

**EFFECTIVENESS OF SELECTED TEACHING STRATEGIES IN
RELATION TO THE LEARNING STYLES OF SECONDARY SCHOOL
STUDENTS OF DIFFERENT DISTRICT OF HARYANA STATE**

Pooja Kamboj¹, Sanjaya K. Das², Sushil Kumar Singh³

¹Ph.D Research Scholar, Department of Education, NIMS University, Jaipur, Rajasthan, India

²Department of Education, NIMS University, Jaipur, Rajasthan, India.

³Department of Education, Lovely Professional University, Punjab, India

ABSTRACT

The aim of the present study was to explore the effectiveness of selected teaching strategies in relation to learning styles of secondary school students in different District of Haryana. Keeping in mind the objectives of the research studies, the test data was collected from the three different district of Haryana. The data collected were tabulated and various statistical parametric techniques were used for calculation in order to achieve the framed objectives of the study. The present research focuses on analytical findings of the current study. The investigator provides both descriptive data and correlational statistics for each academic content area studied. Relevant figures are included to enhance the reader's understanding by adding a visual element to the presentation of the data and statistical analysis.

Keywords: *Learning Styles, Selected Teaching Strategies, Secondary School Education.*

I. INTRODUCTION

Effective teaching are always on the prowl for new and exciting teaching strategies that will keep the students motivated and engaged. Teaching not only consists of lectures, assignments given to students, and a final exam. But there are other teaching strategies which can be incorporated with and within the lecture format in order to stimulate, motivate and foster student learning. For effective teaching, it is important to consider the overall structure of the course as well as the physical constraints and time limits that might influence the delivery of the content, before deciding on teaching strategies. More teaching strategies at disposal will provide more flexibility in content delivery. Teaching method comprises the principles and methods used by teachers to enable student learning. These strategies are determined partly on subject matter to be taught and partly by the nature of the learner. For a particular teaching method to be appropriate and efficient it has to be in relation with the characteristic of the learner and the type of learning it is supposed to bring about. Suggestions are there to design and selection of teaching methods must take into account not only the nature of the subject matter but also how students learn.

The research on learning styles shows that individuals have another learning style besides the dominant one. In other words, an individual has one or more than one learning styles. When the individual has more than one learning styles, the levels of using it can change. Learning styles gives opportunities to recognize individual and

the differences between them. For this reason, a teaching style is required to devise learning approaches that take cognitive, affective and psychological factor into account. Learning styles has an important place in the lives of individuals. When the individual knows his/her learning style, s/he will integrate it in the process of learning so s/he will learn more easily and fast and will be successful. Another advantage of the identification of the own learning style by the student is that it will help the student to become an effective problem solver. The more successful the individual is at solving the problems s/he faces, the more control s/he will take over his/her own life. It is important that individuals receive education in areas suitable for their learning styles. A person educated in an area having no relationship to his/her learning style may lack confidence and s/he may be less successful.

Thus, it is evident that students have specific learning style preferences, and these preferences may be different between male and female students. Understanding a student's learning style preference is an important consideration when designing classroom instruction. To address this concern, faculty members should understand student's learning style preferences and design should be made accordingly. Based on the results of a meta-analysis of 42 experimental studies, Dunn et. al. (1995) claim that students who are taught by an approach compatible with their learning do better than those whose learning styles are not matched to teaching approaches. In a similar vein, Griggs and Dunn(1996) claim that students who learn from an approach compatible with their preferred learning style experience greater academic and have a more positive attitude towards learning. It is very much clear from the above discussion that learning styles has a great role and influence on the learning of the students. Also, if the teaching strategy can be taken as per the need of the learning style of the students, it may certainly contribute to the better learning among the students. So, such type of research work, which the researcher is going to undertake may be of great importance for the education field.

II. REVIEW OF LITERATURE

In India and abroad, significant numbers of studies have been carried out to establish the association concerning selected teaching strategies and learning style preferences for high school students. Most of these past studies have sought to establish the relationship between the two variables; whereby selected teaching strategies have been the independent variable and the learning styles has been taken as the dependent variable. Some of these studies have also sought to understand the relationship by gender, and most of them have found significant relationships between the two variables and by gender. In the present research study, reviews of selected literatures has been divided into the sub-sections: (i) Studies related to learning styles and preferences; (ii) Studies related to teaching styles and teaching strategies; (iii) Studies related to teaching strategies for English Language. The important contribution of various researchers has been recorded in the following sub-sections:

Mahajan N. (1999) conducted a study on learning style and locus of control of gifted and average students in different academic subjects. Researcher found that learning style of gifted student's in general day to day situation were found to be that of assimilators and where as those of average were found to be divergers. In the subject of science', both the gifted and average students had similar learning style that is of assimilator. David

