

A Study of Relationship between Learning Preferences and Academic Achievement

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Abstract

Major focus of this study was on visual, auditory and kinesthetic learning preferences of college students as given in Dunn and Dunn model (Dunn & Dunn, 1993) and their relationship with academic achievement of students. The nature of study was quantitative, descriptive and correlational. All (male and female, science and arts) students enrolled in B.A. /B.Sc. and BS programs of all public sector colleges of Punjab province constituted the population of study. The study was delimited to six districts of Punjab province with two districts from each region (North, Central, & South Punjab). Three-stage cluster sampling technique was used to select the sample of 1200 students. Barsch Learning Preferences Inventory (BLPI) (visual, auditory, & kinesthetic) developed by Barsch (1996) was used as a research instrument. Product Moment correlation coefficient was used to find out relationship between each learning preference and academic achievement. Furthermore, differences among low achieving and high achieving students with respect to their learning preferences were analyzed by applying z-test. It was concluded that college students were predominantly visual in their learning preference. High achieving students were also more visual and kinesthetic. Further, there was also a significant relationship between auditory learning preference and academic achievement.

Keywords: Learning preferences, Academic achievement, High achievers, Low achievers

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Introduction

Learning preferences (LP), which is a complex concept, has conditions in which learners perceive, process, store and recall what they try to learn (James & Gardner, 1995). Learning preferences are defined as relatively stable indicators of how students perceive factors of learning environment for interaction and response for the composite cognitive, emotional, social and physical development and learning (Keefe, 1979). College students in a learning situation are different in many aspects, because, besides other variations, they have developed their own learning preferences. Miller (2001) viewed that it is responsibility of educators and teachers to understand and deal with the diversity of students' learning preference. There are many theories regarding learning preferences. This research focused on Dunn and Dunn model of learning preferences.

Dunn and Dunn (1993) hold their opinion that learning preference is divided into five major stimuli strands. The branches and channels of stimulus are: a) environmental, b) emotional c) sociological d) physical, and e) psychological factors which influence learning, i.e., how many people learn (Dunn, 2003). Pakistani citizens being a part of developing country try to follow new trends so as to make them a member of developed countries. There is an evident room for changes and improvements in all sectors and areas of life but most essential change that is crucial to the cause is in educational system and the means of teaching. Education being the milestone, each nation has to follow to achieve objectives it sets for its development. It is responsibility of educators to come up with those teaching ideologies that can give an efficient, effective, production and a qualified staffing that can prove prosperous in future. This study focused on learning preferences of college students. By knowing what they want and how they want to get educated can be an effective tool for educators as well. By having such in-depth information regarding the likes and dislikes of students, the learning curve and cycle both can become more effective. This is a two way process in which both students and educators need to know learning preferences. Among three styles of learners, all are beneficial but one or more are superseding others. This dominant style is the best explanation of how learning should be done after filtering the other irrelevant or unrelated material. One specific style may not be the only explanation to each task as other styles may also be used in combination to get learning reach its apex of understanding for all concerned parties.

Statement of the problem means stating some difficulty, some issue, some conflict or some controversy in education or teaching and learning that needs to be resolved before it becomes a national crisis in education in future. The quality at all level of education in Pakistan is not upto the mark, especially at intermediate level. College teachers primarily use traditional lecture method without taking it into consideration such

student characteristics as their learning styles and other personal and social factors. Unless the teaching strategies match with student characteristics like their learning preferences so as to enhance academic achievement, youth will not be instrumental in revolutionizing the decaying national economy. The link between the variables of learning preferences and academic achievement needs to be established among youth in order to revert the impending educational crisis. The purpose of the study, therefore was to measure their sensory learning preferences of college students and to determine relationship between their learning preferences and academic achievement.

Objectives of the study

The main objectives of the study were:

1. To measure college students' learning preferences.
2. To explore the difference between high achievers and low achievers in their preferences for learning.
3. To explore relationship between students' learning preferences and their academic achievement.

Hypotheses

Hypotheses of this study were:

H₁: There is significant difference between mean visual learning preference scores, mean auditory learning preference scores and mean kinesthetic learning preference scores of high achievers and low achievers.

