



A STUDY OF THE SKILLS RELATED TO THE CHEMISTRY LABORATORY OF THE STUDENTS OF HIGHER SECONDARY SCHOOL IN CONTEXT TO GENDER

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Abstract:

At higher secondary level of school the students study three main branches of science that are Physics, Chemistry and Biology. They do necessary experiments in the laboratory as a part of their studies. The chemistry laboratory is considered as the most difficult and dangerous of all the three laboratories of science stream at school therefore It becomes essential to know the present condition of the skills required to conduct the experiments and also the skills required for the safety while conducting practicals. The practicals in Sciences are quite important in the field of education and the investigator has thought about doing assessment of such skills developed by the students in the science stream. The present Study was carried out with the Objectives

1. To construct and standardize a test to know the skills concerning the laboratory work of Chemistry subject for higher secondary school students.
2. To know the skills concerning the laboratory work of Chemistry subject for higher secondary school students
3. To study these skills in the context of their gender. Students studying in Std. 12th were selected through stratified random sampling technique. Self constructed tool was used to study the skills related to chemistry laboratory of the students studying in Std. – 12. Data was analyzed by calculation t-value and Reliability and Validity was found for the tool. Girls students were found to possess more Skills concerning to drawing, cleanliness and Safety Skill aspect of Chemistry Lab.

Index Terms - Students of Higher Secondary School, Chemistry, Laboratory, Skills, Study.

1. INTRODUCTION

The children give glimpse of their latent creative ability and skill by preparing the clay models or toys at home or school, charts etc. the creative ability is a unique ability of human beings by which Children expresses innovative creation or innovative idea. The creative ability is in fact an intellectual possession of a person. The creative ability is not just limited to artistic creations or scientific inventions only, but it has its utility in many fields. An engineer also exhibits his creative ability in his work.

The studies of science are made more and more activity based. The whole world has accepted the importance of experiments in the field of science. At such time it is essential to develop the skills necessary to conduct an experiment among the students who are supposed to conduct experiments. It is necessary to habituate the students at school level with experimentation skills while they conduct experiments so that such skills become their aptitude and so that the experiments conducted by such trained hands would bring productive results. It is necessary to have a practical test also to assess how much such skills have developed among the students. At higher secondary level of school the students study three main branches of science that are Physics, Chemistry and Biology. They do necessary experiments in the laboratory as a part of their studies. The chemistry laboratory is considered as the most difficult and dangerous of all the three laboratories of science stream at school. In these laboratories it is essential for the students to keep utmost caution. The laboratory provides the best opportunity to the students for developing the essential skills. It is important for the students to develop the skills like selection of appropriate tools for experiment, insight for the experiment, experimental method, surety of observation and neatness, cleanness and safety. Besides the knowledge of the chemicals being used in the chemistry laboratory, the tools of safety, security while the experiment, skills regarding the emergency treatment if any accident occurs at the time of experiment, it is essential to take some steps to develop all such kind of skills. Therefore it is essential to know the present condition of the skills required to conduct the experiments and also the skills required for the safety while conducting them.

The present Study was carried out to assess such skills developed by the students in the science stream by preparing such practical test.

2. TITLE OF THE STUDY

The title of present study is **A Study of the Skills related to Chemistry Laboratory of the Students of Higher Secondary School in context to Gender**

3. DEFINITION OF KEY WORDS

STUDENTS OF HIGHER SECONDARY SCHOOL

In the present research the Students of Higher Secondary School means those students who as per the education pattern of 10 + 2 have cleared the S.S.C board exams and are studying in Std. 12 of Science stream.

CHEMISTRY:

A branch of science stream which studies the structure of atom, micro atoms, combination of chemicals, mixtures etc. and their chemical characteristics. At the higher secondary level the Chemistry subject is studied as a main subject.

LABORATORY:

A study room for the students to conduct experiments with the help of required tools, substance and various models for using various principles of Chemistry.

SKILLS

The skill means a special ability to operate with hands in which the combination of the students insight, ability, surety, logic, speed can be observed.

