Role of Learning Styles in the Quality of Learning at Different Levels

Muhammad Shahid FAROOQ[1], Jean-Claude REGNIER[2]
[1]University of the Punjab, Pakistan
[2]University of Lyon-Lyon2, France
drshahidpu@gmail.com, jean-claude.regnier@univ-lyon2.fr

The aim of this descriptive, co-relational investigation was to identify the preferred learning styles and their role in quality of performance at secondary, intermediary and university level for language students from six different fields. The association and differences in students' learning styles related to their demographics were also explored. Data analysis showed that the majority of the students from all the fields in sample showed the diverging style and the accommodating style as their most preferred learning styles. The learner's gender and nature of house affected the preference for learning styles. Other variables showed no association with learning styles. The learning styles of language students have no relationship with the grades obtained in their previous exams. This study leads to the fact that it should be replicated on a large sample of language learners and comparison should also be made with their current quality of learning/academic performance.
Keywords: *Learning Styles, Academic Performance, Student's Demographic Profile, Learning Style Preference, Learning Quality*

1 Introduction

Education serves as a light bearer leading to bring a healthy and positive change in society. It ensures consciousness about the right and wrong that not only scaffolds individual's personality and dignity but also nation's wellbeing and prosperity. The process of knowing and learning continues from individual's birth to death through formal and informal ways. One of the most significant processes of one's life is learning. It is a multifaceted phenomenon in its nature. Learning experiences are being manifested in the form of new approaches, theories, philosophies and meta-cognition. In formal academic settings along with the learners' emotional contentment, behavioral adaptation, and attitudinal wellbeing, the quality of learning or better academic performance in the form of high achievement scores and better grades are also of the key objectives [1]. All individuals are with a set of unique characteristics. This diversity may be the cause of differences in their quality of performance at work and conduct.

A Chinese philosopher Lao-Tse 5th-century BC, cited in [2] said that "If you tell me, I will listen. If you show me, I will see. But if you let me experience, I will learn" (p.70). "Learning is a continuous cycle that begins with experience, continues with reflection and leads to the action, and this becomes a concrete experience for reflection" [3]. The history of experiential learning rooted back to the work of John Dewey, Kurt Lewin, Carl Jung, Jean Piaget and Lev Vygotsky [4]. Dewey believed in "learning by doing" and knowledge acquisition through engagement in active experiences. Therefore learner is an active part in the learning process, where he connects his prior experiences in new situations and constructs new knowledge [5]. This philosophy provides the foundations to Kolb's experiential learning theory. Kolb took learning style as a result of "hereditary equipment, past experience, and the demands of the present environment" [6]. He explained learning as an active process based on constructivist approach, to engage a person in, not a something done to anybody [3]. This theory suggested a "constructivist theory of learning whereby social knowledge is created and recreated in the personal knowledge of the learner" [7]. Kolb's experiential learning model has both practical and conceptual values. He developed his Experiential Learning Theory (ELT) based on "Dewey's pragmatism, Lewin's social

psychology, Piaget's cognitive-development, Ruger's client-centered therapy, Maslow's humanism and Perls' Gestalt therapy" [8]. It is a "holistic integrative perspective on learning that combines experience, perception, cognition and behavior" [9].

The concept of styles was originated in two dimensions in educational and vocational psychological research circles. Learners' different characteristics were explored because different individuals retain and organize information in different fashions. Some researchers applied cognitive styles in educational settings for observing the differences in quality of learning as the academic performance of students whereas others focus on different other domains like teaching and learning processes, and introduced theories of learning styles [10]. Learning styles identification helps educators in understanding how their students perceive and process information in different manners and patterns [11].

According to Smith and Blake in teaching learning process the concept of learning styles gained considerable attention since the 1960s [12]. Different theories were developed to elaborate the phenomenon of learning. Some theorists used the term 'learning styles' and others used the terms such as 'learning preferences' or 'learning strategies' (p.9). Reissman defined learning style as a "more holistic (molar) or global dimension of learning operative at the phenomenal level" [13]. It is a set of biological traits that make teaching ineffective for some ones and effective for others. This affects the quality of learning of the learners [14]. "The learning styles are influenced by personality type, educational specialization, career choice, and current job role, and tasks" [7].