H₂: There is significant relationship between students' visual learning preference scores, auditory learning preference scores and kinesthetic learning preference scores and their academic achievement scores.

Literature Review

According to Claxton and Murrell (1987), the psychologist Allport used the term 'style', in a publication in 1961, 'to refer to consistent patterns on the part of individuals'. Wise and Lovatt (2001) have also done some remarkable work that is instigating and exciting both in field of preferences in learning, in context of schools, as well as can be seen in teachers research for effectiveness (Hay McBer, 2000). Learning preferences is generally accepted as the beliefs, preferences and behaviors of individuals, in certain circumstances to help them learn (Brown, 2000). People can differ a little in their ways to learn or much differ in their ways to learn (Dunn & Griggs, 1998) e.g. you may ponder upon which way of learning a name is effective for you, whether it is in written form or visual form, whether learning to see or read will be the best. If we learn a name better by hearing, we are auditory learners (Slavin, 2000).

Three facets of learning preferences recognized by James and Blank (1993) are: 1) how an individual student prefers to process information. It is defined as identifying, pondering, handling problems to solve, and structures relating to normal memory. Such types of preferences as perceptions, organization of the knowledge are considered as unique and consistent. 2) In style based on emotions, attention, mood and how to motivate yourself to maintain the behavior related to personality traits is defined. 3) Physiological style can be defined as the response of bio-based mode, depending on the physical environment, gender differences and personal nourishment and health. These three facets of learning preferences combine to provide a comprehensive approach, taking into account for considering students' mind, emotions and body.

Branch and channel related to environment combines peoples' preferences for sound and lighting, furniture and temperature, and seating plan. Emotional factor focuses on students' encouragement, responsibility, and identity. Social preferences factor provides regulatory requirements for students to deal learning alone or joint learning with their colleagues, as part of a team with teachers, either formally or collectively. Physiological channel encompasses visual, auditory and kinesthetic or tangible, and energy levels during the day, and needs to be addressed (food and drink) and having different movements during learning. Finally, the psychological chain gives integration of information processing unit of global with analysis and impulse and reflection behavior, but it is not to the earlier versions of the models.

Sensory learning preferences, i.e., visual, auditory and kinesthetic, as recognized by Dunn and Dunn (1993), depicts that learners have visual preference who like to see while learning because they comprehend information, concepts and ideas better by pictures and images than by details. Drawing is of much importance for them than discussing. In a learning situation, visual learner creates in mind picture of what is being discussed or described. Reading, for many persons, is like an action which is visualized. Most of the people learn the words which are spoken by us. Resultantly, they are named as auditory learners who prefer listening. They are also labeled as 'Print-oriented' which makes them close to learners having visual preference. Shape and form orientation is for learners preferring visual form, and more dependence on words and numbers in their images is followed by Print-oriented people (Conner, Wright, Curry, Varie, & Mayer, 1996).

There are two types of auditory learners. Spoken messages are given importance by them. This category, which has less understanding, has to hear their own voice to acquaint themselves well with the information. This is the more prevailing type, 'Listeners,' prone to do good performance in school. Same is the case with them also outside the school. They can also demonstrate intellectual replacement of ideas and learn

how to remember the words of others. In contrast, people who are categorized as “talk it out” are often needed to talk to those people who are around them. In classroom setting, when the instructor is not asking questions, hearing oral processors (speakers or talk oriented people) slowly comment like muttering to talk. They seem to be troublemaking; one cannot doubt it but they think that it is necessary to speak. These students are named as “interactive” by some researchers who give importance to listen to both themselves and others (Conner, 1996).

Kinesthetic or physical and palpable learners want to use their good judgment, intelligence and logic about the situation on which they are working. Learners having physical preference are inclined towards touching instead of much seeing and talking. Even where discussion or the written materials are not much helpful to kinesthetic or physical learner, they plan to prolong lesson planning and get help from pictorial forms and labs. So, these types of learners cannot prosper and flourish in conventional classroom settings (Conner, 1996).