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(2000) conducted a study on learning styles of gifted and non-gifted secondary school students studied in Hong Kong and China. Study was done by using Chinese version of learning style inventory. It was found that gifted students preferred interpersonal: verbal exchange and autonomous learning. No significant gender difference was found. The findings of study suggested that students of younger age group has significantly greater preference for learning styles related to games and student's activities as compared to older age group students. Li Guangchao (2000) had conducted a research to determine the relationship between english teaching strategies and learning styles by selecting four different types of teaching strategies for English Language. Drysdale et al. (2001) meted out a study on the impact of learning vogue on the tutorial performance of first year students by taking a sample size of 4546 and experimentally found that tutorial performance supported learning vogue and there is no important variations between the training designs and tutorial performance of science and liberal arts students. Aragon et. al. (2001) studied the influence of learning style preference on student success in online and face to face environments. The aim of the research study was to determine the impact of properly designed learning environments on student learning preferences, regardless of conceptual and practical knowledge of students. It has been concluded that students can be equally successful, in face to face or online environments, regardless of their learning style preferences. Kopsovich (2001) meted out a probe study to make a link between learning varieties of students and their arithmetic scores using Texas assessment of academic skills test. The test data was taken from North Texas Intermediate school by randomly selecting 500 students from grade five and it has been experimentally found that there exist a significance relationship of 0.542 at the 0.05 level of significance. Also, it has been suggested that providing a selected teaching strategies concerning students' learning style preferences will be beneficial for the student achievement. Liyan (2002) conducted a research study at Wuhan Science Technology University to investigate the learning styles of Chinese adult students and had analyzed the factors which are responsible for shaping their different learning style preferences. Srivastva (2002) conducted a study on secondary school students to determine their learning styles and achievement in the subject of science and it has been observed that the first learning styles of the secondary school students is accommodating learning styles and second popular learning styles is convergent. Fritz (2002) concluded that learning style inventory results can be used to create personal learning profiles that will empower students to become active learners and successful learners. David and Ryan (2002) conducted a study to compare the learning styles preferences for students opting online distance learning program and on campus students. It has been experimentally observed that the students opting online program were more independent than on campus students with respect to their learning styles preferences. Also, the authors had concluded that students enrolled in local health education online class have learning styles equivalent to on-campus students. Keri S. (2002) studied into congruities between instructors and students learning styles and student satisfaction revealed that the results indicated that student satisfaction did not relate to congruities in styles it was palpable to conclude that student satisfaction encompassed indeterminable number of variables. Brown (2003) examine that as a result of most business categories serene of scholars having different learning styles, lecturers had to adopt a versatile approach on their tutorial follow so that their final approach will be integrated. Martin (2003) found that some students had long-faced language difficulties with huge success however with very little efforts.

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In distinction, different students long-faced these difficulties with to a small degree success and delight. They conjointly showed that every learner had his/her best approach of learning and was laid low with his/her culture, instructional background and temperament. Hmieleski (2003) conducted a research on learning style preferences and practically observed that students preferred learning style impacted student performance and that students learn more effective when these exist a correlation between learning style and teaching strategies. Verma (2006) conducted a research study on learning styles at Himachal Pradesh university by taking a sample size of 180 students of different courses and observed that course related dissimilarities happened in learning styles for university level students. Patel (2006) in a research study on learning styles preferences had indicated that cooperative learning was found to be effective in teaching science in a school. The experimental results show accomplishment of positive individual and social skills in psychomotor and cognitive affective areas. Chere Campbell (2006) conducted a study to observe the impact of preferred learning styles and perception of barriers on completion of external baccalaureate degree programme. It was found out that multivariate analysis resulted into significant difference in both learning styles and perceived barriers of determined between students preferred learning styles and perception of barrier to completion of an external baccalaureate degree. Greenfield S. (2007) at Oxford University published an article on 29th July, 2007 in Times Educational Supplement Magazine that the learning styles approach to teaching is nonsense as per neuroscientific point of view. Slater and Iujan (2007) conducted study on the influence of gender in learning style preference among first year medical students and applied learning preferences questionnaire i.e. visual auditory, reading/writing, kinesthetic (VARK). The sample data of 56.7 % female students and 56.1% male students was taken into consideration, while conducting the research study and it has been observed that there is no significant difference between genders with respect to types of modality combinations. Tight (2007) conducted a research study on English college students learning Spanish language and experimentally found that regardless of perceptual learning style preference, students performed equally well on vocabulary tests. Woste (2007) studied to look at the best mechanism for relating any particular individual's cognitive learning style to relevant material in an adaptive hypermedia platform for the individual in a kinesthetic, visual or auditory environment. It has been experimentally concluded that if the study material was designed by considering individuals learning preferred style, the quality of learning material will be enhanced. Halder (2007) concluded that science students were found to be most cooperative than arts students in terms of learning attitudes and there is significant difference between science and commerce and science and commerce students were almost uniformly inclined towards competitive learning attitudes than arts students. Male and female students showed no significant difference in the nature of learning behavior attitudes. Singh (2008) conducted a research study to determine the relationship between learning style preference and academic achievement for high school students. The sample size of 538 students of 10th grade was taken from rural and urban area of Dehradun in Uttaranchal State. It has been experimentally observed that no significant relationship between Long-Attention Span and Short-Attention Span for Learning Style Preference of the rural area girls. Sharma and Verma (2009) in a research found that main effect of intelligence was not found significant for learning modes (concrete experience, reflective observation, abstract conceptualization and active experimentation) and Learning styles (imaginative, analytical, precision

and dynamic).it is found that there is non-significant interaction between personality and learning styles. Neither extroversion nor neuroticism dimension of personality in combination with intelligence showed significant effect on any learning mode or any learning style.