Without considering the learning styles of learners, it is not possible to provide them healthy learning experiences. If the main objective of education is to develop mastery among the learners about the information being provided, then it is only possible by delivering instruction in such a way which matches best to each learner's way of learning information. The instruction must be designed with preferred pedagogical practices and processes which can accelerate the information processing mechanism of learners [15]. Students vary in their learning preferences and they use different learning tools for learning and hence exhibit different quality levels in learning. Some process information by relying on text but others requires visual cues. Some learners prefer to work independently while others prefer to work in groups. Some process information intuitively while others need time to reflect on the situations. It is prerequisite to know how they learn for addressing their needs [16].

It is a common observation in the classroom that some students prefer learning through interactive activities like games, simulation, problem solving, and critical thinking activities in a multifaceted motivated learning environment. Some enjoy with the experience of workbooks and handouts to be completed under structured instructions. Others prefer individual study or working in a group by benefiting through peer interactions. They wish a teaching which fulfills their needs of information processing. Students prefer different teaching styles with different reasons ranging from their previous experiences for acquiring good grades. The secret behind their choice of instruction is the typical way of their information processing mechanism [17]. According to Rita Dunn as cited in [18] , "Learning style is the way that he or she concentrates on, processes, internalizes, and remembers new and difficult academic information or skills varying with age, achievement, culture, global versus analytical processing preference and gender" (p.6). The individuals aware of their learning styles can excel in their academic arena by using multiple sources of information to optimize their quality of leanrning [19].

Significant relationships among learner's learning styles, gender, and personality, field of study, study habits, careers ambition, and academic performance have been identified in many researches. These studies led

towards the improvement in the teaching learning environment for empowering learners for better performance. Students show better performance when their learning styles coincide with the learning style of their teacher. Students' preferences for learning styles differ for different subjects of study, so they should be proficient in all types of learning styles [20]. Male students have different learning styles from their female counterparts. Also high achievers (high quality learning) differ in learning styles with low achiever (low quality learning) fellows [21].

Kolb focuses on learning by feeling, watching and listening, thinking, and doing. He introduced opposite polar dimension: CE/AC and AE/RO [3]. His model shows that there are four modes of learning which constitute a learning cycle. These modes are; learning by experience (CE), learning by reflecting (RO), learning by thinking (AC), and learning by doing (AE). Learners with concrete experience (CE) aptitude utilize the sense of feeling. They seems very sensitive towards others values and emotions. They show good performance in professions such as education and social work. Learners with reflective observation ability (RO) depend on auditory/visual modalities. They use their observation in solving problems. Learners with abstract conceptualization (AC) potential prefer to be logical and critical focusing on the basic ideas. They rely on models. Learners with active experimentation (AE) ability are usually very social and prefer to work in high positions in social organizations. They trust in people more than the concepts and ideas. They prefer practical things and seem to be pragmatists. This theory represents two dialectically related modes such as grasping experience (Concrete Experience (CE) and Abstract Conceptualization (AC)) and transforming experience (Reflective Observation (RO) and Active Experimentation (AE)). This cycle exhibits four learning styles: Converging, Diverging, Assimilating, and Accommodating [3]. These dimensions are needed for quality of learning. In the Kolb's learning cycle, concrete experiences provide basis for reflections and observations, and these reflections pass through assimilative process and breeds abstract concepts which in turn provide implications to testify able actions [22].

In recent years the field of learning styles gathered much attention of the researchers. Learning styles are given proper consideration to address the learning difficulties timely by the teachers [23]. To date there has been no study conducted in Pakistan to provide the details of language students' learning styles. This study therefore strived to explore and analyze the role of different learning styles in quality of learning for language learners at university level in different fields. It was an attempt to determine the relationship of students' learning styles with their quality of academic performance. This will be an aid in addressing the important concerns relating to the learning of students in different fields of study to meet the future challenges. It will enable the higher education learners to be in the right discipline. This study evaluated different learning styles to determine the fact that which of these are the good predictors for the better quality of learning/academic performance in specific fields of study.

2 Objectives of the Study

The main objectives of this study were to:

a. explore the most preferred learning styles of language students' studying at university level.
b. explain the relationship between language students' learning styles and their demographic profile.
c. correlate language students' learning styles and their quality of learning/academic performance.

