RELATIONSHIP OF HEATING SKILLS OF SECONDARY SCHOOL TEACHERS WITH EDUCATIONAL ATTAINMENTS OF THEIR STUDENTS

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ABSTRACT

The main purpose of the study was to analyze relationship between teachers' skills and students' achievements the hypothesis of the study was to point out relationship amongst heating skills and educational achievements of the students, the problem was stated for direct relationship with respect to skills and students achievements. The study was conducted in District Dera Ismail khan male Secondary schools and 50 schools were randomly selected. The data was collected with the help of observation of skills of teachers and achievements test was given to students data was tabulated and interpreted with the help of Pearson correlation and percentage calculation .The research finding showed that majority teachers skilled with proper heating process and majority students fall in grade A and B and showed direct relation between independent and dependent variables.

Keywords: *Heating Skills, Secondary School Teachers & Educational Attainments*

INTRODUCTION

The problem under study was to know the expertise and knowledge of secondary school teachers in heating objects and relate this expertise with their student's achievements. The study was conducted in District Dera Ismail Khan. All secondary schools were the population of the study, while 50 male secondary schools were selected as sample .The data was collected through observation of skills of teachers and as well as through achievement test given to students. A skill is learned capacity to carry out predetermined result often with minimum utilization of time and energy. Secondary school teachers have to do two types of services, at one time they teach theoretical science subjects and at the other hand they do a practical work in the laboratory.

Practical work needs varieties of skills. Here we threw a light on heating objects skills. It is a skill in which objects are heated appropriately on the burner flame. As varieties of experiments are conducted in the laboratory and in most experiments the heating of various objects take place. In order to handle hot objects accurately and to protect themselves from the loss of hot objects it require certain techniques and skills. In this connection varieties of skills are require like placing of object on burner flame, setting up require apparatus , recording reading temperature scale and lighting of burner etc.

LITERATURE REVIEW

According to Fay, Paul J. (August 1999) secondary schools are called High Schools from classes 9 to 10. After successful completion of elementary education class 1 to 5, Primary and Class 6 to 8 Middle school education the students receive Secondary Education. A secondary education is in between elementary education and higher education. Board of intermediate and secondary education arrange the examinations for SSC (Class 9 &10) secondary school certificates (P-456). Accordingly Blosser and Patricia (2000) laboratory is facility that provides controlled conditions in which scientific/technological research, experiments and dimension may be performed. Laboratories used for scientific research take many forms because of differing requirements of specialists in the various fields of science. Scientific laboratories can be found in schools (p- 402).

According to Boghai and Davar (1999) Science educators have believed that laboratory is an important means of instruction in science since late in the 19th century. Laboratory activities were used in high school chemistry in the 1880s. In 1886, Harvard University published a list of physics experiments that were to be included in high school physics classes for students who wished to enroll at Harvard. The laboratory instruction was considered essential because it provided training in observation, supplied detailed information, and aroused pupils' interest (P-39). According to Godomsky, Stephen (2002) laboratory plays a central & distinctive role in the science education. Science experts suggest that laboratories activities have rich benefits in learning process. Research studies reveal that learning by demonstration, inquiry and learning by doing have renewed a central status in are learning and specifically in science learning (p-512).

According to Comber and Keeves (1978) laboratory plays central role in understanding the sciences in true sense. It practically proves the science theories, laws and various difficult terms demonstration and explanation is carried out in the laboratory (P-311). According to Gage (1996) in order to use the laboratory in an adequate and proper ways it requires certain skills. Teachers perform various experiments in the laboratory like, filtration, heating objects, measurement, apparatus setting, instruments uses etc. So it becomes essentials for secondary schools teachers to equip themselves with various laboratory skills (P-45). According to Grozier and Joseph (2007) in most experiments the heating of various objects take place. In order to handle hot objects accurately and to protect themselves from the loss of hot objects it require certain techniques and skills. In this connection varieties of skills are require like placing of object on burner flame, setting up require apparatus, recording reading temperature scale and lighting of burner (p-145-178).

