

A STUDY ON ACHIEVEMENT IN CHEMISTRY AND CHEMISTRY LEARNING  
ENVIRONMENT OF HIGHER SECONDARY STUDENTS

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**Abstract**

*This study was conducted with a sample of 800 higher secondary students of Cuddalore district of Tamilnadu, India. Their achievement in Chemistry and Chemistry learning environment were studied. Study shows high level achievement and good Chemistry Learning Environment. Subsamples show difference with respect to Management of schools and Religion for Achievement in Chemistry and for Learning Environment Locality of School and Religion shows differences.*

**Introduction**

The learning environment can play a powerful role in children's academic success. This environment has the ability to affect a young person's development and is capable of sending strong subconscious messages, such as "this is a place where I can learn," and "I am welcome here." Academic achievement of a student is always associated with the many components of learning environment. Based on the Sandberg's (1998), the definition on the functions of a learning environment can be quoted as "Teacher component's role is to provide something between loose guidance and direct instruction. It can be a human agent (present or distant), an intelligent agent, and instructions like some text books provide. This component provides information from the syllabus to the task level". Student's motivation for learning is also generally regarded as one of the most critical determinants, which contribute to the success and quality of any learning outcome (Mitchell, 1992).

Research shows that student's perceptions of academic competency decline as they advance in school (Eccles, Wigfield, & Schiefele, 1998). Schunk and Pajares (2002) attribute this decline to various factors, including greater competition, less teacher attention to individual student progress, and stresses associated with school transitions. A study by Niebuhr (1995) examined relationships between several variables and student academic achievement. His findings suggest that the elements of both school climate and family environment have a stronger direct effect on academic performance. Academic performance is typically assessed by the use of teacher ratings, tests, and exams (Howse, 1999).

### **Chemistry Education**

Chemistry education (or chemical education) is a comprehensive term that refers to the study of the teaching and learning of chemistry in all schools, colleges and universities. Topics in chemistry education might include understanding how students learn chemistry, how best to teach chemistry, and how to improve learning outcomes by changing teaching methods and appropriate training of chemistry instructors, within many modes, including classroom lecture, demonstrations, and laboratory activities. There is a constant need to update the skills of teachers engaged in teaching chemistry, and so chemistry education speaks to this need.

### **Academic Achievement**

Academic achievement or (academic) performance is the outcome of education - the extent to which a student, teacher or institution has achieved their educational goals. Academic achievement is commonly measured by examinations or continuous assessment but there is no general agreement on how it is best tested or which aspects are most important - procedural knowledge such as skills or declarative knowledge such as facts.

### **Objectives of the Study**

The following are the objectives of the present study. To find out:

1. The level of Achievement of Higher Secondary Students in Chemistry.
2. The Chemistry Learning Environment of Higher Secondary Students.

3. If there is any significant difference between the sub-samples of the students under various categories with respect to their Achievement in Chemistry.
4. If there is any significant difference between the sub-samples of the students under various categories with respect to their Learning Environment.
5. If there is any significant relationship between higher Secondary students' Achievement in Chemistry and their Learning Environment.

### Hypotheses of the study

Suitable null hypotheses were framed.

### Tool Used

Chemistry Learning Environment Scale constructed and standardized by the Investigator.

Half yearly Achievement scores in Chemistry Marks taken as Achievement scores for the study.

### Chemistry Learning Environment Scale

The Scale consists of 48 statements with options as SA-Strongly Agree, A-Agree, UD-Undecided, DA-Disagree, SDA-Strongly, Disagree. The scoring is 4, 3, 2, 1, 0 for positive statements and reverse for the Negative statements.

### Reliability and Validity of the Scale

The Reliability of the chemistry Learning Environment Scale was determined by Split-Half method. The scale was divided into two halves and each half was treated as a separate test. The reliability of the test by Split-half technique (consistency) followed by the use of Spearman-Brown Prophecy formula is found to be 0.89.

The content validity has been established by a panel of experts, faculty members from the Department of Education and Higher Secondary school Teachers. The Criterion validity has been calculated and the validity co-efficient was found to be 0.81. The Criterion related validity of the Inventory was found to be high.

### Sample of the Study

The present study was conducted with 800 Higher Secondary School Students studying in Cuddalore District of Tamilnadu State. The sample was selected by using Simple Random Sampling Technique. The sample forms a representative sample of the entire population. Due proportionate weightage was given to various sub-samples.

