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Academic stream, scientific attitude and learning styles

[1] Kavita, [2] Dr. Monika Sood
[1] Research Scholar, Department of Education, ICDEOL, Himachal Pradesh University, Shimla, Himachal Pradesh, India
[2] Assistant Professor, Department of Education, ICDEOL, Himachal Pradesh University, Shimla, Himachal Pradesh, India

Abstract
The present study was undertaken to investigate the relationship of academic stream, scientific attitude and learning style. The population of the present study consisted of all senior secondary school students studying in Himachal Pradesh. The sample comprised 240 students studying in senior secondary schools located in district Shimla, Himachal Pradesh. Seven learning styles were regarded as dependent variables. Academic stream and scientific attitude were treated as independent variables. The findings revealed that students belonging to science stream were significantly more prone towards verbal and logical learning style than arts stream senior secondary school students. Also it may be said that science stream students had more liking for the use of verbal and logical learning styles as compared to commerce stream senior secondary school students. Students having favourable scientific attitude differed significantly from the students having unfavourable scientific attitude on social learning style.

Keywords: academic stream, scientific attitude and learning styles

Introduction
A learning style is very important for every student as it has a strong influence in contribution of achievement. A learning style is a method in which individuals absorb and retain new information or skills, regardless of how it is described, but the process is different for each individual. Grasha (1996) [4] said "Learning style is collective experience of learning during the process of gaining knowledge". A learning style is a balanced measurement of a person resulting a person to react to the environment, how to interact and viewing something in the learning process. The term "learning styles" speaks to the understanding that every student learns differently. Many people recognize that each person prefers different learning styles and techniques. Technically, an individual's learning style refers to the preferential way in which the student absorbs processes, comprehends and retains information. Kolb (1984) [7] and Honey and Mumford (1992) described Learning Style as an individual's preferred or habitual way of processing and transforming knowledge. Learning Styles indicate that how a learner perceives, interact with, and responds to the environment. In fact, learning style is a criterion for individual differences, as individual characteristics and qualities which influence the ability of a learner in acquiring information, interaction with learners and teacher and his abilities to take part in learning experiences.

Each of us is unique and different from each other. We see many of things differently. We have our own opinion sand thinking, our own personalities, even our own fingerprints. Just like our unique fingerprint, we all have a unique learning style. Learning styles refer to a range of competing and contested theories that aim to account for differences in individuals' learning. A learning style is a series of theories that explain the differences in our individual patterns of understanding information. We all learn differently, and we prefer information to be presented to us in a particular way - a way that makes it easiest for us to understand.

There are seven different types of learning styles. Each learning style is often referred to using different names. The seven learning styles include:

- **Visual learning style (spatial):** learners prefer using pictures, images, and spatial understanding.
- **Verbal learning style (linguistic):** learner prefers using words, both in speech and writing.
- **Aural learning style (auditory-musical):** learners prefer using sound and music.
- **Physical learning style (kinesthetic):** Learners prefer using your body, hands and sense of touch.
- **Logical learning style (mathematical):** learners prefer using logic, reasoning and systems.
- **Social learning style (interpersonal):** learners prefer to learn in groups or with other people.
- **Solitary learning style (intrapersonal):** learners prefer to work alone and use self-study.

While each of us learns in a combination of ways comprising of several different learning styles, we typically favor one style and may not use one or more styles at all. Each learning style is an individual way of learning with distinct characteristics that affect both learning and personality.

Scientific Attitude
Scientific attitude is really a composite of a number of mental habits or of tendencies to react consistently in certain ways to a novel or problematic situation. These habits or tendencies include accuracy, intellectual honesty, open-mindedness, suspended judgment, criticalness and a habit of looking for true cause and effect relationship. It is a cognitive concept. Scientific attitudes are normally associated with the mental

processes of scientists. These habits are important in the everyday fife and thinking not only of the scientist but of everyone. According to Vaidya, N. (1999) [12] explained that "Scientific attitude as open mindedness, curiosity, judgements based upon scientific facts alone, willingness to test and verify conclusions, faith in cause and effect relationship, honest reporting, rejection of the principle of authority and more faith in the books written by specialists in their fields etc." Scientific attitudes possess attributes thought to be either true or false and do not express an evaluative quality. To lessen the semantic confusion, scientific attitudes maybe better labeled as "scientific attributes". The attributes of scientific attitude are rationality, curiosity, open mindedness, aversion to superstitions, objectivity in intellectual honesty and suspended judgment.

Khalid, Rozalina (2013) [6] in the study entitled "The Learning Styles and Academic Achievements among Arts and Science Streams Student" findings show that respondents prefer the dependent learning style followed by cooperation in all the variables namely gender, class, ethnic, family income and students' academic achievement. However, there can be a bit of a difference in terms of students who come from the home income of RM 2000, where they prefer cooperation followed by dependency. The Pearson Correlation analysis showed no significant relationship between learning styles as a whole with academic achievements, except for avoidance.