According to Lott and Gerald (1999) skill is learned capacity to carry out pre-determined result often with minimum utilization of time and energy .It is the innate ability of the individual due to which one can gets expertise in the field of its interest. It means training an individual in certain field, so that he may work with ease and interest. It is ability and capacity of individual acquired through, deliberate, smooth and systematic and sustained effort to get expertise (P-45). Rowe and Mary (1999). The secondary school teachers are those who teach at secondary school especially to 9th and 10th classes. They play very important role in secondary schools because secondary schools majority courses are taught by them (P-678). According to Wise, Kevin and Kames (1999) there are two kinds of secondary school teachers; one is called SST general while other is called SST science. SST science have to do two types of teaching process one is teaching theory of science subjects like Physics, Chemistry and Biology while the other task is to handle laboratory work. It means that they perform various experiments in the schools (P-256).

The Objectives of study

This research study was directed to achieve the following objective: To point out heating skills possessed by secondary school Teachers in doing practical work and their relation with academic achievements of the students.

The Problem Statement

The problem under study was to find out correlation between heating skills of the Secondary school teachers and corresponding academic achievements of their students.

The Hypothesis of study

The main hypothesis of the study was following: There was direct relationship between the heating skills of SSTs and academic achievements of their students.

RESEARCH METHODOLOGY

Methodologies means procedure, definitions and explanations of techniques used to collect, store, analysis and present information's as a part of research process in given discipline

The Design of study

The research was descriptive with respect to achievement tests as well as observational list comprising heating skills were used for collecting data.

The Population

All secondary schools in district Dera Ismail Khan form the total population of the study. According to census 2014-2015 there are 205 male secondary schools working in District Dera Ismail Khan.

The Sample

Gay (2003) said that a sample is a small portion of objects, units taken from the population for observation and study. A sample of 50 secondary schools was selected from the whole population.

The Sampling Technique

A sample of 50 schools was selected through random sampling technique from the given population.

The Instrument

The data was collected through careful observation and achievement test. The researcher itself carried out the task. The observational list composed of three points likert scale comprising, Yes, To Some Extent and No. As for as achievement test was concerned it was MCQS type test in the science subjects.

	HEATING SKILLS	YES	To some extent	NO
1	Uses Thermometer used properly	YES	To some extent	NO
2	Object heats at the top of the inner core of the flame	YES	To some extent	NO
3	Uses wire gauze properly while heating object	YES	To some extent	NO
4	Handles the hot objects with prong	YES	To some extent	NO
5	All apparatus stand/beaker/spirit lamp uses properly.	YES	To some extent	NO
Achievement test				
1	There are …scales use for measuring temperature	1	2	3
2	The anomalous behavior of water is due to	HB	PH	BP
3	The standard scale of temperature is	K	C	F
4	The temperature at which the liquid boil is called	BP	FP	PH
5	The ice float on the surface of water due to low	PH	BP	Density

Abbreviations

HB=Hydrogen Bond, PH= PH scale, BP=Boiling point, K= kelvin, C= Celsius, F=Fahrenheit .FP= Freezing point SST= Secondary school teacher

DATA ANALYSIS

Collected data was analyzed through statistical tools Pearson correlation and percentage methods were applied on the data to obtain results and drawing conclusion. The standard value of coefficient of correlation fall between (1) and (-1).