**Table No. 1**

**The Mean and Standard Deviation of Achievement in Chemistry scores of Higher Secondary School students**

Sub-sample	N	Mean	SD
Entire Sample	800	70.66	11.09

The Achievement in Chemistry of entire sample of Higher Secondary Students is high.

**Table No.2**

**The Mean and Standard Deviation of Learning Environment scores of Higher Secondary School students**

Sub-sample	N	Mean	SD
Entire Sample	800	142.86	22.58

The Learning Environment of entire sample of Higher Secondary Students is good.

### Differential Analysis - Achievement in Chemistry scores

**Analysis of Mean Achievement in Chemistry scores of Higher Secondary students with respect to their Gender**

### Null Hypothesis

There is no significant difference between the male and female Higher Secondary School students with respect to their Achievement in Chemistry.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.3**

**Significance of difference between Mean Achievement in Chemistry scores of higher secondary students with respect to their Gender**

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Male	355	66.72	11.05	9.36	Significant
Female	445	73.80	10.07		

From the above table, since the 't' value is significant at 0.05 level, the above null hypothesis is rejected and it is concluded that there is significant difference between the male and female Higher Secondary School students with respect to their Achievement in Chemistry.

**Analysis of Mean Achievement in Chemistry scores of Higher Secondary students with respect to their Locality**

**Null Hypothesis**

There is no significant difference between the rural and urban Higher Secondary School students with respect to their Achievement in Chemistry.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.4**

**Significance of difference between Mean Achievement in Chemistry scores of higher secondary students with respect to their Locality**

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Rural	400	71.55	11.01	2.28	Significant
Urban	400	69.77	11.11		

From the above table, since the 't' value is significant at 0.05 level, the above null hypothesis is rejected and it is concluded that there is significant difference between the rural and urban Higher Secondary School students with respect to their Achievement in Chemistry.

#### Analysis of Mean Achievement in Chemistry scores of Higher Secondary students with respect to their Type of School

##### Null Hypothesis

There is no significant difference between the Govt. and Private Higher Secondary School students with respect to their Achievement in Chemistry.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.5**

#### Significance of difference between Mean Achievement in Chemistry scores of higher secondary students with respect to their Type of School

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Govt	400	71.21	10.94	1.41	Not significant
Private	400	70.11	11.22		

From the above table, since the 't' value is not significant at 0.05 level, the above null hypothesis is accepted and it is concluded that there is no significant difference between the Govt. and Private Higher Secondary School students with respect to their Achievement in Chemistry.

**Analysis of Mean Achievement in Chemistry scores of Higher Secondary students with respect to their Religion**

**Null Hypothesis**

There is no significant difference among the Mean Achievement in Chemistry scores of higher secondary students with respect to their Religion.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.6**

**Significance of difference among the Mean Achievement in Chemistry scores of higher secondary students with respect to their Religion**

	Sum of Squares	df	Mean Square	F	Significance at 0.05 level
Between Groups	228.38	2	114.19	0.92	Not significant
Within Groups	98063.77	797	123.04		
Total	98292.15	799			

From the above table, since the 'F' value is not significant at 0.05 level, the above null hypothesis is accepted and it is concluded that there is no significant difference among the Mean Achievement in Chemistry scores of higher secondary students with respect to their Religion.

**Analysis of Mean Learning Environment scores of Higher Secondary students with respect to their Gender**

**Null Hypothesis**

There is no significant difference between Male and Female Higher Secondary School students with respect to their Learning Environment.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.7**

**Significance of difference between Mean Learning Environment scores of higher secondary students with respect to their Gender**

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Male	35	134.95	22.58	9.21	Significant
Female	44	149.17	20.52		

From the above table, since the 't' value is significant at 0.05 level, the above null hypothesis is rejected and it is concluded that there is significant difference between the male and female Higher Secondary School students with respect to their Learning Environment.

**Analysis of Mean Learning Environment scores of Higher Secondary students with respect to their Locality**

**Null Hypothesis**

There is no significant difference between Rural and Urban Higher Secondary School students with respect to their Learning Environment.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.8**

**Significance of difference between Mean Learning Environment scores of higher secondary students with respect to their Locality**

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Rural	400	144.36	22.77	1.88	Not



Urban	400	141.36	22.32		significant
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From the above table, since the 't' value is not significant at 0.05 level, the above null hypothesis is accepted and it is concluded that there is no significant difference between the rural and urban Higher Secondary School students with respect to their Learning Environment.