III. TEST DATA AND SAMPLE SIZE

The present study aims at finding the effectiveness of selected teaching strategies in relation to learning styles of Secondary School Students. In order to achieve these objectives a sample of 800 students was drawn from various secondary schools of Fatehabad, Sirsa and Hisar districts of Haryana state. The description of used test data is depicted in Fig.1. In order to answer the research questions, the investigator has used various Tools/instruments in the data collection process of this research study to obtain the scores necessary to perform the indicated statistical analyses. The information is collected through a 3-item questionnaire. This is achieved by using a proved questionnaire followed by a statistical analysis method. The questionnaire has two versions; version 1 is designed to investigate the learning and teaching styles of the students and teachers respectively. In the present study, the researcher used the following standardized psychological tools:

- CAPSOL Styles of Learning Inventory (Mansfield Ohio, 2010)
- Barsch Learning Style Inventory (BLSI)
- BSEH Standardized Tests of Achievement
- Twenty lesson plans for each selected strategies will be prepared by the investigator to teach English to 10th class students.

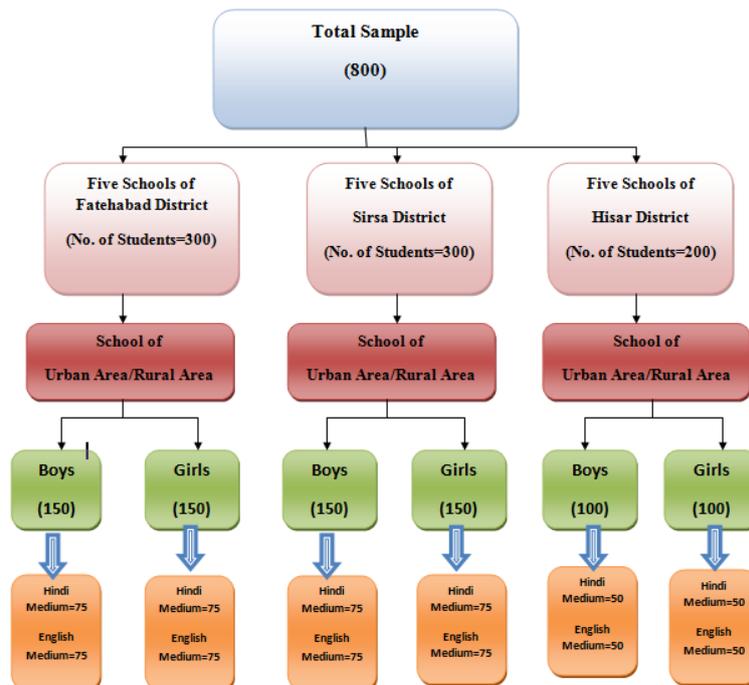


Fig.1: Description of Sample data used

In order to determine the learning styles preferences of secondary school students, sample size of 800 students from class X of various secondary schools of Fatehabad, Sirsa and Hisar districts of Haryana state was taken into consideration, which is diagrammatically shown in Fig.2(a). Keeping in mind the nature of the problem, stratified random sampling technique was used to collect data. The targeted sample population of 800 was not achieved due to drop out of 36 respondents during the data collection process, thus achieving a response rate of 95.5%. In terms of the gender of the students, majority of the students are female 438 (57%) and the minority 326 (43%) are male. This was due to the fact that most of the targets school were girl's school and only few were co-education schools. Fig.2 (b) shows the pictorial representation of the sample data with respect to their gender.



Fig.-2(a): Student Profile and Drop out Students Details

(b) Gender Profiles of the sampled data

IV. RESULTS AND DISCUSSION

In order to analyse and discuss the results, the overall study has been divided into four different objectives. The interpretation of the effective research study has been presented in the following sub-sections:

Objective-1: To identify the learning styles of secondary school students

In order to identify the learning style preferences of secondary school students, CAPSOL Styles of Learning Inventory (Mansfield Ohio, 2010) and Barsch Learning Style Inventory (BLSI) was used. The students were asked to answer the statements listed in Learning Style Inventory on their preferred learning style. The three learning styles were tested in BLSI include: Visual (V), Auditory (A) and Kinesthetic (K). A score of 21 and above in a given dimension would mean that the student prefers that particular learning style. However, for the purpose of this study, the mean scores of the learning style dimensions will not be emphasized because they show the strength of that modality and less information about the preference.