Singh, Ravi Kant and Dhar, Murli (2015) [11] "Relationship between learning styles and scientific attitude of secondary school students and their achievement in Science subject." Sample-By taking a sample of 500 secondary school students of science stream an attempt had to know the relationship between learning style, scientific attitude and achievement in science. Tool Used- With the help of standardized instruments Ex-post facto and Survey method were used. Results indicate that science students have different learning styles. Further, achievement in science subject was not significant differ in some groups of learning style but it was significant in some groups. Students having more and less scientific attitude of different categories of learning style were not significant overall but in some cases they were significant different.

In present age of science and technology focus must be given to enhance the scientific caliber of the individuals. This would be possible when we will select the right person for the task. It means we have to focus more on the practical subjects like science. So it is essential to study the attitude of younger generation towards science. It will prove quiet beneficial in selection of those candidates, who shows favourable attitude towards science. The favourable attitude of students will help them perform the task with keen interest leading to maximum outcome.

A small amount of research is available, still researcher remain engaged in exploring new dimensions in the concerned field. This period of life also demands involvement in serious studies and better learning styles. A better learning style helps an individual to opt better career in his life. There are so many factors which influence learning style of students. The present study will focus on finding the relationship between the academic streams, scientific attitude and learning styles. This is a unique attempt in the sense that by studying the learning styles of senior secondary school students in relation to academic stream and scientific attitude.

Jaleel, Sajna and Philip, Sherly (2017) [5] "A Study on The Relationship Between Scientific attitude and Achievement in Physics of secondary School Students" Objectives of the study-(1) To find out whether there exist any significant relationship between scientific attitude and Achievement in Physics of secondary school students for the total sample and sub-sample based on Gender. (2) To find out whether there exist any significant difference between Scientific Attitude of secondary school students based on Gender. (3) To find out whether there exist any significant difference between achievement in Physics of secondary school students based on Gender. Sample selected for the study. The sample selected for the study consists of 110 secondary school students in standard VIII of various schools of Kollam District. Out of 110 samples 55 were boys and 55 were girls. The samples were selected by using stratified sampling Technique. Tools used for the study Scientific Attitude Scale is a standardized tool prepared by Dr. Sukumaran Nair and Shakunthala Devi. Methodology used for the study-The investigators adopted Survey Method for collecting data of Scientific Attitude Scale. Statistical Technique used-(i) Descriptive Statistics (ii) Significance of difference between Means (iii) Pearson Product Moment Correlation. Major findings of the study- (a) There exists positive Correlation between Scientific Attitude and Achievement in Physics of secondary school students for the total sample and subsample based on Gender. (b)There is significant difference in Scientific Attitude of secondary school students based on Gender. (c) There is no significant difference on Achievement in Physics of secondary school students based on Gender.

Objectives

1. To find out the differences in learning styles of arts, science and commerce stream senior secondary school students.
2. To find out the differences in learning styles of students with favourable and unfavourable scientific attitude studying in senior secondary school students.
3. To find out the interactional effect of academic stream and scientific attitude on in learning styles of senior secondary school students.

Hypotheses

1. There would be significant differences in learning styles of arts, science and commerce stream senior secondary school students.
2. There would be significant difference in learning styles of students with favourable and unfavourable scientific attitude studying in senior secondary school students.
3. There would be significant interaction between academic stream and scientific attitude on learning styles of senior secondary school students.

Method and Procedure

The population of the present study consisted of all senior secondary school students studying in Himachal Pradesh.

Sample

The sample comprised 240 students studying in senior secondary school located in district Shimla, Himachal

Pradesh. The schools were selected through lottery method and students were drawn through random sampling method. These students were from arts, science and commerce stream having favourable as well as unfavourable scientific attitude.

Variables

Seven learning styles were regarded as dependent variables. Academic stream and scientific attitude were treated as independent variables.

Tools Used

- Learning Styles Inventory- Memletics Learning Styles Inventory by Sean Whiteley (2003) adapted by the researcher to measure learning styles (visual learning style, aural learning style, verbal learning style, physical learning style, logical learning style, social learning style and solitary learning style) of Senior Secondary School Students. It consists of 70 items. Ten items belonging to each dimension of the learning styles.
- Scientific Attitude Scale –In order to measure the Scientific Attitude of the subjects "Scientific Attitude Scale" developed and standardized by the researcher. It was based on five point likert type scale. There are positive and negative items with five dimensions namely Rationality, curiosity, Open Mindedness, Faith in Scientific Method, Aversion to superstition. There are 24 negative and 26 positive items in this tool.