3 Research Questions

This study answered the following questions:

a. What are the most preferred learning styles of language students studying at university level?
b. Does any relationship exist between language students' learning styles and their demographic profile?

c. Do language students' learning style preferences affect their quality of learning/academic performance?

4 Method and Procedure

The samples of this survey study comprised of the all 218 on campus students currently enrolled in final year of regular Master Degree programs of six languages (English, French, Urdu, Punjabi, Arabic, and Persian) present in the class at the time of data collection at University of the Punjab, Pakistan.

This study was delimited to students of six languages enrolled in the final year of regular Master Degree Programs. Secondly the learning styles were measured by using Kolb's Learning Style Inventory based on Kolb's Experiential Learning Theory. Thirdly the quality of learning/academic performance was taken as the achievement scores/academic grades obtained by the students in previous examinations conducted by different Boards of Intermediate and Secondary Education, and Universities.

Data were collected from the sample through survey by using Demographic Profile Questionnaire, and the Kolb's Learning Style Inventory. Demographic Profile Questionnaire was consisting of variables to collect information such as: gender, age, family size, field of specialization, residential region, marital status, and academic score in the previous examinations (Secondary school level, intermediary level and university level).

The Learning Style Inventory (LSI) was a self descriptive inventory consisted of 12 questions, each followed by four answers. The respondents were asked to rank their answers from one to four by describing their preferences. These preferences were then mapped on the four respective poles: Concrete experience (CE), Abstract conceptualization (AC), Active experimentation (AE) and Reflective observation (RO). These four poles constituted four quadrants relating to four learning styles: Converging, Diverging, Assimilating, and Accommodating. The scores of AC-CE and AE-RO show the learner's preference for the abstract dimension over the reflective dimension and for the active dimension over the reflective dimension respectively [7]. The specific learning style of a student is measured by plotting the scores of AC-CE and AE-RO on a grid. The values for AC-CE are placed on vertical axis and on the horizontal axis score AE-RO are plotted to identify the diverging, the accommodating, the converging and the assimilating learning styles.

Data were tabulated and analyzed by using descriptive and inferential statistical measures through SPSS 16, Excel 2007 and CHIC (Cohesive Hierarchical Implicative Classification). Cross Tabulation and Chi-square were used to study the differences/relationships of learning style preferences with different independent demographic variables and quality of learning/academic performance at secondary, intermediary and university levels.

5 Results

The sample of 218 students for this study consisted of 26% students of Urdu language, 18% students of English language, 17% students of Arabic language, 15% students of Persian language, 13% students of French language and 11% students of Punjabi language which indicate almost equal representation in the sample (Figure 1).

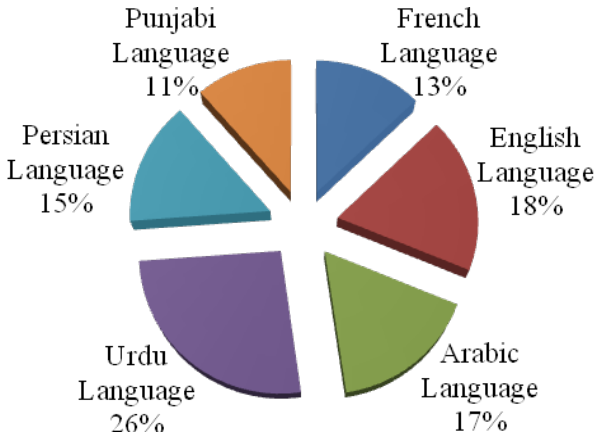


Fig. 1. Department wise distribution of sample

Table 1. Distribution of Sample on Different Variables

	Variables		Frequency	Percent
1.	Gender	Male	58	26.6
		Female	160	73.4
2.	Marital Status	Single	201	92.2
		Married	15	6.9
		Widow	1	0.5
		Separated	1	0.5
3.	Domicile	Urban	140	64.2
		Rural	56	25.7
		Sub-urban	22	10.1
4.	Medium of instruction at school level	Urdu	159	72.9
		English	59	27.1
5.	Gender of head of household	Male	189	86.7
		Female	29	13.3

Table 1 shows that the majority of the language students (73.4%) in sample were females and also unmarried (92.2%). It is concluded that in Pakistani culture females are more inclined to take language courses than males. The majority of the students in sample (64.2%) belonged to urban areas, and 72.9% were with Urdu (National language) as their medium of instruction at school level. The head of households (86.7%) of respondents were male and only 13.3% were female. It is due to the fact that in Pakistani culture male member is considered more responsible for the family matters as compared to the female family members. Further the marital status statistics also gives the reflection of societal trend that mostly young ones are not married during their education. The distribution of students on their domicile basis shows that in higher education of languages urban students are more participating than the students belonging to rural and suburban areas.

