on human civilization. Till 1933, Rutherford did not believe that energy could be tapped from atoms. But in 1938, Hann and Meitner discovered neutron-induced fission reaction of uranium. This is the basis of nuclear weapons and nuclear reactors. The contribution of physics in the development of alternative resources of energy is significant. We are consuming the fossil fuels at such a very fast rate that there is an urgent need to discover new sources of energy which are cheap. Production of electricity from solar energy and geothermal energy is a reality now, but we have a long way to go. Another example of physics giving rise to technology is the integrated chip, popularly called as IC. The development of newer ICs and faster processors made the computer industry to grow leaps and bounds in the last two decades. Computers have become affordable now due to improved production techniques 15 and low production costs. The legitimate purpose of technology is to serve people. Our society is becoming more and more science-oriented. We can become better members of society if we develop an understanding of the basic laws of physics.

2. Need and significance of the study

Pupils studying Physics practical should have basic knowledge in Physics and Physics practical. Practical knowledge is useful for their achievement in Physics practical. Hence knowledge in Physics practical was chosen as the independent variable and achievement in Physics practical as the dependent variable. Since Physics practical are considered to be difficult by students, it was chosen as the subject area of the study. The influence of sub variables gender, medium, locality of the study on knowledge in Physics practical was investigated by the researcher. Hence the present investigation was carried out. The investigator chosen samples from XI and XII standard as knowledge in Physics practical will help them to get good marks in their practical examination.

3. Importance for the study

It is very important to know the students knowledge in Physics practical to eliminate their fear and difficulties in Physics practical. It will improve their achievement in Physics practical at higher secondary level. Teachers must assess the higher secondary student's knowledge, attitude and difficulty in Physics practical to make it interesting for them doing Physics practical. They will know their difficulties in doing Physics practical. It will help them to mastery the concepts learnt through Physics practical. They will develop positive attitude towards Physics subject and Physics practical. They will know their difficulties in doing Physics practical and will try to overcome them. Teacher must take effort in understanding the knowledge level of higher secondary students. They must clarify their doubts; conceptual learning should be promoted in theory classes. At practical sessions, conceptual knowledge and practical experience must be integrated. So that the students will improve in their achievement in Physics practical, Higher secondary level is a crucial period where practical marks are given due importance by the teachers and students. So the study was undertaken for the benefit of the Physics teachers and students in the current scenario.

4. Statement of the problem

The present study is titled as "A Study on knowledge and achievement in Physics practical among higher secondary students"

5. Objectives of the present study

The following major objectives have been set in the present study.

- To study the relationship between knowledge and achievement in Physics practical among higher secondary school students.
- To find out the significant difference between girls and boys students in their knowledge in Physics practical among higher secondary school students..
- To find out the significant difference between Tamil and English medium students in their knowledge in Physics practical among higher secondary school students.
- To find out the significant difference between Rural and Urban area students in their knowledge in Physics practical among higher secondary school students..

6. Hypotheses of the study

H: 1. There is no significant relationship between knowledge and achievement in Physics practical among higher secondary school students.

H: 2. There is no significant difference between boys and girls among higher secondary school students in their knowledge in Physics practical.

H: 3. There is no significant difference between Tamil and English Medium among higher secondary school students in their knowledge in Physics practical.

H: 4. There is no significant difference between Rural and Urban area among higher secondary school students in their knowledge in Physics practical.

7. Methodology of the study

The design of the present study is (1x1) with one independent variable and one dependent variable. This study is by normative survey as the process. In this present study, the facts involved are in the ratio of 1:1.

8. Research tools

The tool an instrument which is used to collect the data from the sample in the study, to assess the knowledge in Physics practical among higher secondary school students has been used with the four dimensions. The knowledge in Physics practical questionnaire was developed by the investigator. It consists of 4 dimensions and 50 statements. In this tool 4 point scale are used namely always, often, sometimes, and never. The reliability of knowledge in Physics practical inventory was worked out by using split half method. The reliability co-efficient is (0.6021). The validity of knowledge in Physics practical inventory was computed, by taking square root of the reliability. The validity of knowledge in Physics practical inventory was found to be (0.7759).

9. Samples

This includes the sampling techniques used, the reasons for selection of a particular sampling technique, and the selection of sample according to different variables. The sample is selected through Simple random sampling technique. A total of 3 Government, 3 Government aided and 4 Private schools are selected. All the higher secondary school students from the mentioned schools are taken as the sample for the present study. Hence the sample comprises of 270 students of Villupuram and Thiruvallur districts.