Research Design

In the present study a 3X2 factorial design was used for analyzing the data in respect of three level of academic stream(arts, science and commerce) and two levels of scientific attitude (favourable and unfavourable) in each cell of the design. Thus 7 factorial designs of 3X2 natures were employed in the present investigation.

Statistical Techniques

Two-way ANOVA followed by t-test was employed in the study for analysis of data.

Results

The obtained results of two-way ANOVA in respect of learning styles have been given in table1. Significance of the difference in mean score of verbal learning style of arts, science and commerce students has been presented in table 2. Further significances of the difference in mean scores of logical learning styles of arts, science and commerce senior secondary school students have been reported in table 3.

Table 1: Summary of Two-way ANOVA in respect of seven learning styles

S. No	Learning Styles	Source of Variation	Sum of Square	Df	Mean Square	f-ratio
1	Visual Learning Style	Academic Stream (A)	20.93	2	10.46	1.30NS
		Scientific Attitude (B)	1.35	1	1.35	0.16NS
		Acad. Stream * Scientific Attitude (AXB)	2.5	2	1.25	0.15NS
2	Verbal Learning Style	Academic Stream (A)	67.10	2	33.55	4.58*
		Scientific Attitude (B)	9.20	1	9.20	1.25NS
		Acad. Stream * Scientific Attitude (AXB)	6.67	2	3.30	0.45NS
3	Aural Learning Style	Academic Stream (A)	16.13	2	8.06	1.03NS
		Scientific Attitude (B)	20.41	1	20.41	2.61NS
		Acad. Stream * Scientific Attitude (AXB)	5.73	2	2.86	0.36NS
4	Physical Learning Style	Academic Stream (A)	16.15	2	8.07	0.98NS
		Scientific Attitude (B)	4.81	1	4.81	0.58NS
		Acad. Stream * Scientific Attitude (AXB)	1.35	2	0.67	0.08NS
5	Logical Learning Style	Academic Stream (A)	81.63	2	40.81	6.84**
		Scientific Attitude (B)	0.15	1	0.15	0.02NS
		Acad. Stream * Scientific Attitude (AXB)	14.4	2	7.2	1.20NS
6	Social Learning Style	Academic Stream (A)	0.93	2	0.46	0.05NS
		Scientific Attitude (B)	100.10	1	100.10	12.00**
		Acad. Stream * Scientific Attitude (AXB)	17.7	2	8.86	1.06NS
7	Solitary Learning Style	Academic Stream (A)	6.77	2	3.38	0.47NS
		Scientific Attitude (B)	8.06	1	8.06	1.13NS
		Acad. Stream * Scientific Attitude (AXB)	0.85	2	0.42	0.42NS

*Significant at 0.05 level, ** Significant at 0.01 level and NS- not significant

It may be observed from table1 that academic stream had main effect on verbal learning style and logical style. Table1 further shows that scientific attitude had main effect on social learning style. However there is no interaction effect of academic stream and scientific attitude on any learning style.

Table 2: Significance of the difference in Mean scores of Verbal Learning Style of Arts, Science and Commerce Senior Secondary School Students.

S. No.	Academic Stream	N	Mean	SD	Comparison Group	t-value
1.	Arts	80	9.78	2.48	Arts vs. Science	2.95**
2.	Science	80	11.02	2.92	Arts vs. commerce	0.75 NS
3.	Commerce	80	10.07	2.66	Science vs. Commerce	2.20*

*Significant at 0.05 level, ** Significant at 0.01 level and NS- not significant

It is further evident from table 2 that mean score of science stream senior secondary school students (M=11.02) was greater than mean score (M=9.78) of arts stream students, and t-value was significant at 0.01 level, it may be inferred that science stream senior secondary school students were significantly more prone towards verbal learning style than arts stream senior secondary school students. But there was no difference in verbal learning style of arts stream and commerce stream senior secondary school going students as the obtained t-value (0.72) was not-significant at 0.05 level.

From table 2 it can also be seen that the t- value (2.20) for the comparison of mean score of science stream and commerce stream senior secondary school students was significant at 0.05 level which further indicates that the mean of science stream students (11.02) was greater than mean of commerce stream (10.07) senior secondary school students, it may be said that science stream students had more liking for the use of verbal learning style as compared to commerce stream senior secondary school students.

Table 3: Significance of the difference in Mean scores of Logical Learning Style of Arts, Science and Commerce Senior Secondary School Students.