Table-1: Overall Learning Style Preference among secondary school students

| Statistics of Learning Styles Preferences of Secondary School Students | | | | | | | |
|--|----------------|------------------|---------------------|------------|------------|------------|-------------|
| | Visual Learner | Auditory Learner | Kinesthetic Learner | VA Learner | VK Learner | AK Learner | VAK Learner |
| Number of students | 81 | 22 | 5 | 278 | 54 | 29 | 295 |
| %age of Learning Styles | 10.6020% | 2.87% | 0.6544% | 36.3874% | 7.0680% | 3.7958% | 38.6125% |
| Mean | 29.93 | 31 | 28 | 29.3 | 28.84 | 28.5 | 29.04 |
| SD | 3.525 | 5.345 | 2.828 | 2.439 | 2.478 | 3.171 | 2.148 |
| Variance | 12.424 | 28.571 | 8 | 5.948 | 6.14 | 10.056 | 4.615 |
| Skewness | 0.603 | 0.239 | | 0.367 | 0.079 | 0.47 | 0.136 |
| Kurtosis | -0.312 | -1.51 | | -0.085 | -0.562 | -0.185 | -0.396 |
| Sum | 868 | 248 | 56 | 2901 | 548 | 285 | 3136 |

Further, in this study, the students' learning style preferences reported include: unimodal (one strong dimension), bimodal (two strong dimensions) and trimodal/multimodal (three strong dimensions). Table-1 shows that majority of the students have strong visual, auditory and kinesthetic modalities. The most preferred learning style by the students is the multimodal dimension (Visual/Auditory/Kinesthetic) with 38.6125% which involves all the three modalities. The trimodal learning style is followed by the Visual/Auditory (bimodal) with 278 (36.3874%) of the students reporting their preference on the same and on third position is the single Visual dimension with 10.6020% of the respondents reporting their preference on it. The least preferred learning style dimensions are the single Auditory and Kinesthetic learning styles which had 2.87% and 0.6544% preference levels respectively.

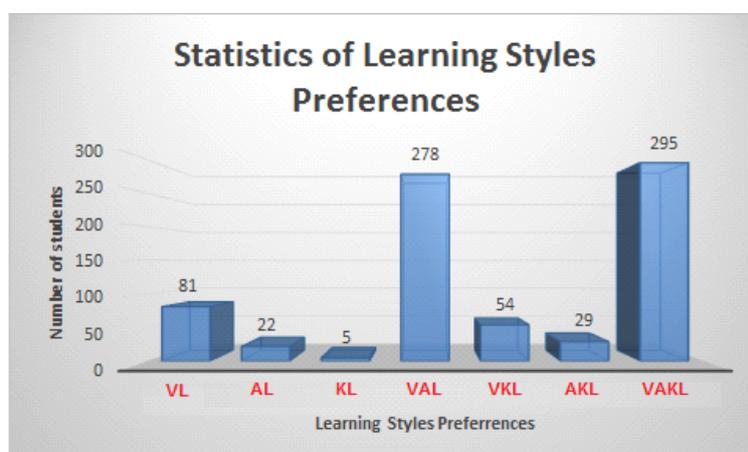


Fig.3: Statistics of Learning Styles Preferences of Students

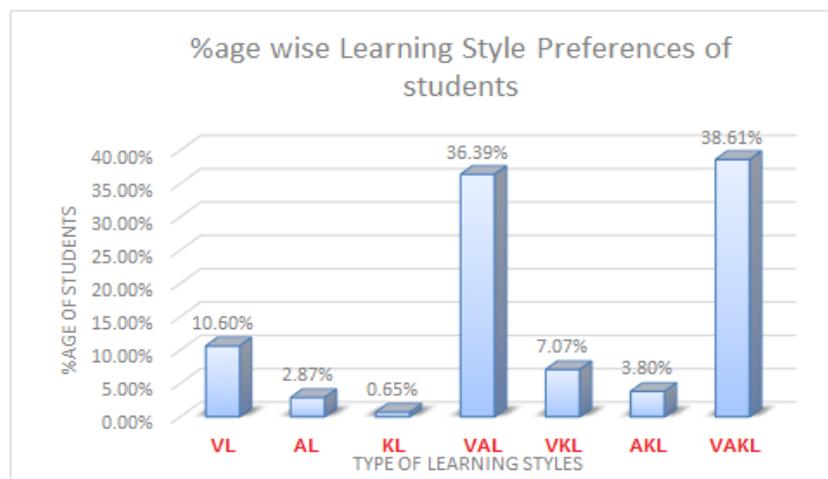


Fig.4: Percentage wise Statistics of Learning Styles Preferences of Students

Learning Style Preference by Students' Gender

Table-2 shows the Learning Style Preference of students with respect to their Gender. When examined through a gender perspective, there is no big difference in percentages of the students who prefer various learning styles. For example, some students prefer the trimodal (VAK) learning style (Female=38.127% vs. male=40.184%), others prefer bimodal learning styles such as Visual/Auditory (Female=38.584% vs. male=33.128%), Visual/Kinesthetic (Female=5.022% vs. male=8.588%), Auditory/Kinesthetic (Female=2.511% vs. male=4.601%); while others prefer unimodal learning styles such as Visual (Female=10.730% vs. male=10.736%), Auditory (Female=3.424% vs. male=2.760%) and kinesthetic which had a preference of 1.598% among the female students only.