In the present study skills means the skills like selection of appropriate tools for experiment, insight for the experiment, experimental method, surety of observation and neatness, cleanliness and safety.

STUDY

Study means to collect the necessary data, to analyze it and then to find the findings on the basis of that.

In the present study, study means the process of finding results regarding the students' skills concerning the laboratory of Chemistry with the help of a test to assess the Creativity.

4. OBJECTIVES

The following objectives were kept in mind for the present study.

1. To construct and standardize a test to know the skills concerning the laboratory work of Chemistry subject for the students studying in higher secondary schools.
2. To know the skills concerning the laboratory work of Chemistry subject for the students studying in higher secondary schools.
3. To study the skills concerning the laboratory work of Chemistry subject for the students studying in higher secondary schools in the context of their gender.

5. HYPOTHESES

Hypotheses for the current study are as follows:

Ho1 There would be no significant difference between the mean scores achieved by boys and girls in the skill assessment test related to chemistry laboratory for the students of higher secondary schools.

Ho2 There would be no significant difference between the mean scores achieved by boys and girls in the drawing skill aspect of the skill assessment test related to chemistry laboratory for the students of higher secondary schools.

Ho3 There would be no significant difference between the mean scores achieved by boys and girls in the manipulative and procedural skills aspect concerning the experimental work of the skill assessment test related to chemistry laboratory for the students of higher secondary schools.

Ho4 There would be no significant difference between the mean scores achieved by boys and girls in the observational skill aspect concerning the experimental work of the skill assessment test related to chemistry laboratory for the students of higher secondary schools.

Ho5 There would be no significant difference between the mean scores achieved by boys and girls in the cleanliness and safety related skill aspect concerning the experimental work of the skill assessment test related to chemistry laboratory for the students of higher secondary schools.

Ho6 There would be no significant difference between the mean scores achieved by boys and girls in the reporting and interpretation related skill aspect concerning the experimental work of the skill assessment test related to chemistry laboratory for the students of higher secondary schools.

6. VARIABLES

The Variables included in the present study were as given below

INDEPENDENT VARIABLE

Gender- Boys and Girls

DEPENDENT VARIABLE

Achievement of skills related to Chemistry laboratory

7. POPULATION AND SAMPLE

POPULATION

The students studying in Std. 12- Science Stream from districts Kheda, Gandhinagar and Ahmedabad of central Gujarat comprises the population for the present study.

SAMPLE OF THE STUDY

The higher secondary schools of each of the districts of central Gujarat Kheda, Gandhinagar and Ahmedabad were distributed into rural and urban area, afterwards total 20 schools were selected using the stratified random sampling method. From all these schools, 304 students studying in Std. 12 were selected randomly in which 160 boys and 144 girls were included and which consist of 109 rural area students and 195 urban area students.

8. TOOL

Self Constructed Tool was used for the purpose of present Study. In this test two experiments based on Acid Based Neutralization and Non-carbonic analysis were selected keeping in mind the laboratory experimentation skills like drawing skill, manipulative and procedural skills, observational skills, cleaning, safety skills and reporting and interpretative skills. Both these experiments were organized stage wise and there were total 32 items decided.

Among these steps there were 15 steps / items for the Acid Based Neutralization experiment and 17 steps / items for the experiment of Non-carbonic analysis. There are observation criteria prepared for each step of the experiment when the students conduct the experiment. For the pre – piloting application, 15 students of Std.12 of Science Stream were selected and on the basis of that the time of the test was decided of two hours. Afterwards this test was given to 100 students of Std. 12 of Science Stream for piloting. On the basis of this piloting work and the scores achieved by the students in the piloting work, the finding value and discriminating index was found. Those items which has finding value less than 45 percent were rejected and in this way, steps / item number 5 and 6 of experiment – 2 were removed from the piloting test. In the final test 30 steps / items of both the experiments were included. For each item, as per the quality of the skill, it was decided to give 0, 1, 2, 3 marks. In this way the final test of total 90 marks was decided.