S. No.	Academic Stream	N	Mean	SD	Comparison Group	t-value
1.	Arts	80	9.05	2.17	Arts vs. Science	3.83**
2.	Science	80	10.47	2.64	Arts vs. commerce	1.72NS
3.	Commerce	80	9.67	2.47	Science vs. Commerce	2.00*

*Significant at 0.05 level, ** Significant at 0.01 level and NS- not significant

It is further evident from table 3 that t-value (3.83) for the comparison of arts stream and science stream students was highly significant further mean score value (M=10.47) of science stream senior secondary school students was greater than the arts stream students (M=9.05).this means that science stream students have more tendency of using logical learning style as compared to arts stream students. There was found no difference between arts and commerce stream students in the use of logical learning style

Again in table 3 we can find that t-value was significant (t=2.00) for the comparison of mean scores of science stream and commerce stream senior secondary school students. Further mean score value of science (M=10.47) stream students was more as compared to commerce stream (M=9.67) senior secondary school students meaning thereby the preference of science stream students for the use of logical learning style was greater as compared to commerce stream senior secondary school students. No difference was found between Arts and Commerce stream students in the use of logical learning style.

Table 4: Means and SD's of Social Learning Style in respect Scientific Attitude

Scientific Attitude	N	Mean	SD
Favourable	120	11.67	2.78
Unfavourable	120	10.38	2.96

From table 4 it can be seen that students having favourable scientific attitude were having mean score (M=11.67) greater than the mean score (M=10.38) of the students having unfavourable scientific attitude. This implies that students having favourable scientific attitude had stronger preference for social learning style as compared to their counterpart students having unfavourable scientific attitude.

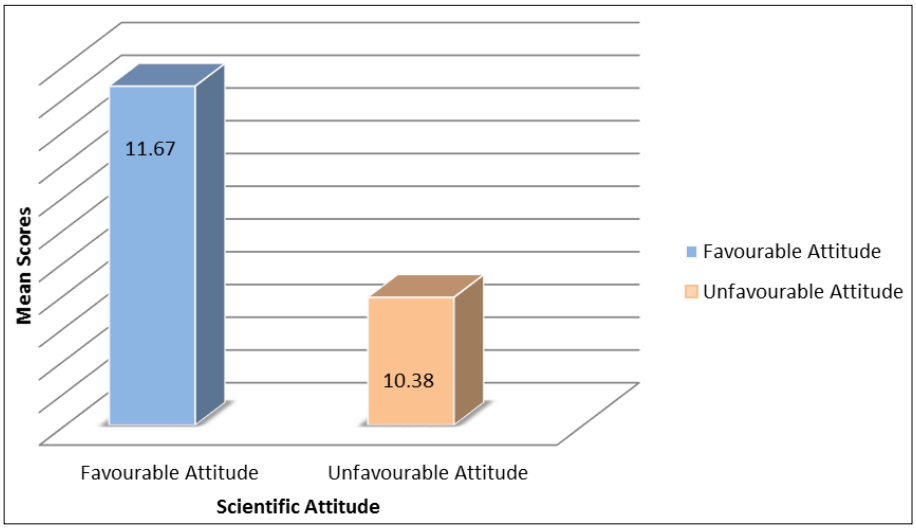

Fig 1: Showing difference in Mean Scores of Social Learning Style of favourable and un-favourable attitude Senior Secondary School Students.

So far the interaction is concerned, it was found non-significant (F=1.06; df 2 and 239). The effect of academic stream (Arts, Science and Commerce) was same for both the students having favourable scientific attitude and students having unfavourable scientific attitude

Discussion

Hypothesis 1 stated that there would be significant differences in learning styles of arts, science and commerce stream senior secondary school students. This was retained with reference to only two learning styles viz. verbal learning style and logical learning style. The findings revealed that students belonging to science stream were significantly more prone towards verbal and logical learning style than arts stream senior secondary school students. Also it may be said that science stream students had more liking for the use of verbal and logical learning styles as compared to commerce stream senior secondary school students.

The second research hypothesis stated that there would be significant differences in learning styles of the students having favourable and unfavourable scientific attitude. In this regard our findings anticipate that students having favourable scientific attitude differed significantly from the students having unfavourable scientific attitude on social learning style.

The result of interaction of academic stream and scientific attitude did not emerge out to be significant. Hence research hypothesis 3 was rejected.

Educational Implications

The findings of the study suggest that teachers should give proper attention so that the students of arts, science and commerce may feel comfortable in learning activities. In addition to the above, on two learning style namely verbal and logical, the science stream students were found superior to arts and commerce stream senior secondary school students. This implies that some appropriate intervention programmes be used to develop these two learning style among arts and commerce stream students.

Further such instructional procedures may be used with senior secondary school students which match verbal and logical learning style. Assessment of the performance of these students should also focus on tasks concerning these two learning styles.

It is further recommended that there is an urgent need to undertake studies for exploring the relationships of scientific attitude and learning styles so that broader generalizations may be formulated in this context.

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