Table No.1 Uses Thermometer properly

N	X		Y		∑X²	∑Y²	∑XY
1	A	50	90	YES	2500	8100	4500
2	B	30	6	To some extent	900	36	180
3	C	20	4	NO	400	16	80
		∑X=100	∑Y=100		3800	8152	4760

$$r\,XY = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2 n\sum y^2 - (\sum y)^2}} = \frac{3\times 4760 - 100\times 100}{\sqrt{[3\times 3800 - 10000][3\times 8152 - 10000]}} = 0.95$$

According to statement uses Thermometer properly, according to calculations the table shows 95% teachers equally use the thermometer properly in measurements,6% teachers to some extent use the thermometer accurately in measurements and 4% teachers do not the use of thermometer . Table showed that calculated value (0.96) that there is positive relationship amongst heating skills of teachers and educational attainments of their students. As for as achievement test is concern (50) students secure grade 'A' while (30) students obtain grade ''B'' and (20) students achieve grade ''C'.

Table No.2 Heats objects at the top of the inner core of the flame

N	X		Y		∑X²	∑Y²	∑XY
1	A	50	25	YES	2500	625	1250
2	B	30	46	To some extent	900	2116	1380
3	C	20	39	NO	400	1521	780
		∑X=100	∑Y=100		3800	4226	3410

$$r\,XY = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2 n\sum y^2 - (\sum y)^2}} = \frac{3\times 3410 - 100\times 100}{\sqrt{[3\times 3800 - 10000][3\times 4262 - 10000]}} = 0.03$$

According to question "An Object heated at the top of inner core of the flame", according to calculations the table review that 25% teachers heat object accurately, 46% teachers to some extent heat the object properly and 39% teachers do not know process of heating objects. Table showed that calculated value (0.03) that there is positive relationship amongst object heating skills of teachers and educational attainments of their student

Table No.3 Uses wire gauze properly while heating objects

N	X		Y		∑X²	∑Y²	∑XY
1	A	50	5	YES	2500	25	250
2	B	30	86	To some extent	900	7396	2580
3	C	20	9	NO	400	81	180
		∑X=100	∑Y=100		3800	7502	3010

$$r\,XY = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2 n\sum y^2 - (\sum y)^2}} = \frac{3\times 3010 - 100\times 100}{\sqrt{[3\times 3800 - 10000][3\times 7502 - 10000]}} = -0.23$$

According to statement ‘’ Uses the wire gauze properly while heating object ’’, according to calculations 5% teachers equally use the wire gauze properly ,86% teachers to some extent keep it properly and 9% teachers do not know its use. Table showed that calculated value (-0.023) shows that there is no relationship amongst heating skills of teachers and educational attainments of their students.

Table No.4 Handles the hot objects with prong

N	**X**		**Y**		**$\sum X^2$**	**$\sum Y^2$**	**$\sum XY$**
1	A	50	20	YES	2500	400	1000
2	B	30	46	To some extent	900	7396	1380
3	C	20	34	NO	400	1155	680
		∑X=100	∑Y=100		3800	3672	3060

$$r\,XY = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2 n\sum y^2 - (\sum y)^2}} = \frac{3\times 3060 - 100\times 100}{\sqrt{[3\times 3800 - 10000][3\times 3672 - 10000]}} = -0.68$$

According to predetermined notion “Handles the hot objects with prong” according to calculations the table reveal that 20% teachers handle the hot object accurately, 46% teachers to some extent accurately handle the hot object and 34% teachers do not know the appropriate use of handling hot objects. Table showed that calculated value (-0.68) that there no relationship amongst hot objects skills teachers and educational attainments of their students.

Table No.5 All apparatus stand/ beaker/ spirit lamp uses properly

N	**X**		**Y**		**$\sum X^2$**	**$\sum Y^2$**	**$\sum XY$**
1	A	50	50	YES	2500	2500	1000
2	B	30	26	To some extent	900	676	1380
3	C	20	24	NO	400	576	680
		∑X=100	∑Y=100		3800	3752	3760

$$r\,XY = \frac{n\sum xy - \sum x \sum y}{\sqrt{n\sum x^2 - (\sum x)^2 n\sum y^2 - (\sum y)^2}} = \frac{3\times 3760 - 100\times 100}{\sqrt{[3\times 3800 - 10000][3\times 3752 - 10000]}} = 0.96$$

According to statement “All apparatus are set accordingly” according to calculations the table shows that 50% teachers know apparatus setting, 26% teachers to some extent know familiar about apparatus setting and 24% teachers do not the proper use of apparatus. Table showed that calculated value (0.96) that there is strong positive relationship amongst apparatus settings skills of teachers and educational attainments of their students.