Table-2: Learning Style Preference by Gender

| Statistics of Learning Style Preference by Students' Gender | | | | | | | | |
|---|-----------------|-------|-----|---------|---------------|-------|-----|---------|
| | Female Students | | | | Male Students | | | |
| | Mean | SD | N | %age | Mean | SD | N | %age |
| Visual learner | 30 | 3.464 | 47 | 10.730% | 29.88 | 3.686 | 35 | 10.736% |
| Auditory Learner | 33 | 5.774 | 15 | 3.424% | 29 | 4.761 | 9 | 2.760% |
| Kinesthetic Learner | 28 | 2.828 | 7 | 1.598% | | | | 0.000% |
| VA Learner | 29.33 | 2.47 | 169 | 38.584% | 29.28 | 2.433 | 108 | 33.128% |
| VK Learner | 28.17 | 2.229 | 22 | 5.022% | 29.15 | 2.609 | 28 | 8.588% |
| AK Learner | 30 | 2.646 | 11 | 2.511% | 27.86 | 3.338 | 15 | 4.601% |
| VAK Learner | 28.89 | 2.286 | 167 | 38.127% | 29.15 | 2.048 | 131 | 40.184% |

Graphical representation of learning styles preferences between male and female students' groups are shown in Fig-5 and percentage wise representation of learning styles preferences between male and female students' groups are depicted in Fig-6.

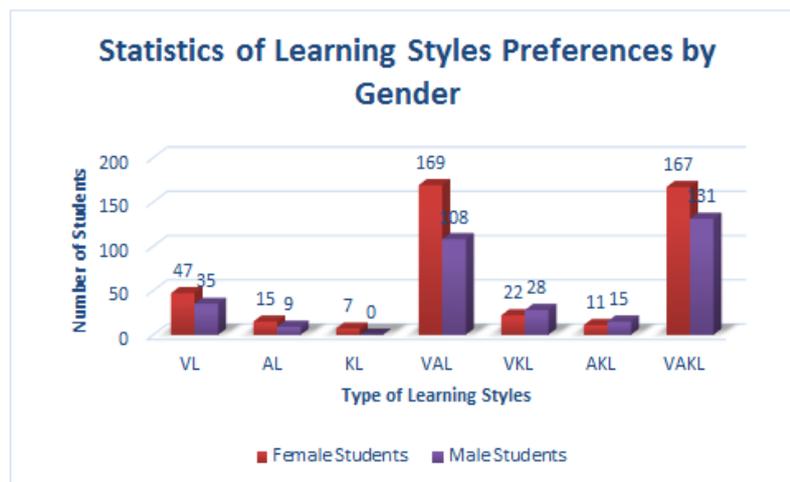


Fig.5: Learning styles preferences between male and female students' groups

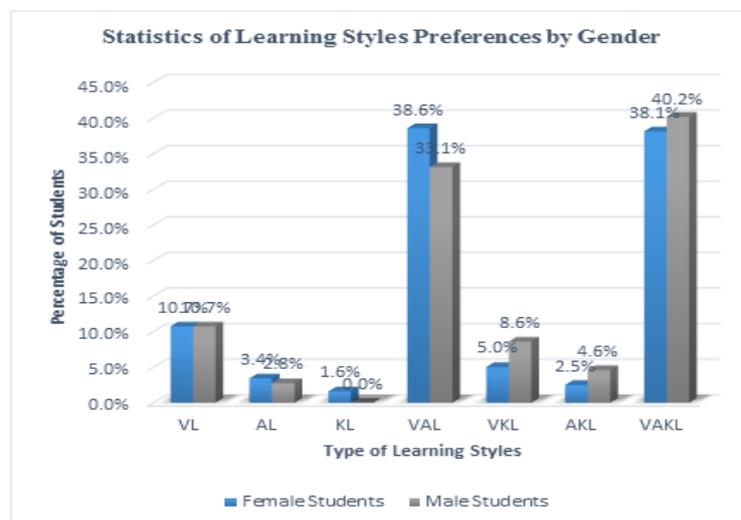


Fig.6: Percentage wise Learning styles preferences between male and female students' groups

Objective-2: To study the level of academic achievement of secondary school students.

In order to study the level of academic achievement for secondary school students, The standardized test of achievement pattern of Board of School Education, Haryana (BSEH) is taken into consideration. BSEH examination pattern is a newly developed instrument adopted by Board of School Education, Haryana as the Semester-wise achievement for students for primary to Secondary classes. This instrument measures student

achievement in relation to the state academic standards in the following content areas: Language (English/Hindi), Mathematics, Science, and Social studies and Moral Education. In the proposed research study, the subject of English was taken into consideration for effective results.