Figure 2 represents that most of the students were with seven (20.6%), eight (19.3%) and six (18.8%) family members.

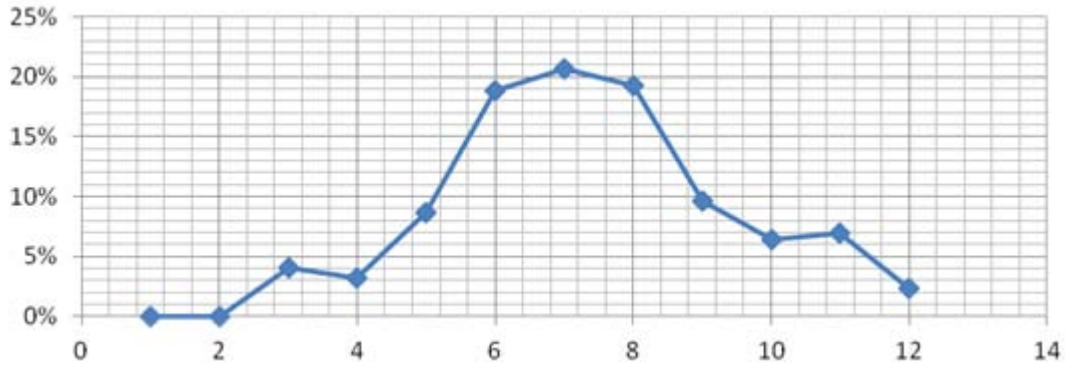


Fig. 2. Family size of respondents

Table 2. Nature and Area of House

	Nature and Area		**Frequency**	**%**
Nature of house	Owned		175	80.3
	Rented		33	15.1
	Others		10	4.6
Area of house	Less than 5 Marla	(Less than 1361.25 sq ft.)	60	27.5
	5-17 Marla	(1361.25sq ft – 2722.5 sq ft)	92	42.2
	11-15 Marla	(2994.75sq ft – 4083.75 sq ft)	22	10.1
	16-27 Marla	(4356.00 sq ft – 7350.75 sq ft)	21	9.6
	21-25 Marla	(5717.25 sq ft – 6806.25 sq ft)	14	6.4
	Above 25 Marla	(More than 6806.25 sq ft)	9	4.1

(Marla is a unit of land measurement in Pakistan; 1 Marla = 272.25 sq ft)

Table 2 shows that 80.3% respondents have own houses and 42.2% live in house with area of 5-17 Marla (1361.25sq ft – 2722.5 sq ft). The nature and size of house show that the language students belonged to families with reasonable socio economic status.

Table 3. Distribution of Sample Students on the basis of their Grades

Grades & % Marks Obtained	Secondary School Level		Intermediary Level		University level	
	Frequency	%	Frequency	%	Frequency	%
A1 [Excellent (80 and above)]	25	11.5	4	1.8	4	1.8
A [very good (70-80)]	51	23.4	32	14.7	16	7.3
B [Good (60-70)]	51	23.4	70	32.1	83	38.1
C [Fair (50-60)]	68	31.2	77	35.3	97	44.5
D [Acceptable (40-50)]	23	10.6	32	14.7	17	7.8
E [Just passed (33-40)]	0	0	3	1.4	1	.5
Total	218	100	218	100	218	100

It is obvious from Table 3 that the language students mostly possess grade C by obtaining marks 50-60% at all the three levels: Secondary School Level (31.2%),

Intermediary Level (35.3%) and University Level (44.5%).