Dunn and Dunn model considers preferences related to tasks and activities explained in learning by listening, reading-writing, sense of touch and by practically doing as an important dimension. Dunn’s Model was earlier criticized by Carbo (1983) that researches previously done have been weak and not up to the mark regarding their methodologies and hence there are only two researches out of 19 researches that have shown objectivity and solid interaction between modality strength and the methods of reading. Rest of the studies have shown no such relationship and thus making the case easier for Carbo to criticize this grey area. Although he has asserted after realization that there exists certain relation between the two. Many researchers do not follow the Dunn’s model and they find no such link of modality preference with the learning strategy. For instance, in a study of 22 researches, it was posited by Kampwirth and Bates (1980) that 20 of the researches found no relationship and interaction between the method and preference. Tarver and Dawson (1978) also studied that only 2 from 14 researches showed a significant relationship between modality preference and methodology of teaching. It has also been suggested by Deverensky (1978) regarding the sensitivity and specification of the measurement of preference while debating on no causal relation between modality and learning performance. There have been many researches that focus on the importance of understanding for students themselves regarding preferences for learning and their performance. This has been nominated as essential for academic excellence (Atkinson, 1998; Biggs & Moore, 1993; Mathews, 1991). Can individual differences in the preference for learning be of importance considering the presentation in academic setup? There has been a portion of empirical research regarding hindrances or enhancement casted on academic performance with respect to learning preferences (Riding & Grimley, 1999; Ross & Schultz, 1999). On the contrary, there is fewer research work carried on the marriage of teaching strategy and design against learning preferences.

Research Methodology

This study was undertaken on college students in the Punjab province of Pakistan during 2010-12. Students' learning preferences were explored and differences in their learning preference were examined with reference to their academic achievement. The study was quantitative, descriptive and correlational.

All students who were currently enrolled in B.A. /B.Sc. and BS programs of all public sector colleges of Punjab province constituted the population of the study. The study sample was delimited to six districts of Punjab province with two districts from each region (North, Central and South Punjab). Three-stage cluster sampling technique was used to select the sample of 1200 students. In the first stage, two districts from each of three regions were randomly selected. At second stage, two colleges from each district were selected. At third stage, from each selected college, 100 students were randomly selected. In order to identify students' learning preferences, 24-item Barsch Learning Preferences Inventory (BLPI) (visual, auditory and kinesthetic) developed by Barsch (1996) was used as a research instrument. In order to examine the validity and reliability of Urdu version of Barsch Inventory of Learning Preferences (BILP), it was administered to a sample of 60 students of two govt. colleges of Mianwali district. To check reliability of questionnaire, split-half method was used. The questionnaire's reliability coefficient was found to be 0.81. Barsch Learning Style Inventory is a valid instrument because it has also been used by many other researchers (Erton, 2010; Beck, 2007; Kratzig & Arbuthnott 2006; Halsne & Gatta, 2002; Doyran, 2000). However, its validity was determined because it was translated in the national language of Pakistan. Moreover, it was required because of different context in which it was used. The respondents involved in pretest were briefed to point out the convenience with respect to reading and understanding the questionnaire. A few amendments were made in the questionnaire in the light of their opinions. Product Moment correlation coefficient was used to find out the relationship between each learning preference and academic achievement. Furthermore, differences among low achieving and high achieving students with respect to their learning preferences were analyzed by applying z-test and Chi-Square contingency test.

Results

Preferences of students studying at graduation level in public colleges on visual, auditory and kinesthetic learning are tabulated and interpreted in this section.

Table 1*Mean scores and ranks for the items of visual learning preference of students at college level*

Statements	Mean	Rank
I like to write things down or take notes for visual review.	3.79	2
I obtain information on an interesting subject by reading relevant materials.	3.56	3
I am good at working and solving jigsaw puzzles and mazes.	3.49	4
I am skillful and enjoy developing and making graphs and charts.	3.45	5
I can understand and follow directions using maps.	3.42	6
I feel the best way to remember is to picture it in my head.	3.24	7
I can better understand a news article by reading about it in the paper than by listening to the radio.	3.20	8

Table 1 presents that mean visual learning preference score on eight items of the questionnaire range from 3.20 to 4.02 out of the maximum score of 5. The table depicts that highest preference of visual learners is “I follow written directions better than oral directions”. Second highest preference of visual learners is “I like to write things down or take notes for visual review” and the least preference being learning from “I can better understand a news article by reading about it in the paper than by listening to the radio”.