Table-3: Level of academic achievement of secondary school students

| | | Level of Achievement | | | |
|---------------------------|---------------|---------------------------------------|---------------|--------|---------|
| | | High Achievers | Low Achievers | Total | |
| Gender of Students | Female | Count | 287 | 173 | 460 |
| | | % within Gender of the Student | 62.30% | 37.70% | 100.00% |
| | | % within Level of achievement | 46.60% | 41.80% | 44.70% |
| | | % of Total | 37.57 | 22.64 | 60.21 |
| | Male | Count | 175 | 129 | 304 |
| | | % within Gender of the Student | 57.57% | 42.34% | 100% |
| | | % within Level of achievement | 53.40% | 58.20% | 55.30% |
| | | % of Total | 31.90% | 23.40% | 55.30% |

The sample population was drawn from four secondary schools selected based on the schools' achievements levels in the 2013 BSEH examination and by gender. Table-3 shows that among the selected 460 female students, 287 (62.30%) were high achievers and 173 (37.70%) were low achievers. Among the total male students of 304, 175 (57.57%) were high achievers as compared to 129 (42.43%) who were low achievers. In terms of the academic achievement levels, among the high achievers, 46.60% were females while 53.40% were males. Among the low achievers, 41.80% were female while 55.30% were male. Graphical representation of Level of academic achievement of secondary school students is shown in Fig. 7.

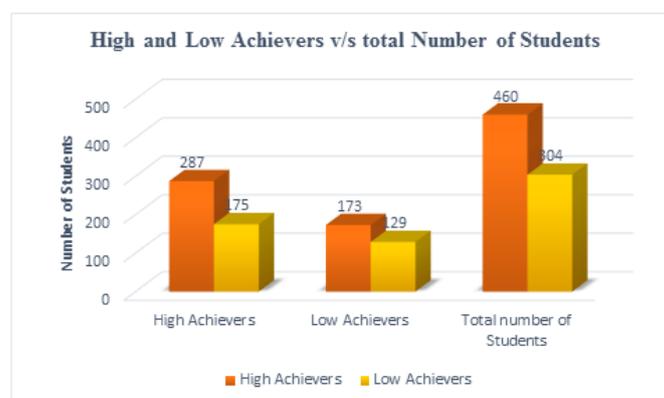


Fig.7: Level of academic achievement of secondary school students

Objective-3: To compare the academic achievement of secondary school students having different learning styles.

The comparative analysis of academic achievement of secondary school students with respect to different learning styles are depicted in Table-4 and Table-5. According to level of achievements, the comparison was divided into two categories i.e. High Achievers and Low Achievers. Table-4.4 depicts the results of the learning style preference analyzed based on the high achieving group of the students. Generally, there is no big difference of learning styles preference based on the academic achievement levels. Majority of the high achievers (40.43%) prefer trimodal (VAK) learning styles. Others are bimodal learners, for example, 34.35% are Visual/Auditory, 6.09% are Visual/Kinesthetic and 3.70% are Auditory/Kinesthetic learners. The rest are unimodal: 12.83% are Visual and 2.61% are Auditory. There is no kinesthetic learner among this group. Fig.8 represents the graphical information concerning Learning Style Preference among High Achievers student's group.

Table-4: Learning Style Preference among High Achievers student's group

| Statistics for Level of achievement for High Achievers | | | | | | |
|--|----------------|------------------|------------|------------|------------|-------------|
| | Visual Learner | Auditory Learner | VA Learner | VK Learner | AK Learner | VAK Learner |
| N | 59 | 12 | 158 | 28 | 17 | 186 |
| %age | 12.83% | 2.61% | 34.35% | 6.09% | 3.70% | 40.43% |
| Mean | 30 | 31 | 29.29 | 29.17 | 29 | 29.45 |
| SD | 4 | 6.218 | 2.333 | 2.552 | 4.05 | 2.164 |
| Variance | 16 | 38.667 | 5.444 | 6.515 | 16.4 | 4.683 |
| Skewness | 0.497 | 0 | 0.309 | 0.329 | 0 | 0.054 |
| Kurtosis | -0.841 | -2.433 | -0.229 | -1.262 | -1.664 | -0.257 |
| Sum | 630 | 124 | 1640 | 350 | 174 | 1944 |

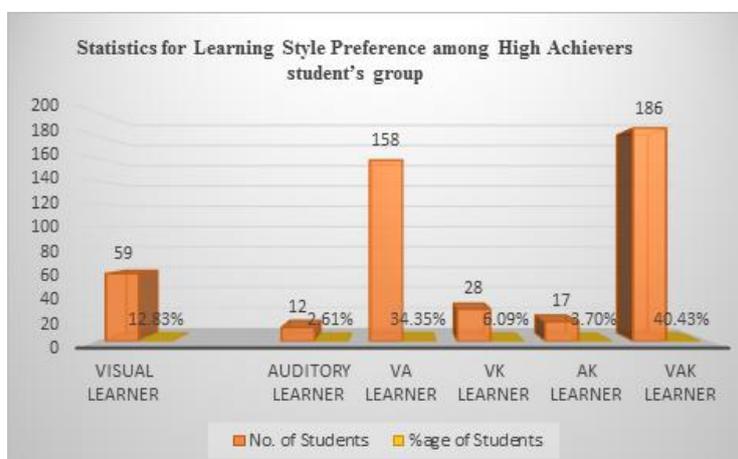


Fig.8: Graphical representation of Learning Style Preference among High Achievers student's group

