

A Longitudinal Study of Attitude Towards Learning Chemistry Lessons at the Higher Secondary Level

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ABSTRACT

The purpose of this study is to track the changes in the student's attitude towards learning chemistry lessons at the higher secondary level during their higher secondary learning years. ATCLS (Attitude towards learning chemistry lessons scale) was administered to 50 random samples of Sacred Heart higher secondary school, Iruppurichy, Cuddalore Dt, Tamil Nadu. It was hypothesized that there is no significant difference in the attitude towards learning chemistry lessons among students during their higher secondary learning years. The data was collected before the start of the course, as they entered class 11, and again the same tool was administered on the same sample when they completed the course, as they completed learning chemistry in class 12. On computing the data, it is alarming to note that the student's attitude towards learning chemistry is in decline as they move from one level to the other. This study also suggests Chemistry teachers focus on the affective dimension of chemistry education.

Keyword: Attitude towards learning chemistry and attitude towards chemistry lessons

INTRODUCTION

In the year 2023, we had an opportunity to examine the class 11 students' attitude towards learning chemistry lessons at higher secondary level. In that study, we used the Attitude Towards learning chemistry lessons scale as a diagnostic tool to examine the affective component in chemistry lesson learning. In this research study, the same tool is used as an achievement test to track the change in the students' attitude towards learning chemistry lessons.

This study is based on the latent viewpoint on attitude, which suggests that chemistry lessons ought to arouse students' cognitive, affective, and behavioural responses. In simple words, the chemistry lessons taught are the stimulus and the responses are the cognitive, affective, and behavioural responses. These responses could be measured through the Attitude Towards Chemistry Lessons Scale (ATCLS) developed by Cheung in the year 2009.

SIGNIFICANCE OF THE STUDY

Potvin and Hasni (2014) pointed out an alarming decline in the students' attitude towards learning science and technology from elementary education to High school education. Primarily this study aimed to know the students' attitude towards learning chemistry as they move from higher secondary to higher education.

Secondly, this study is to use the ATCLS scale as an achievement test to know the students' attitude towards learning chemistry as they complete the higher secondary level.

REVIEW OF LITERATURE

Farhan Wan Yunus (2018) studied the attitude towards learning chemistry among secondary students and found some students have a negative attitude towards learning chemistry, and he raised the concern that the future generation is losing interest in science, especially in chemistry. Arvind Kester et al. (2022) in exploring students' future intention to enroll in chemistry-related courses found the student attitude towards chemistry was the most significant factor, but unfortunately, the enrollment in chemistry degree courses is in decline. This study in line with the above literature aims to know the students' attitude towards learning chemistry lessons and to look for factors that would enhance positive attitude towards learning chemistry lessons.

OBJECTIVE OF THE STUDY

To find out the change in the attitude towards learning chemistry among students during higher Secondary level.

HYPOTHESIS

The following are the hypotheses formulated through the review of the literature:

1. There is no significant difference in liking for theory chemistry lessons among students during their higher secondary learning years.
2. There is no significant difference in liking for Chemistry laboratory work among students during higher secondary learning years.
3. There is no significant difference in Evaluation beliefs about school chemistry among students during higher secondary learning years.
4. There is no significant difference in Behavioural tendencies to learn chemistry among students during higher secondary learning years.
5. There is no significant difference in Attitude towards chemistry lessons among students during higher secondary learning years.

METHOD OF STUDY

A normative survey research method is used for the present study.

SAMPLE OF THE STUDY

A sample of 50 students from 187 from class XII from Sacred Heart Higher Secondary School, Iruppukurichy, Cuddalore Dt, Tamilnadu was selected by random sampling method. The same sample was used before the start of the course and at the end of the course.

TOOLS

Attitude towards Chemistry Lessons Scale (ATCLS) developed by Cheung in the year 2009, with four subscales, namely, a) Liking for theory chemistry lessons (3 items), b) Liking for chemistry laboratory work (3 items), c) Evaluation beliefs about school chemistry (3 items) and d) Behavioural tendencies to learn chemistry (3 items) is the tool administered for this study.