9. DATA COLLECTION AND DATA ANALYSIS

Data was collected from 304 Students with the help of self constructed tool and was standardized with the help of Test-retest and Split half Reliability and Validity.

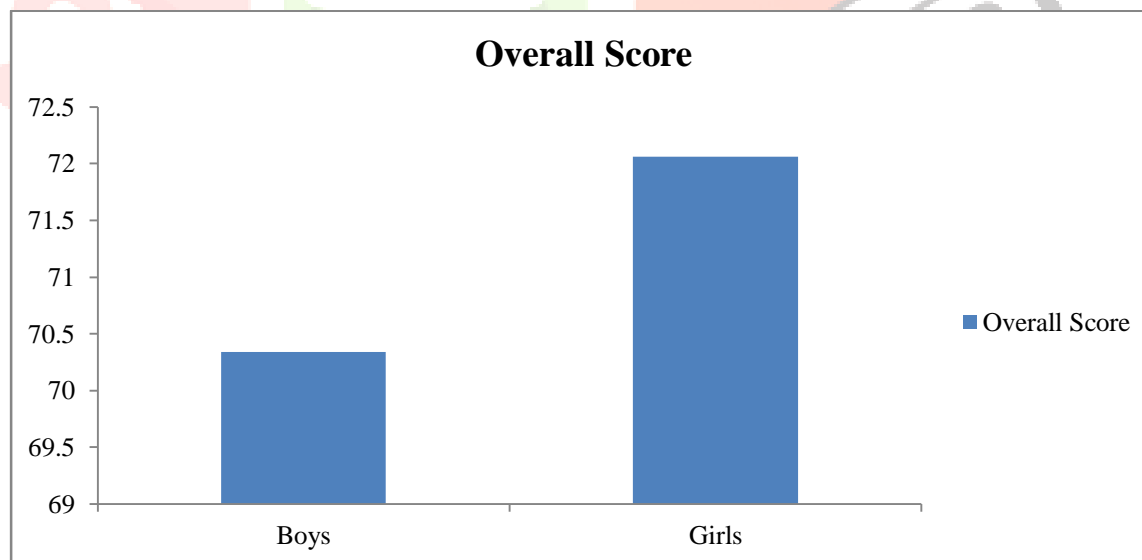
This test was given to only two students at a time. Each student did the experiment work as per the sequence given to the steps / items of the experiment, at that time the observer did the observation as per the pre-decided criteria of the observation of the experimental work and each step was scored 0, 1, 2, 3 marks as per the quality of the skill performed. On the basis of that the students gained their marks in the whole test. On the basis of achieved marks by the student's gender wise statistical calculations were made. To decide the level of significance, on the basis of the achieved scores, gender wise, area wise, school type wise and academic achievement wise, the calculation of average, standard deviation, standard deviation and t – value was found.