Table 4. Distribution of High Achievers, Average Achievers and Low Achievers in Sample

Grades	Secondary School Level		Intermediary Level		University level	
	Frequency	%	Frequency	%	Frequency	%
High Achievers	73	33.5	33	15.1	18	8.3
Average Achievers	117	53.7	145	66.5	178	81.7
Low Achievers	28	12.8	40	18.3	22	10.1
Total	218	100.0	218	100.0	218	100.0

For simplicity and more clarity the six grades were transformed into three levels; High Achievers (70% and above), Average Achievers (50% to 70%) and Low Achievers (Lowest to 50%). The overall comparison shows that the students in sample are average achievers that are more in number at all the three levels than the others. It may be concluded that the field of languages is the choice of students with average academic performance throughout their career (Table 4).

6 Analyses of Learning Styles

Data obtained from respondents on Kolb's Learning Style Inventory (LSI) 3.1 were transformed on four dimensions CE (Concrete Experience), RO (Reflective Observation), AC (Abstract Conceptualization), and AE (Active Experimentation). It was done by using the coding key as provided with the LSI. With the help of these four dimensions, AC-CE and AE-RO were calculated for all the respondents. The values of AC-CE and AE-RO varied from -24 to 30. These values were plotted on the Learning Style Type Grid by using the cut points as given in The Kolb Learning Style Inventory, Version 3.1. This whole process was done with the help of Excel 2007. "The cut point for the AC-CE scale was +7, and the cut point for the AE-RO scale was +6. The Accommodating type would be defined by an AC-CE raw score <=7 and an AE-RO score>=7, the Diverging type by AC-CE<=7 and AE-RO<=6, the Converging type by AC-CE>=8 and AE-RO>=7, and the Assimilating type by AC-CE>=8 and AE-RO<=6" [7]. By using this method learning styles of respondents were identified.

Table 5. Learning Styles of Students in Sample

Sr.	Learning Style	Frequency	Percent
1.	Diverging	140	64.2
2.	Accommodating	42	19.3
3.	Converging	05	2.3
4.	Assimilating	31	14.2
	Total	218	100.0

Table 5 shows that the majority of the students in sample (64.2%) were with the diverging learning style. The accommodating learning style is for 19.3% of respondents. Only 2.3% of students showed the converging learning style and 14.2% showed the assimilating learning style.

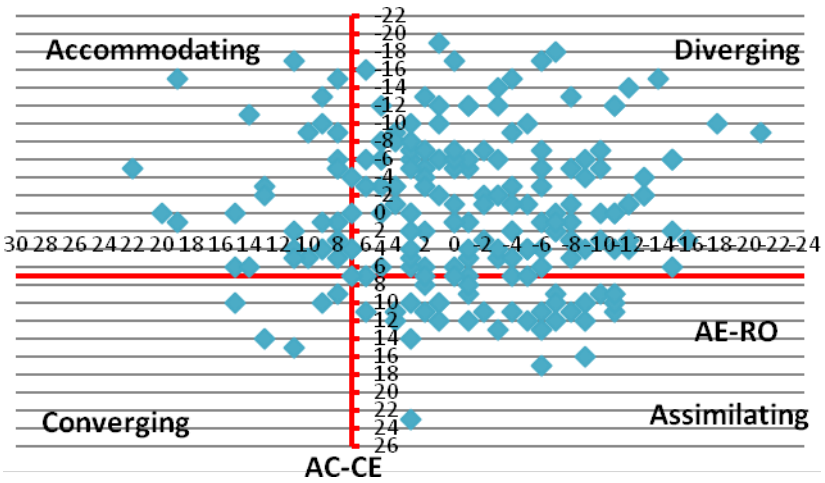


Fig. 3. Kolb's learning style quadrants (N=218)

Figure 3 also shows distribution of respondents on Kolb's learning style quadrants. The dots on the graph represent the corresponding individuals.

Table 6. Learning Style of Students from Different Fields of Study

Sr.	Field of Study	Diverging	Accommodating	Converging	Assimilating
1.	French Language (N=28)	14 (50.0%)	4 (14.3%)	2 (7.1%)	8 (28.6%)
2.	English Language (N=40)	24 (60.0%)	8 (20.0%)	2 (5.0%)	6 (15.0)
3.	Arabic Language (N=36)	23 (63.9%)	8 (22.2%)	0 (00.0%)	5 (13.9%)
4.	Urdu Language (N=57)	38 (66.7%)	8 (14.0%)	1 (1.8%)	10 (17.5)
5.	Persian Language (N=32)	23 (71.9%)	9 (28.1%)	0 (00.0%)	0 (00.0%)
6.	Punjabi Language (N=25)	18 (72.0%)	5 (20.0%)	0 (00.0%)	2 (8.0%)

Table 6 indicates department wise position of respondents for their preferred learning styles. It is evident that the most of the respondents from all the departments prefer the diverging learning style. There was no student from Arabic language, Persian language and Punjabi language students with the converging learning style. Also none of the Persian language group showed the assimilating learning style.