Similarly among the low achievers, majority (39.49%) are trimodal (VAK) learners followed closely by the Visual/Auditory learners with 38.14%. Other bimodal learners include Visual/Kinesthetic (6.25%) and Auditory/Kinesthetic learners (3.62%). The rest are unimodal: Visual (7.24%), Auditory (3.62%) and the least being the kinesthetic learners (1.64%) among this group. Statistics representing the learning styles between the low achieving groups were shown in Table-5 and Fig.9 below:

Table-5: Learning Style Preference among Low Achievers student’s group

| Statistics for Level of achievement for Low Achievers | | | | | | | |
|---|----------------|------------------|---------------------|------------|------------|------------|-------------|
| | Visual Learner | Auditory Learner | Kinesthetic Learner | VA Learner | VK Learner | AK Learner | VAK Learner |
| N | 22 | 11 | 5 | 119 | 19 | 11 | 117 |
| %age | 7.24% | 3.62% | 1.64% | 39.14% | 6.25% | 3.62% | 38.49% |
| Mean | 29.75 | 31 | 28 | 29.33 | 28.29 | 27.75 | 28.38 |
| SD | 1.982 | 5.292 | 2.828 | 2.598 | 2.43 | 1.258 | 1.975 |
| Variance | 3.929 | 28 | 8 | 6.749 | 5.905 | 1.583 | 3.9 |
| Skewness | 1.486 | 0.864 | | 0.427 | -0.659 | -1.129 | 0.156 |
| Kurtosis | 2.973 | -0.286 | | 0.091 | 0.609 | 2.227 | -0.689 |
| Sum | 238 | 124 | 56 | 1261 | 198 | 111 | 1192 |

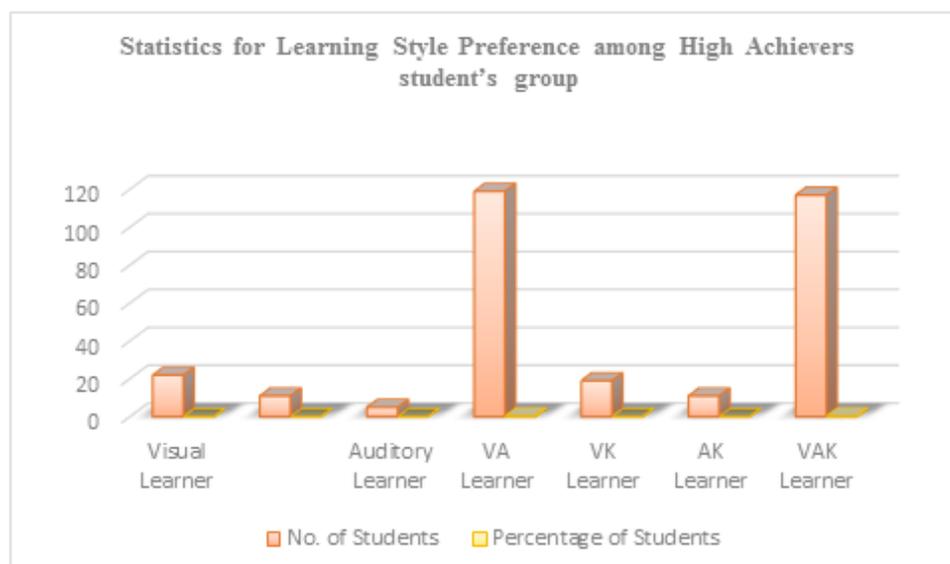


Fig.9: Graphical representation of Learning Style Preference among Low Achievers student’s group

Relationship between Learning Styles and Academic Achievement for Secondary School Students

In order to establish the relationship between learning styles and academic achievement of the students the Pearson Moment Correlation Coefficient was used. Table-6 show that there is generally positive relationship between learning styles and academic achievement with varying strengths ranging from 0.246 and 0.777 and also the number of students in preference for a certain learning style.

Table-6: Correlation Coefficients between Learning Styles and Academic Scores by Gender

| Correlations between Learning Styles and Academic achievement | | | | |
|--|---------------------|----------------|-------------|---------------|
| Types of Learner | | Overall | Male | Female |
| Visual learner | Pearson Correlation | 0.396 | 0.373 | 0.509 |
| | Sig. (2-tailed) | 0.033 | 0.155 | 0.076 |
| | No. of Students | 82 | 35 | 47 |
| Auditory Learner | Pearson Correlation | 0.777 | 0.917 | 0.843 |
| | Sig. (2-tailed) | 0.023 | 0.083 | 0.157 |
| | No. of Students | 24 | 9 | 15 |
| Kinesthetic Learner | Pearson Correlation | 1 | too small | 1 |
| | Sig. (2-tailed) | | | |
| | No. of Students | 7 | 0 | 7 |
| VA Learner | Pearson Correlation | 0.246 | 0.225 | 0.267 |
| | Sig. (2-tailed) | 0.014 | 0.115 | 0.064 |
| | No. of Students | 277 | 108 | 169 |
| VK Learner | Pearson Correlation | 0.666 | 0.775 | 0.541 |
| | Sig. (2-tailed) | 0.002 | 0.002 | 0.268 |
| | No. of Students | 50 | 28 | 22 |
| AK Learner | Pearson Correlation | 0.462 | 0.147 | 0.895 |
| | Sig. (2-tailed) | 0.178 | 0.753 | 0.294 |
| | No. of Students | 26 | 15 | 11 |
| VAK Learner | Pearson Correlation | 0.738 | 0.754 | 0.743 |
| | Sig. (2-tailed) | 0 | 0 | 0 |
| | No. of Students | 298 | 131 | 167 |