**Analysis of Mean Learning Environment scores of Higher Secondary students with respect to their Type of School**

**Null Hypothesis**

There is no significant difference between Govt. and Private Higher Secondary School students with respect to their Learning Environment.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.9**

**Significance of difference between Mean Learning Environment scores of higher secondary students with respect to their Type of School**

Sub-Samples	N	Mean	Standard Deviation	t-value	Significance at 0.05 level
Govt.	400	144.55	22.88	2.12	Significant
Private	400	141.17	22.18		

From the above table, since the 't' value is significant at 0.05 level, the above null hypothesis is rejected and it is concluded that there is significant difference between the Govt. and Private Higher Secondary School students with respect to their Learning Environment.

**Analysis of Mean Learning Environment scores of Higher Secondary students with respect to their Religion**

**Null Hypothesis**

There is no significant difference among Hindu, Muslim and Christian Higher Secondary School students with respect to their Learning Environment.

In order to test the above Null hypothesis 't' value is calculated.

**Table No.4.10**

**Significance of difference among the Mean Learning Environment scores of higher secondary students with respect to their Religion**

	Sum of Squares	df	Mean Square	F	Significance at 0.05 level
Between Groups	250.90	2	125.45	0.24	Not significant
Within Groups	407329.96	797	511.07		
Total	407580.87	799			

From the above table, since the 'F' value is not significant at 0.05 level, the above null hypothesis is accepted and it is concluded that there is no significant difference among the Mean Learning Environment scores of higher secondary students with respect to their Religion.

**Correlation between the Achievement in Chemistry & Learning Environment of higher secondary students**

In order to realize one of the objectives of the present study, it has been decided to find out the Correlation between the Achievement in Chemistry & Learning Environment of higher secondary students. The correlation was computed and the values are given in Table No.4.68

**Table 4.11**

**Correlation between the Achievement in Chemistry & Learning Environment of higher secondary students**

Sub-sample	N	df	'r' value	Table value at 0.05	Significant / Not Significant
Entire Sample	800	798	0.911	0.088	Significant

The correlation for the entire sample is positive and significant. The same trend is witnessed in all cases of sub-samples. Hence it is concluded that there is a significant

relationship between the Achievement in Chemistry & Learning Environment of higher secondary students.

### Findings of the study

- The Achievement in Chemistry of entire sample of Higher Secondary Students is high.
- The Learning Environment of entire sample of Higher Secondary Students is good.
- There is significant difference between the male and female Higher Secondary School students with respect to their Achievement in Chemistry.
- There is significant difference between the rural and urban Higher Secondary School students with respect to their Achievement in Chemistry.
- There is no significant difference between the Govt. and Private Higher Secondary School students with respect to their Achievement in Chemistry.
- There is no significant difference among the Mean Achievement in Chemistry scores of higher secondary students with respect to their Religion.
- There is significant difference between the male and female Higher Secondary School students with respect to their Learning Environment.
- There is no significant difference between the rural and urban Higher Secondary School students with respect to their Learning Environment.
- There is significant difference between the Govt. and Private Higher Secondary School students with respect to their Learning Environment.
- There is no significant difference among the Mean Learning Environment scores of higher secondary students with respect to their Religion.
- There is a significant relationship between the Achievement in Chemistry & Learning Environment of higher secondary students.

### Recommendations

This study shows high level of achievement and good Chemistry Learning Environment, further to increase the achievement and the quality of Learning Environment, activities should be taken :

- to provide good Class room Environment,
- to increase Teacher Support, Personnel Participation,
- the class room teaching and
- the learning process should be Student Centered,

- Laboratory Environment should be motivating one to engage in Laboratory activities,
- Enjoyment of Chemistry Lessons should be ensured,
- Home Environment should be a strong motivator for the students.

### Conclusion

Ideas for lessons, reading, tests, and projects-the fiber of formal learning-should come from a variety of sources. Individual differences (styles and rates of learning) are accommodated. There is learning through the all of senses (feeling, hearing, tasting, smelling, and seeing); Hence the learning environment for the Chemistry subject should satisfy all the individuals. Inquiry-based learning, project-based learning, direct instruction, peer-to-peer learning, school-to-school, eLearning, Mobile learning, the flipped classroom, and on and on-the possibilities are endless. Chances are, none are incredible enough to suit every bit of content, curriculum, and learner diversity in your classroom. A characteristic of a highly-effective classroom, then, is diversity here, which also has the side-effect of improving your long-term capacity as an educator.

### References

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