Table 7. Cross Tabulation of Students' Gender and Learning Styles (N=218)

Gender		Learning Styles				
		Diverging	Accommodating	Converging	Assimilating	Total
Male	Observed Count	**39**	5	**3**	**11**	58
	Expected Count	37.2	11.2	1.3	8.2	58
Female	Observed Count	101	**37**	2	20	160
	Expected Count	102.8	30.8	3.7	22.8	160
	Total	140	42	5	31	218
χ^2=8.868, df=3, p-value=.031						

The cross tabulation indicates that there is a significant association between students' gender and learning styles, (χ^2=8.868, p=.031). In other words leaner's gender affects the preference for learning styles. A comparison between observed values and the expected values shows that female students have more association with the accommodating learning style and male students with the diverging and the assimilating style (Table 7).

Table 8. Cross Tabulation of Students' Age Group and Learning Styles (N=218)

Age group		Learning Styles			
		Diverging	Accommodating	Converging	Assimilating
19 to 23.5 years	Observed Count	95	31	3	23
	Expected Count	97.6	29.3	3.5	21.6
23.6 to 27.5 years	Observed Count	43	11	2	7
	Expected Count	40.5	12.1	1.4	9.0
27.6 to 30 years	Observed Count	2	0	0	1
	Expected Count	1.9	.6	.1	.4
	Total	140	42	5	31
χ^2=2.655, df=6, p-value=.851					

The cross tabulation indicates that there is no significant association between students' age group and learning styles, (χ^2=2.655, p=.851). In other words age group of students does not affect learning style preference (Table 8).

Table 9. Cross Tabulation of Students' marital Status and Learning Styles (N=218)

Marital Status		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
Single	Observed Count	131	38	3	29	201
	Expected Count	129.1	38.7	4.6	28.6	201
Married	Observed Count	7	4	2	2	15
	Expected Count	9.6	2.9	.3	2.1	15
Widow	Observed Count	1	0	0	0	1
	Expected Count	.6	.2	.0	.1	1
Separated	Observed Count	1	0	0	0	1
	Expected Count	.6	.2	.0	.1	1
	Total	140	42	5	31	218
χ^2=10.850, df = 9, p-value=.286						

Table 9 shows that there is no significant association (χ^2=10.850, p=.286) of marital status with language students' preferred learning styles.

It is evident from Table 10 that language learners' learning styles have no significant association (χ^2=6.081, p=.414) with their urban, rural, and sub-urban belongingness.

Table 10. Cross Tabulation of Students' Domicile and Learning Styles (N=218)

Domicile		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
Urban	Observed Count	87	27	4	22	140
	Expected Count	89.9	27.0	3.2	19.9	140
Rural	Observed Count	35	14	1	6	56
	Expected Count	36.0	10.8	1.3	8.0	56
Sub-urban	Observed Count	18	1	0	3	22
	Expected Count	14.1	4.2	.5	3.1	22
	Total	140	42	5	31	218
χ^2=6.081, df = 6, p-value=.414						

Table 11. Cross Tabulation of Students' Medium of Instruction and Learning Styles (N=218)

Medium of Instruction at School Level		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
Urdu	Observed Count	109	26	2	22	159
	Expected Count	102.1	30.6	3.6	22.6	159.0
English	Observed Count	31	16	3	9	59
	Expected Count	37.9	11.4	1.4	8.4	59.0
	Total	140	42	5	31	218
χ^2=7.115, df = 3, p-value=.068						

Table 11 shows that language students' medium of instruction at school level have no significant association (χ^2=7.115, p=.068) with their preferred learning styles.