9.1 Subgroups of the sample

Gender : (Male / Female)
 Medium : (Tamil / English)
 Locality : (Rural / Urban)

Simple random sampling technique is applied to select the present sample consists of 270 students studying at higher secondary level.

10. Analysis and Interpretation

Table-1

Correlation between knowledge and achievement in Physics practical among higher secondary school students.

S. No	Variables	Number of sample	'r' value	Correlation
1	Knowledge and Achievement in Physics practical	270	0.677**	High Positive Correlation

Table value = 0.148

** represents significant at 0.01 level.

Interpretation

From the table 1, It can be correlated that the relationship 'r' –values between knowledge in Physics practical and achievement in Physics practical of Higher secondary students. it can be noted that knowledge in Physics practical hold significant relationship between achievement at 0.01 level. The correlated 'r' –value dependent and independent variables (0.6770) and table value (0.148) for N=270 and degree of freedom ($df_1 = 2, df_2 = 268$) was founded to be hold 0.01 level of significant Knowledge in Physics practical which directly influence achievement of higher secondary students. This indicated existence of a high positive correlation between Knowledge and Achievement in Physics practical.

Table- 2
Student's knowledge in Physics practical with respect to their Gender.

S. No	Variable	Gender						't' value	Level of Significance
		Boys			Girls				
		N	Mean	S.D	N	Mean	S.D		
1	Knowledge in Physics practical	140	77.71	8.38	130	81.16	8.4	3.37**	0.01

Note: ** representing 't' value significant at 0.01 level.

Interpretation

From the table 2, represents the 't'- value of boys and girls. From the values it can be observed that the mean scores of knowledge in Physics practical (77.71) of boys and girls mean score (81.16); the 't' value being 3.37 which is higher than the table value (2.58) at 0.01 level, it can be found that there is significant difference between boys and girls in their knowledge in Physics practical. This further indicates that boys and girls show significant difference in their knowledge in Physics practical. Girls show more knowledge in Physics practical than boys. So girls mean score is slightly higher than boys mean score and they do differ significantly. Hence null hypothesis (H₀) is rejected.

Table-3:
Student's knowledge in Physics practical with respect to their Medium

S. No	Variable	Medium		't' value	Level of Significance
		Tamil	English		

		N	Mean	S.D	N	Mean	S.D		
1	Knowledge in Physics practical	220	78.6	8.32	50	82.75	8.80	3.04**	0.01

Note: ** representing 't' value significant at 0.01 level.

Interpretation

From the table 3, represents the 't' – value of significance was also employed for the computation of overall knowledge in Physics practical scores of Rural and Urban area schools higher secondary students. The mean values of knowledge in Physics practical for rural group to be 78.20 and urban group (82.14) respectively. Its t-value was found to be 3.55. The obtained 't' – value is greater than the table value at 0.01 level. This means that urban higher secondary students have high knowledge in Physics practical than rural higher secondary students. Therefore Rural and urban area Higher secondary students in their knowledge in Physics practical significantly. Hence null hypothesis (H₃) is rejected.

Table-4:

Student's knowledge in Physics practical with respect to their Locality.

S. No	Variable	Locality						't' value	Level of Significance
		Rural			Urban				
		N	Mean	S.D	N	Mean	S.D		
1	Knowledge in Physics practical	190	78.2	8.28	80	82.14	8.6	3.35**	0.01

Note: ** representing 't' value significant at 0.01 level.

Interpretation

From the table 4, shows the mean, standard deviation and 't' – ratio for knowledge in Physics practical with respect Tamil and English medium Higher secondary students. The obtained 't'–value for Tamil and English medium students (3.04) significant difference at 0.01 levels. The results indicate that there is a significant in knowledge in Physics practical between Tamil and English medium students. This further indicated that Tamil and English medium students significant in their knowledge in Physics practical. So it's mean score substantially higher camper to English medium students in their knowledge in Physics practical. Hence null hypothesis (H₄) is rejected.

11. FINDINGS OF THE STUDY

- There is significant difference between Knowledge and Achievement in Physics practical
- There is High positive correlation between Knowledge and Achievement in Physics practical
- There is significant difference in knowledge in Physics practical between boys and girls.
- There is significant difference in knowledge in Physics practical in between student from Tamil and English medium.
- There is significant difference in knowledge in Physics practical between higher secondary students from rural and urban areas.