Hypotheses' testing is shown in Table:A

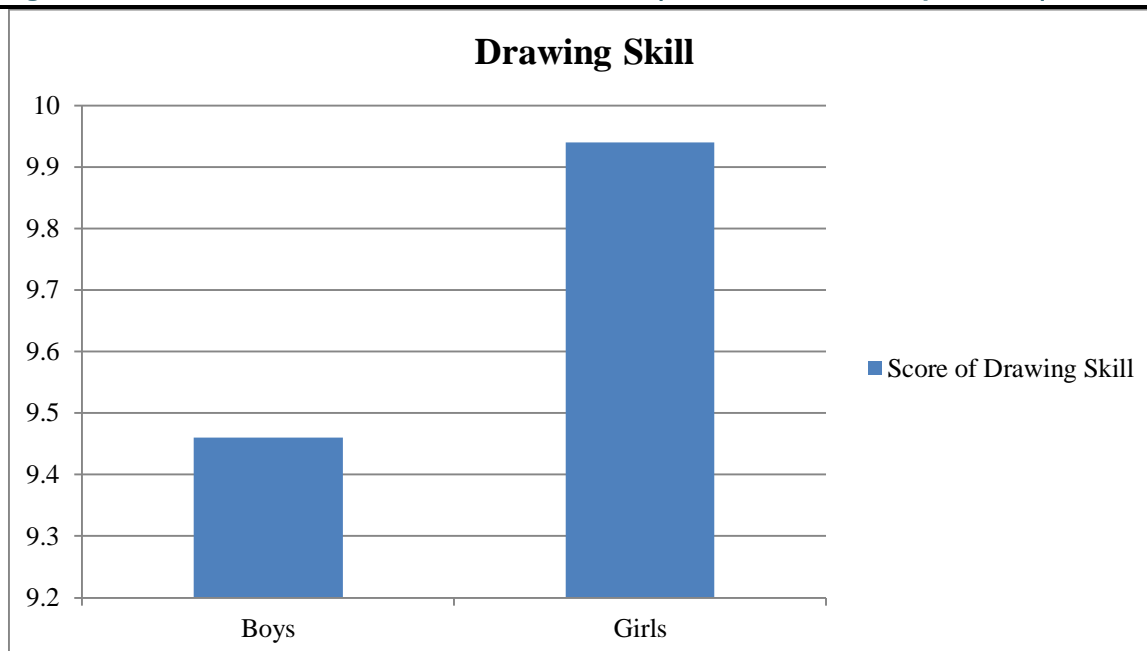
Table:A : Hypotheses Testing

Hypotheses	Skills	Variable	N	M	SD	SE _D	t-value	Remarks
Ho ₁	Overall	Boys	160	70.34	6.18	0.69	2.49	0.05
		Girls	144	72.06	5.78			
Ho ₂	Drawing Skill	Boys	160	9.46	1.84	0.19	2.53	0.05
		Girls	144	9.94	1.52			
Ho ₃	Manipulative and Procedural Skill	Boys	160	37.89	5.40	0.61	1.50	NS
		Girls	144	38.81	5.26			
Ho ₄	Observational Skill	Boys	160	9.96	1.42	0.16	0.32	NS
		Girls	144	10.01	1.37			
Ho ₅	Cleanliness and Safety Skill	Boys	160	9.49	1.76	0.19	2.54	0.05
		Girls	144	9.96	1.47			
Ho ₆	Reporting and Interpretation Skill	Boys	160	3.55	1.04	0.12	1.76	NS
		Girls	144	3.33	1.10			

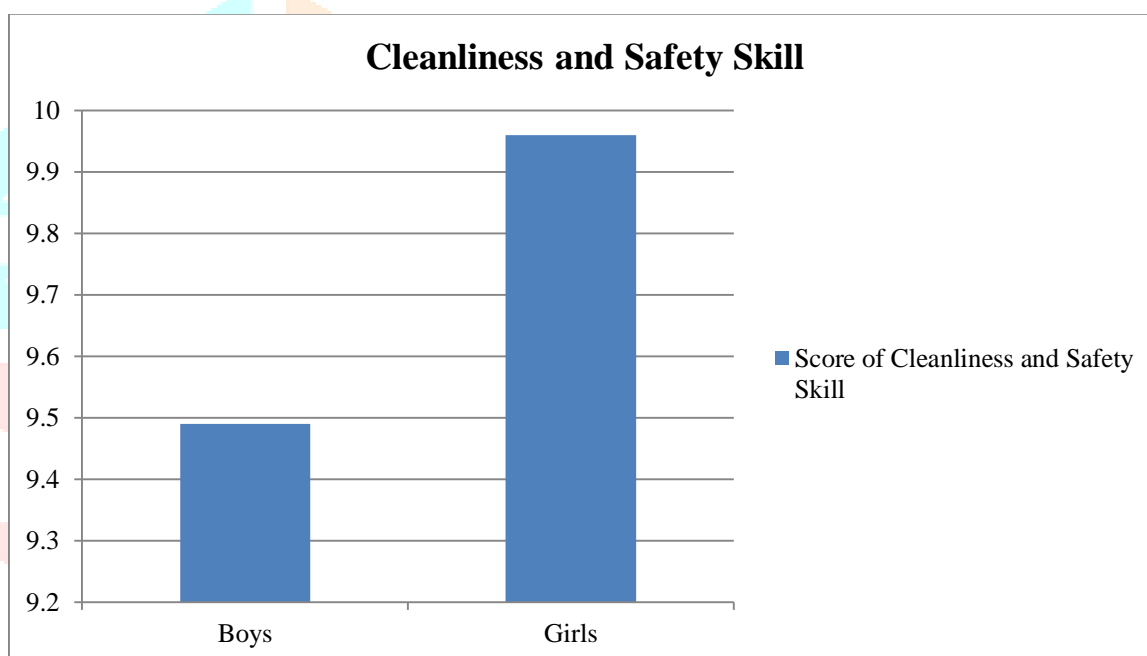
According to Table: A, Ho₁, Ho₂, and Ho₅ are rejected and Ho₃, Ho₄ and Ho₆ are not rejected for which pictorial presentation is as follow:



Graph 1 : Comparison of Overall Score of Boys and Girls



Graph 2 : Comparison of Score of Drawing Skill of Boys and Girls



Graph 3 : Comparison of Score of Cleanliness and Safety Skill of Boys and Girls

Reliability and Validity of Test is shown in Table: B

Table:B :Reliability and Validity of Test

No.	Method	Reliability/ Validity	
1	Test-Retest Method (Reliability)	0.96	
2	Split Half Method (Reliability)	0.68	
3	Content Validity	Good	
4	Concurrent Validity	Laboratory Practical Examination Score	0.84
5		Theoretical Examination Score	0.56

According to Table B, the reliability as per the test – re-test method and split half method is subsequently found to be 0.96 and 0.68 which indicates reliability of the test and the validity of test. The content validity of the test was found good and concurrent validity was found to be 0.56 and 0.84.

10. FINDINGS

The findings of the present study are as given below:

1. There is significant difference found between the average scores achieved by boys and girls in favor of Girls in the skill assessment test related to Chemistry laboratory for the students of higher secondary schools. Therefore it can be said that Girls Students are superior to Boys Students in Skills of Chemistry laboratory.
2. There is no significant difference found between the average scores achieved by boys and girls in the manipulative and procedural skill aspect, observational skill aspect and reporting and interpretation skills aspects of the skill assessment test related to Chemistry laboratory for the students of higher secondary schools. Therefore it can be said that Boys and Girls possess equal skills in terms of the quality of the manipulative and procedural skill aspect, observational skill aspect and reporting and interpretation skills aspects.
3. There is significant difference found between the average scores achieved by boys and girls in the drawing skill aspect and cleanliness and safety skill aspect of the skill assessment test related to Chemistry laboratory for the students of higher secondary schools. Therefore it can be observed that girls' students possess better skills in terms of drawing skill aspect, cleanliness and safety skill aspects.

11. EDUCATIONAL IMPLICATION

After a comprehensive study and the conclusions emerged few educational implications of the present study are as follows

1. Some programmes to enhance the Experimentation skills of Boys can be developed.
2. In future studies, one can neglect the gender variable specifically in manipulative and procedural skill aspect, observational skill aspect and reporting and interpretation skills aspects.
3. Teachers should pay more attention to develop drawing skill aspect and cleanliness and safety skill aspect among boys.

12. CONCLUSION

The teachers still give more importance to lecture method for explaining basic concepts or teaching a practical subject like science. It is necessary to leave such traditional methods and adopt practical way of teaching; today all around the world new inventions are happening everyday in the field of science. Original thinking and creative imagination is the need of the hour it is important that the students learn the skills of practical works from the school level and satisfy their curiosity by doing research oriented and creative works. By giving practical education of the subject like science, the virtues like observation ability, decision making ability, patience, surety can be developed. At such time, it has become very crucial that subject like science should be taught by doing more and more experiments so that maximum number of students can be made interested and attracted towards experimentations.

13. REFERENCES

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