Table 2*Mean scores and ranks for the items of auditory learning preference of students at college level*

Statements	Mean	Rank
I require explanations of diagrams, graphs, or visual directions.	3.45	2
I can tell if sounds match when presented with pairs of sounds.	3.23	3
I do better at academic subjects by listening to lectures and tapes.	3.14	4
I follow oral directions better than written ones.	3.06	5
I prefer listening to the news on the radio rather than reading about it in a newspaper.	3.02	6
I would rather listen to a good lecture or speech than read about the same material in a textbook.	2.83	7
I learn to spell better by repeating the letters out loud than by writing the word on paper.	2.72	8

As Table 2 depicts, mean auditory learning preference scores on eight related items ranging from 2.72 to 3.66 out of maximum 5. The table depicts that highest preference of auditory learners is “I can remember more about a subject through listening than reading”. Second highest preference of auditory learners is “I require explanations of diagrams, graphs, or visual directions” and the least preference being learning from “I learn to spell better by repeating the letters out loud than by writing the word on paper”. The auditory, range preference bracket is less than that of visual learning preference.

Table 3*Mean scores and ranks for the items of kinesthetic learning preference of students at college level*

Statements	Mean	Rank
I enjoy working with tools.	3.23	2
I remember best by writing things down several times.	3.05	3
I play with coins and keys in pockets.	2.86	4
I feel very comfortable touching others, hugging, handshaking, etc.	2.84	5
I grip objects in my hands during the learning period.	2.76	6
I learn spelling by "finger spelling" the words.	2.66	7
I chew gum or snack during studies.	2.52	8

Table 3 reveals that mean kinesthetic learning preference score on eight related items ranges from 2.52 to 3.39 which is the lowest range, meaning thereby that kinesthetic learning preference is the lowest preference, the visual preference being highest in the group and auditory learning preference being intermediary. Table depicts that highest preference of kinesthetic learners is "I bear down extremely hard with pen or pencil when writing". Second highest preference of kinesthetic learners is "I enjoy working with tools", the least preference being learning from "I chew gum or snack during studies".

Table 4*Frequency of learning preferences of college students*

Learning Preference	<i>f</i>	%
Auditory	211	17.6
Kinesthetic	102	8.5
Visual and Auditory	112	9.3
Visual and Kinesthetic	65	5.4
Auditory and Kinesthetic	32	2.7
Visual, Auditory and Kinesthetic	43	3.6
Total	1200	100

Table 4 indicates that 52.9% college students were visual learners, 17.6% students were auditory and 8.5% students were kinesthetic learners. But 9.3% college students preferred to learn with the combination of visual and auditory sensations, 5.4% students preferred to learn with the combination of visual and kinesthetic sensations, 2.7% students preferred to learn with the combination of auditory and kinesthetic sensations and 3.6% college students preferred to learn with the combination of visual, auditory and kinesthetic learning preferences. Overall 79% college students preferred to learn with single learning preference, 17.4% students were bimodal and only 3.6% students were tri-model in their learning preferences.

Table 5

Significance of difference between mean visual learning preference scores of low achievers and high achievers

Category	N	M	S.D.	S.E of mean	Z
Low Achievers	301	27.88	5.08	0.29	2.08*
High Achievers	302	28.72	4.77	0.27	

$z = 1.96$

As table 5 above shows, the mean visual preference score of high achievers ($M=28.72$) is greater than mean visual learning preference score of low achievers ($M=27.88$) out of maximum visual preference score of 40. The Z value of mean difference 2.08 is statistically significant at 0.05 level. This implies that high achievers had more preference for visual learning.