DISCUSSIONS

The result of this study indicates that there is positive relationship between heating skills of the secondary school teachers and corresponding academic achievements of their students. Majorities of secondary school teachers are equipped with the skills of proper use of laboratory equipment's for heating purposes. The results of achievements tests given to the students show that majority student secured high grades.

- Research finding shows that majority secondary school teachers are equipped with heating objects skills and very few have lack of such ability.
- Research study reveals that majority SSTs keep the objects properly on burner flame while very few face difficulty in doing so.
- 3 .Research study depicts that that majority SSTs know the exact use of wire gauze, while very few have lack of this kind of knowledge.
- It is proved that majority SSTs handle the hot object with ease, while very face difficulty in handling hot objects.
- It is observed that majority SSTs know the setting of apparatus during experimentation, while some get puzzle due to lack of knowledge.
- Research study proves that heating objects skills of the SSTs are positively related with educational achievements of their students.
- Achievements test results shows that large numbers of students secured grade (A) and some students obtained grade(B) and few students achieve grade(C) .

CONCLUSION

The conclusions draw from the research study are given below

- The majority SSTs equip with knowledge of heating objects in laboratory.
- The secondary school teachers know the exact use of burner.
- SSTs know the proper use of wire gauze.
- The majority science teachers handle the hot objects easily while doing practical work.
- SSTs know the setting of apparatus for experimentation.
- Secondary school teachers practical skills are strongly correlated with their students achievements.

Recommendations

Important recommendations of the research study are given below

- Secondary schools may be provided with latest laboratory instruments.
- Secondary school teachers may be given more practical skills training.
- Specific time table must be provided for daily practical.

- Practical must be given at least half of theory subjects marks.
- Secondary school teachers must be given refresher courses on annual basis in practical's skills.

References

Blosser, D., & Patricia, E. (2000). A Critical Review of the Role of the Laboratory in Science Teaching. Columbus, OH: ERIC Clearinghouse for Science, Mathematics and Environmental Education.

Boghai, T., & Davar M. (1999). A Comparison of the Effects of Laboratory and Discussion Sequences on Learning College Chemistry. *Dissertation Abstracts*, 39 (10), 6045A.

Comber, L. C., & Keeves, J. P. (1978). Science Education in Nineteen Countries, International Studies in Evaluation I. New York: John Wiley & Sons, Inc.

Fay, Paul, J. (1999). The History of Chemistry Teaching in American High Schools. *Journal of Chemical Education*, 8 (8), 1533-1562

Gage, N. L. (1996). Handbook of Research on Teaching. Chicago: Rand McNally & Co.

Godomsky, Stephen F. (2002). Programmed Instruction, Computer-Assisted Performance Problems, Open Ended Experiments and Student Attitude and Problem Solving Ability in Physical Chemistry Laboratory. *Dissertation Abstracts*, 31(11), 5873A.

Grozier, Joseph E. (2007). The Role of the Laboratory in Developing Positive Attitudes toward Science in a College General Education Science Course for Nonscientists. *Dissertation Abstracts*, 31(11), 2394A

Lott, Gerald, W. (1999). The Effect of Inquiry Teaching and Advance Organizers upon Student Outcomes in Science Education. *Journal of Research in Science Teaching*, 20(5), 437-451.

Rowe, Mary B. (1999). What Research Says to the Science Teacher, *I*, Washington, DC: National Science Teachers Association.

Wise, Kevin, C., & Okey, R. (1999). A Meta-Analysis of the Effects of Various Science Teaching Strategies on Achievement. *Journal of Research in Science Teaching*, 20(5), 419-435.