Table 12. Cross Tabulation of Students' Performance at Secondary School Level and Learning Styles (N=218)

Grades		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
A1	Observed Count	15	6	2	2	25
	Expected Count	16.1	4.8	.6	3.6	25.0
A	Observed Count	27	12	3	9	51
	Expected Count	32.8	9.8	1.2	7.3	51.0
B	Observed Count	36	6	0	9	51
	Expected Count	32.8	9.8	1.2	7.3	51.0
C	Observed Count	44	14	0	10	68
	Expected Count	43.7	13.1	1.6	9.7	68.0
D	Observed Count	18	4	0	1	23
	Expected Count	14.8	4.4	.5	3.3	23.0
	Total	140	42	5	31	218
χ^2=17.256, df =12, p-value= .140						

Table 12 shows that learning styles of students of languages and academic grades at secondary school level have no significant association (χ^2=17.256, p=.140).

Table 13. Cross Tabulation of Students' Academic Performance at Intermediary Level and Learning Styles (N=218)

Grades		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
A1	Observed Count	3	0	1	0	4
	Expected Count	2.6	.8	.1	.6	4.0
A	Observed Count	18	5	2	7	32
	Expected Count	20.6	6.2	.7	4.6	32.0
B	Observed Count	41	17	2	10	70
	Expected Count	45.0	13.5	1.6	10.0	70.0
C	Observed Count	54	14	0	9	77
	Expected Count	49.4	14.8	1.8	10.9	77.0
D	Observed Count	22	6	0	4	32
	Expected Count	20.6	6.2	.7	4.6	32.0
E	Observed Count	2	0	0	1	3
	Expected Count	1.9	.6	.1	.4	3.0
	Total	140	42	5	31	218
χ^2=20.710, df =15, p-value=.146						

Table 13 shows that learning styles of students of languages and academic grades at intermediary level have no significant association (χ^2=20.710, p=.146).

Table 14. Cross Tabulation of Students' Academic Performance at University Level and Learning Styles (N=218)

Grades		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
A1	Observed Count	3	0	0	1	4
	Expected Count	2.6	.8	.1	.6	4.0
A	Observed Count	10	5	1	0	16
	Expected Count	10.3	3.1	.4	2.3	16.0
B	Observed Count	49	18	2	14	83
	Expected Count	53.3	16.0	1.9	11.8	83.0
C	Observed Count	69	15	2	11	97
	Expected Count	62.3	18.7	2.2	13.8	97.0
D	Observed Count	8	4	0	5	17
	Expected Count	10.9	3.3	.4	2.4	17.0
E	Observed Count	1	0	0	0	1
	Expected Count	.6	.2	.0	.1	1.0
	Total	140	42	5	31	218
χ^2=13.527, df =15, p-value=.562						

Table 14 shows that learning styles of students of languages and academic grades at university level have no significant association (χ^2=13.527, p=.562).

Table 15. Cross Tabulation of Students' Quality of Learning/Academic Performance (High Achievers, Average Achievers, Low Achievers) at Secondary Level and Learning Styles

Grades		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
High Achievers	Observed Count	42	**16**	**5**	10	73
	Expected Count	46.9	14.1	1.7	10.4	73.0
Average Achievers	Observed Count	**78**	20	0	**19**	117
	Expected Count	75.1	22.5	2.7	16.6	117.0
Low Achievers	Observed Count	**20**	**6**	0	2	28
	Expected Count	18.0	5.4	.6	4.0	28.0
	Total	140	42	5	31	218
χ^2=12.732, df =6, p-value=.047						

Table 15 shows that the learning styles of language learners have a significant association with academic performance (high achievers, average achievers and low achievers) at secondary school level (χ^2=12.732, p=.047). High achievers are associated with the accommodating and the converging style, Average achievers are associated with the diverging and the assimilating styles, and the low achievers are associated with the diverging and the accommodating styles of learning.

Table 16. Cross Tabulation of Students' Quality of Learning/Academic Performance (High Achievers, Average Achievers, Low Achievers) at Intermediary Level and Learning Styles