Table 6

Significance of difference between mean auditory learning preference scores of low achievers and high achievers

Category	N	M	S.D.	S.E of mean	Z
Low Achievers	301	23.49	5.08	0.27	1.70
High Achievers	302	22.81	4.64	0.27	

$z = 1.96$

Table 6 above shows that the average auditory preference score of high achievers ($M=24.91$) is slightly lesser than the average auditory preference score of low achievers ($M=25.34$). However, the Z value of average difference ($Z=1.10$) is statistically nonsignificant at 0.05 level. This means that low and high achievers had almost equal preference for auditory learning.

Table 7

Significance of difference between mean kinesthetic learning preference scores of low achievers and high achievers

Category	N	M	S.D.	S.E of mean	Z
Low Achievers	301	25.34	4.76	0.27	1.10
High Achievers	302	24.91	4.77	0.27	

$z = 1.96$

Table 7 above indicates that the average kinesthetic preference score of high achievers is lower than the average auditory preference score of low achievers ($M=22.81$ vs $M=23.49$). But the Z value of actual mean difference ($Z=1.70$) is not statistically significant at 0.05 level. This mean that both the low achievers and high achievers did not differ also in their preference for kinesthetic learning.

Table 8

Significance of relationship between learning preference scores and academic achievement scores of college students

Variables	N	r	p
Visual Learning Preference scores and achievement score	1200	0.042	0.14
Auditory Learning Preference scores and achievement score	1200	0.066	0.02*
Kinesthetic Learning Preference scores and achievement score	1200	0.008	0.77

Table 8 shows that students' visual and kinesthetic learning preference scores had non-significant correlation with their academic achievement scores while auditory learning preference scores had significant correlation with the academic achievement of college students. This means that auditory learners appeared to do better than visual and kinesthetic learners in academic achievement.

Discussion

This study shows that 52.9 percent students of colleges had visual preference, 17.6 percent of college students possessed auditory preference and 9.3 percent students were in favour of visual and auditory preference, 8.5 percent were kinesthetic learners, 5.4 percent were visual and kinesthetic learners, 2.7 percent were auditory and kinesthetic learners and 3.6 percent were visual, auditory and kinesthetic learners. In the study of Cheng and Wong (2014), the findings of ILS show that the most effective style of learning that received 82.4% of the participants preference was graphical. This also amounted to the visual presentation and learning by seeing. It was examined by Dunn and Dunn (1979) that just 20 to 30 percent school students held auditory and 40 percent of school students were visual, and 30 to 40 percent possessed kinesthetic, and also tactile and visual or other amalgamations of preference in learning. Inclination to two learning preferences in process of learning was 36.1 percent and fondness of three learning preferences was 63.9 percent among total 155 students found by Baykan and Nacar (2007). It was found that 23.3 percent had inclination to kinesthetic, 7.7 percent preferred auditory, 3.2 percent held visual, and 1.9 percent had read-write preference, while 30.3 percent students had bimodal, 20.7 percent had tri-modal and 12.9 percent had quad modal preference. Lujan and DiCarlo (2006) stated that 36.1 percent had single approach to learn. Among these, 5.4 percent possessed visual learning, 4.8 percent favored auditory, 7.8 percent gave importance to words that were printed, and 18.1 percent were in favour of kinesthetic preference. Contrarily, 63.8 percent possessed multi styles: among these, 24.5 percent held 2 styles, 32.1 percent had 3 styles, 43.4 percent held 4 styles.

This study revealed that high achieving college students also preferred more to learn with visual learning preference than low achieving college students. Low achieving college students were more auditory and more kinesthetic learners in their learning preferences whereas high achieving college students preferred less to learn with auditory and kinesthetic learning preferences. Dunn and Griggs (1998) also found that there are discriminations in learning preferences of high and low achievers. Similarly, if one method of teaching or learning is helpful to one group, it may not be helpful to another group. Park (1997) examined that more visual preference was present in high achievers than in low achievers. Students having middle and low achievement level possessed low inclination towards learning in groups while high achievers possessed negative inclination to group learning. Murphy et al. (2004) found that majority of students in dentist courses had more liking for the visual stimuli in comparison with kinesthetic preference in VARK website.