DATA COLLECTION

The Attitude towards Chemistry Lessons Scale (ATCLS) was administered twice on the same sample. The first time, the tool was administered on the sample selected when the students entered the higher secondary course, that is when they entered class 11, and the same tool was administered on the same sample when they completed the course when they completed class 12.

STATISTICAL TECHNIQUES USED

In the present study, Mean, Standard Deviation (S.D.), and T-test, have been used to analyze the data.

DELIMITATION OF THE STUDY

- The study is limited to the Higher Secondary level.
- The present study is conducted only in Sacred Heart Higher Secondary School, Iruppurichy, Cuddalore Dt, Tamilnadu.

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TESTING THE HYPOTHESES

Hypothesis -1

There is no significant difference in liking for theory chemistry lessons among students during their higher secondary learning years.

Table 1 't-test value for Liking for Chemistry theory lessons means scores of the students.

	N	Mean	S. D	't-value	0.05 Level of significance
At the start of the course	50	24.71	3.18	2.84	Significant
At the end of the course	50	21.22	3.03		

It was hypothesized that there is no significant difference in liking for theory chemistry lessons among the students during their higher secondary learning years. Table. 1 shows the results for liking for theory chemistry lessons at the start of the course (Mean = 24.71 and SD = 3.18) and at the end of the course (Mean = 21.22 and SD = 3.03) is $t = 2.84$. Here the 't' value (2.84) which is above the standard table value 1.96 and hence, the null hypothesis is accepted. Hence, there is significant difference in Liking for Chemistry theory lessons among the students during their higher secondary learning years.

Hypothesis-2

There is no significant difference in liking for Chemistry laboratory work among students during their higher secondary learning years.

Table 2 't-test value for Liking for Chemistry laboratory work means scores of students.

Group	N	Mean	S. D	't-value	0.05 Level of significance
At the start of the course	50	27.53	2.37	1.95	Significant
At the end of the course	50	26.04	1.34		

It was hypothesized that there is no significant difference in liking for chemistry laboratory work among students during their higher secondary learning years. Table. 2 shows the results for liking for theory chemistry lessons at the start of the course (Mean = 27.53 and SD = 2.37) and at the end of the course (Mean = 26.04 and SD = 1.34) is $t = 1.95$. Here the ‘t’ value (1.95) which is above the standard table value 1.96 and hence, the null hypothesis is rejected. Hence, there is significant difference in liking for Chemistry laboratory work among students during their higher secondary learning years.

Hypothesis-3:

There is no significant difference in Evaluation beliefs about school chemistry among students during their higher secondary learning years.

Table 3 ‘t-test value for Evaluation belief about school chemistry means scores of students.

Group	N	Mean	S. D	‘t-value	0.05 Level of significance
At the start of the course	50	26.39	3.27	0.85	Not Significant
At the end of the course	50	25.33	3.00		

It was hypothesized that there is no significant difference in Evaluation belief about school chemistry among students during their higher secondary learning years. Table.3 shows results for Evaluation beliefs about school chemistry at the start of the course (Mean = 26.39 and SD = 3.27) and at the end of the course (Mean = 25.33 and SD = 3.00) is $t = 0.85$. Here the ‘t’ value (0.85) which is below the standard table value 1.96 the null hypothesis is accepted. Hence, there is no significant difference in Evaluation belief about school chemistry among students during their higher secondary learning years.

Hypothesis-4:

There is no significant difference in Behavioural tendencies to learn chemistry among students during their higher secondary learning years.

Table 4 ‘t-test value for Behavioural tendencies to learn chemistry means scores of students.

Group	N	Mean	S. D	‘t-value	0.05 Level of significance
At the start of the course	50	26.35	2.77	3.55	Significant
At the end of the course	50	22.90	2.08		

It was hypothesized that there is no significant difference in Behavioural tendencies to learn among students during their higher secondary learning years. Table. 4 shows results for Behavioural tendencies to learn chemistry at the start of the course (Mean = 26.35 and SD = 2.77) and Computer Science group (Mean = 22.90 and SD = 2.08) is $t = 3.55$. The greater the magnitude of ‘t’ greater the evidence against null hypothesis. Here the ‘t’ value (3.55) which is above the standard table value 1.96 the null hypothesis is rejected. Hence, there is significant difference in Behavioural tendencies to learn chemistry among the students before and after the course during their higher secondary learning years.