According to the Table-6, a general positive relationship was reported among all the various learning style dimensions, except for the kinesthetic dimension which had a frequency of 7 and the correlation coefficient could not be computed due to the small size of the sample. The overall trimodal (VAK) coefficient of 0.738 (N=298) indicated a strong correlation which is also significant at 0.05. Further, the relationship for the trimodal for both male ($r=0.754$, $N=131$) and female ($r=0.743$, $N=167$ students) was strong and significant at 0.01.

The other unimodal (V, A and K) and bimodal (VA, VK and AK) learning style dimensions had a positive relationship but which were not significant at 0.021 or 0.05 levels. For instance, the relationship for the V-learners was 0.396 (N=82); A-learners, 0.777 (N=24); VA-learners, 0.246 (N=247); VK-learners, 0.666 (N=50) and AK-learners 0.462 (N=26). This indicated positive relationships, but they were not significant. When examined from a gender perspective, the relationships for the unimodal and bimodal learning styles were not significantly different. The small samples for the various learning style categories may justify why the relationships are not significant at 0.01 or 0.05 levels.

When the data was disaggregated by the academic achievement levels (high and low), the relationship between learning styles and academic achievement was positive and varying from weak to strong relationships. Further, only the relationship among trimodal learners for both high ($r=0.691$; $p<0.001$) and low achievers ($r=0.800$; $p<0.001$) was significant, while the rest were not. The strongest relationship existed between the auditory learners and academic achievement, and among high ($r=0.830$; $p>0.05$) and low achievers ($r=0.986$; $p>0.05$), although the sample for the auditory learners was quite small and the relationship was not statistically significant.

Significance of the Research study using One-Way Analysis of Variance

A one-way analysis of variance (ANOVA) was conducted to investigate the existence of possible differences among learning style dimensions and the two academic achievement groups. To determine whether any of the differences between the means are statistically significant, a comparison between the p-value and the significance level was done to assess the null hypothesis. The null hypothesis states that the population means are all equal. The results of the analysis are displayed in Table-7 below:

Table-7: Significance of the Research study using One-Way Analysis of Variance

| Analysis of Variance (ANOVA) | | | | | | |
|------------------------------|----------------|----------------|----|-------------|-------|-------------------|
| | | Sum of Squares | df | Mean Square | F | Significant Value |
| Visual learner | Between Groups | 179.195 | 14 | 12.8 | 1.062 | 0.456 |
| | Within Groups | 168.667 | 14 | 12.048 | | |
| Auditory Learner | Between Groups | 198 | 6 | 33 | 16.5 | 0.186 |
| | Within Groups | 2 | 1 | 2 | | |
| Kinesthetic Learner | Between Groups | 8 | 1 | 8 | | |
| | Within Groups | 0 | 0 | | | |
| VA Learner | Between Groups | 108.113 | 21 | 5.148 | 0.835 | 0.67 |
| | Within Groups | 474.796 | 77 | 6.166 | | |
| VK Learner | Between Groups | 92.86 | 12 | 7.738 | 2.628 | 0.122 |
| | Within Groups | 17.667 | 6 | 2.944 | | |
| AK Learner | Between Groups | 78 | 8 | 9.75 | 0.78 | 0.71 |
| | Within Groups | 12.5 | 1 | 12.5 | | |
| VAK Learner | Between Groups | 314.605 | 27 | 11.652 | 5.2 | 0 |
| | Within Groups | 179.247 | 80 | 2.241 | | |

According to the Table-7, the difference among high and low achievement groups is trivial with respect to the trimodal (VAK) learning style dimension ($df=27$, $F = 5.2$, $p<0.05$ level). The results also denote that there is not much difference in preference for this learning dimension among high and low achievement groups. The preference for both learning style dimensions among high and low achievement groups are the same. On a whole, the academic achievement groups have similar preference for all the three learning style dimensions.

V. CONCLUSION

The aim of the present study was to explore the effectiveness of selected teaching strategies in relation to learning styles of secondary school students in different District of Haryana. Keeping in mind the objectives of the research studies, the test data was collected from the three different district of Haryana. The data collected were tabulated and various statistical parametric techniques were used for calculation in order to achieve the framed objectives of the study. The present research focuses on analytical findings of the current study. The investigator provides both descriptive data and correlational statistics for each academic content area studied. Relevant figures are included to enhance the reader's understanding by adding a visual element to the presentation of the data and statistical analysis.

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