12. EDUCATIONAL IMPLICATIONS

From the findings of the present study, the investigator would like to suggest the following as its implements.

- The students are developers of the nation. So, we have to adapt them according to the changes places all over. For prospers nation, Good citizens should be created for which we have to rise the qualitative aspects of education to prepare for the students life.
- Physics is an important subject at higher secondary level. Understanding of the concept and application of knowledge is essential for achievement in Physics and Physics practical. Teacher must teach the higher secondary students in such a way that meaningful learning occurs in positive aspects. They must help them to identify the basic knowledge and good skill in Physics practical. This will enhance the student's achievement in Physics practical
- Teacher must try to understand the problems of pupils and adjust his method of teaching practical accordingly.
- Student - teacher relationship has to be improved, so that the students ask their doubts and the teacher can clarifying their doubts.
- Physics club, Physics exhibition and field trips organized in the school.
- The problem in learning Physics practical at higher secondary level will affect their higher studies also. So the curriculum content methodology must cope up to the modern educational technologies to clarify their doubts in practical and improve the learning skills.
- The government should clearly frame the basis infrastructural facilities for a school building in order to provide better lab room, well modified library, with latest science, magazines, journals and books of well designed laboratory as well as school environment for the higher secondary student will create more science research interest for the students.
- In rural school, there is no adequate laboratory facility for higher secondary students especially, for Physics students, therefore adequate laboratory and science equipments should be provided to those schools for enriching their practical

knowledge. Result of public examination shows that rural students perform poorly in laboratory activities. So more infrastructural facilities regarding Physical practical must be provided for the benefit of students.

13. SUGGESTION FOR FURTHER RESEARCH

On the basis of the findings, the following suggestions are offered for the researchers for further research works,

1. An experimental study can be made on skill oriented knowledge and achievement in Physics practical.
2. The study may be conducted for other Science subject practicals.
3. The study may extend to other districts of Tamil Nadu.
4. A comparative study may be done for two districts to find out their knowledge and achievement in Physics practical.
5. A comparative study may be taken up for different types of school management like Government, Government Aided, Private students.
6. The study may be conducted to find out knowledge and achievement in Physics practical among college students..
7. The studies can be carried out for Engineering, Diploma and science college students.
8. The studies can be extended to student from CBSE, ICSE syllabus.

14. CONCLUSION AND RECOMMENDATIONS

It is clear from the present study that there is significant relationship between knowledge and achievement in Physics practical of the higher secondary students regardless of their gender, medium and locality of school of the study. The major findings show that there were significant relationship between knowledge and achievement in Physics practical. The level of knowledge affects achievement in Physics practical. Hence it is a necessity and important stages to inculcate basic knowledge in practicals. Therefore it is necessary that every school must ensure proper learning situation for students to overcome difficulties and acquire the knowledge in all the practicals, So that we can develop the understanding skills in science practicals and conceptual learning in a meaningful manner. It may help the students overall personality development increase scientific knowledge, interest and attitude. The major finds would be the database for further research work.

REFERENCES

- Mangal. S.K.,(2010) "Advanced Educational Psychology", 2nd Edition, Prentice Hall of India Pvt Limited, New Delhi.
- Aggarwal. J.C.(1975) "Educational Research", An introduction, 2nd Edition, Arya Book Depot, New Delhi.
- Best, John.W.,(1982) "Research in Education", 4th Edition Prentice Hall of India Pvt Limited. New Delhi.
- Best.W, John and Khan.V.James (1999) "Research in Education" Prentice Hall of India Pvt Limited. New Delhi.
- Buch. M.B.,(1992) "Fifth survey of Educational research", Volume-I, NCERT Publications, New Delhi.
- Radhamohan (2007)"Research Methods in Education", Neelkamal Publications, Pvt Ltd, Hyderabad.
- James, M. J. (2000). *Ordinary Level Practical Physics*. London: Heinemann Educational Books.
- Mankilik, M. (2011). *Practical Approaches to the Teaching of Science*. A keynote address Delivered at the workshop organized by School of Sciences, Federal College of Education, Pankshin, Nigeria on 13th July.
- Boyo, A. (2010). *Identifying Problems Associated with Studying of Physics in Lagos State, Nigeria*. Retrieved on 2nd September, from http://www.wcpsd.org/posters/education/Boyo_Adenike_1.pdf