The present study found that visual and kinesthetic learning preference scores had non-significant correlation with academic achievement of college students while auditory learning preference scores and total learning preference scores had significant correlation with academic achievement of college students. Baykan and Nacar (2007) found that there was no obvious dissimilarity between grades and learning preferences of first semester students. There was no vivid discrimination in engineering students with respect to department in a study by Arslan (2003). In Jamie Cano's study (1999), low academic achievement was found in field-dependent college students as compared to field-independent college students and disciplinary action was taken against field-dependent college students due to their low performance. Conversely, Torres (1993), Torres and Cano (1994) stated that there was much association in learning preferences and academic achievement in terms of GPA in courses. Same result was found in students of different agriculture courses in a study by Garton et al. (1999), and similar findings were given by Cano and Porter (1997), Cano (1999) in entire higher education.

This study viewed the learning preferences of adolescents from physiological stimuli strand out of the five major stimuli strands as identified in the Dunn and Dunn model of learning preferences. The study results contribute toward expansion of knowledge about the visual, auditory and kinesthetic learning preferences by indicating relative dominance of visual learners among male adolescents in a specific area of Pakistan and the greater sign of associations between auditory learning preferences and academic achievements. Thus, the Dunn and Dunn model has been extended to the field of education. The study results also identify the items of BILP used in the study more powerful items that measure each learning preference of the adolescents. Besides contributing to add to the existing literature on physiological stimuli of the Dunn and Dunn model, it provides useful knowledge for teachers and students to improve teaching

and learning by matching teaching style with students learning style and, more importantly, for the students to adopt their learning preferences according to the dominant teaching style. The major finding supported by data from this study is that instructors should employ strategies that include all three preferences. If this were taken seriously and put into practice, it would help strengthen education in Pakistan, not only in higher education but at all levels.

Possible limitations of study are that the selection of only academic achievement in percentage obtained by students in annual examination. If we could include academic performance as a whole for the measurement of students' performance, results could be more authentic and maybe relationship could be found among other learning preferences (visual and kinesthetic) and academic achievement. The present research focused on college students. Study population comprised all students studying at graduation level in government colleges of Punjab province. Punjab is comprised of three strata, north, south and central Punjab. Firstly, two districts were randomly selected from each strata of Punjab. Thus, six districts were selected, from which total 12 colleges were randomly selected. It would have been better if we could select all public and private sector colleges, like commerce institutes, management and computer science colleges of the Punjab province at graduation level of all three regions i.e. North Punjab, South Punjab and Central Punjab for obtaining more authentic results. As educators, all three styles should be preferably used while presenting any information. By doing so, every learner is involved regardless of his/her learning preference. Another benefit that can be achieved is the involvement of the learners in all the other styles as well. The other two methods are also being utilized by the learner. Thus, preferring one style does not guarantee the ineffectiveness of the other two styles.

Conclusion

The first learning preference of the college students was found to be visual, second learning preference auditory, third learning preference a combination of visual and auditory and fourth learning preference kinesthetic. Visual and auditory learners were generally found to be better learners and high achievers. High achieving college students were found to be more visual in their learning preferences, but no difference was found among high achievers and low achievers in auditory and kinesthetic learning preferences. Auditory learning preference was found to be associated with academic achievement ($r = 0.066$) while visual and kinesthetic learning preferences did not relate with academic achievement.

Recommendations

1. As college students mostly prefer to learn through seeing and hearing as revealed in this study, the college teachers should also prefer to use audiovisual aids while lecturing. However, in the subjects of practical nature like art and sciences, the students to be provided demonstrations, hands-on experiences and experiments so that they learn more and achieve better.
2. The present study used BILP (1996) because it was widely used in such previous studies, but no research could be found that verified the claim of its author that it really measures the three learning preferences. Therefore, its construct validity needs to be established if it has not been previously tested in order to find out whether it measures the underlying factors it claims to measure.
3. As the study was quantitative in nature, there may be the support of qualitative method along with quantitative method in further studies in order to render the results more authentic.

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