Hypothesis-5:

There is no significant difference in Attitude towards learning chemistry among students during their

higher secondary learning years.

Table 5 ‘t-test value for Attitude towards Chemistry Lessons means scores of students.

Group	N	Mean	S. D	‘t-value	0.05 Level of significance
At the start of the course	50	104.98	8.93	3.09	Significant
At the end of the course	50	95.49	6.35		

It was hypothesized that there is no significant difference in Attitude towards chemistry Lessons among students during their higher secondary learning years. Table. 5 shows results for Attitude towards chemistry Lessons of at the start of the course (Mean = 104.98 and SD = 8.93) and after the course (Mean = 95.49 and SD = 6.35) is $t = -2.45$. The greater the magnitude of ‘t’ greater the evidence against null hypothesis. Here the ‘t’ value (3.09) which is above the standard table value 1.96 the null hypothesis is rejected. Hence, there is significant difference in Attitude towards Chemistry Lessons among computer science and pure science group students during their higher secondary learning years.

RESULTS AND DISCUSSION

The following are the results of the data analysis:

- There is a significant difference in liking for theory chemistry lessons among students during their higher secondary learning years.
- There is a significant difference in liking for Chemistry laboratory work among students during higher secondary learning years.
- There is no significant difference in Evaluation beliefs about school chemistry among students during higher secondary learning years.
- There is a significant difference in Behavioural tendencies to learn chemistry among students during higher secondary learning years.
- There is a significant difference in Attitude towards chemistry lessons among students during higher secondary learning years.

The decline in students’ Attitude in learning Chemistry Lessons among of the students during their higher secondary learning years in this study is a major concern which is in parallel with Montes et al. (2018) study, which also depicts a decline in the students’ attitude towards chemistry as they proceed from lower to higher grades. The reason suggests by Montes et al. that the content of the chemistry lessons is tricky and challenging is also a major concern to be addressed. As Milian Kubiato (2017) finding shows that reduced number of practical hours could be a possible reason for the decline in Attitude towards chemistry lessons among students during higher secondary learning is also possible reason the decline in attitude towards learning chemistry in this paper.

Looking for factors that could probably be the reason for decline, the chemistry teacher who is handled the sample of the study listed out the heaviness of the syllabus, the shortage of the time available to complete the syllabus, lack of time to give hands-on experience to the students in the laboratory be the possible reason. However, the list of factors that causes the decline in the attitude towards learning chemistry is much larger in my perspective and it needs a serious in-depth study.

Educational implication:

- As the chemistry syllabus focuses more on the competitive exams like NEET, the below and average students are not so much considered in curriculum construction by the state board. In our opinion, a separate NEET group at the higher secondary level for those who aspire for NEET and another group for average and below average group could be constituted and the students could learn chemistry with lighter syllabus.
- The declining Attitude towards Learning Chemistry invites to revisit the teachers' curriculum construction and teaching methods used.
- The teacher has the responsibility to see the factors that influencing the students' attitude towards chemistry and develop a methodology to foster positive attitude towards chemistry learning at the higher secondary level.

Recommendations:

- The Government in its curriculum construction need to focus on the affective domain of Chemistry education and chemistry teachers are recommended to know in detail about the factors influencing the students' attitude towards chemistry at the higher secondary level.
- The chemistry teacher would use this Attitude towards Chemistry lessons scale as a diagnostic tool for formulating teaching and learning strategies. Ans again to use this same tool as an achievement tool to reevaluate the strategies used.

Conclusion:

Only when, the affective component of attitudinal construct of Attitude towards chemistry can addressed by the Government, the institution and teachers to enhance a positive attitude towards Chemistry will bring the desired achievement in Chemistry in their present learning environment as well in the future carrier. The significant difference in Student's attitude towards learning chemistry among the students during their secondary learning years needs further research and investigation.

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