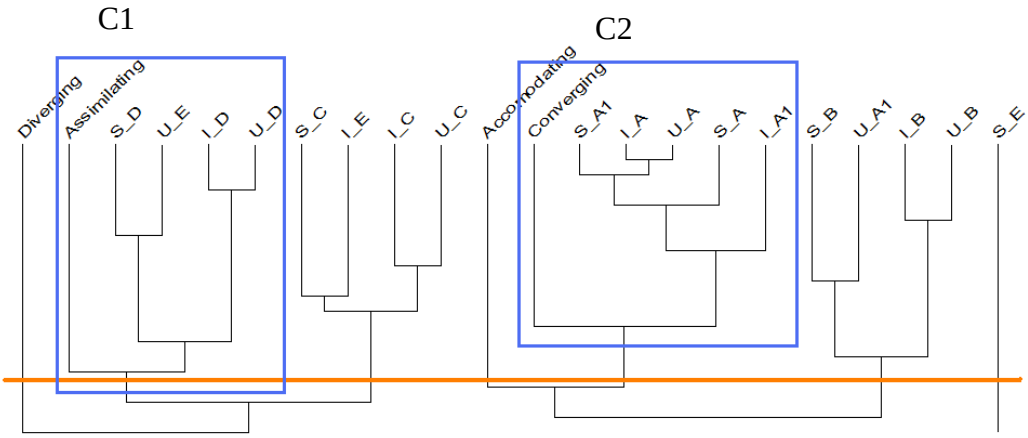
Grades		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
High Achievers	Observed Count	18	5	3	7	33
	Expected Count	21.2	6.4	.8	4.7	33.0
Average Achievers	Observed Count	95	30	2	18	145
	Expected Count	93.1	27.9	3.3	20.6	145.0
Low Achievers	Observed Count	27	7	0	6	40
	Expected Count	25.7	7.7	.9	5.7	40.0
	Total	140	42	5	31	218
χ^2=10.671, df =6, p-value=.099						

Table 16 shows that the academic performance (high achievers, average achievers and low achievers) at intermediary level have no significant association with learning styles (χ^2=10.671, p=.099).

Table 17 shows that the academic performance (high achievers, average achievers and low achievers) at university level have no significant association with learning styles (χ^2=4.296, p=.637).

Table 17. Cross Tabulation of Students' Quality of Learning/Academic Performance (High Achievers, Average Achievers, Low Achievers) at University Level and Learning Styles

Grades		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
High Achievers	Observed Count	11	5	1	1	18
	Expected Count	11.6	3.5	.4	2.6	18.0
Average Achievers	Observed Count	116	33	4	25	178
	Expected Count	114.3	34.3	4.1	25.3	178.0
Low Achievers	Observed Count	13	4	0	5	22
	Expected Count	14.1	4.2	.5	3.1	22.0
	Total	140	42	5	31	218
χ^2=4.296, df =6, p-value=.637						



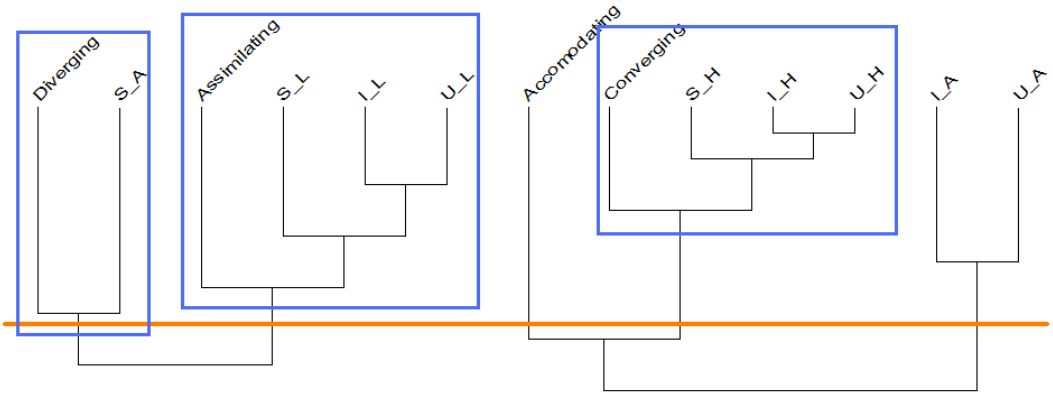
[Classification at level: 15; (Assimilating ((S_D U_E) (I_D U_D))); (Similarity: 0.820164)]

(S_A1= Grade A1 at secondary level, S_A= Grade A at secondary level, S_B= Grade B at secondary level, S_C= Grade C at secondary level, S_D= Grade D at secondary level, S_E= Grade E at secondary level, I_A1= Grade A1 at intermediary level, I_A= Grade A at intermediary level, I_B= Grade B at intermediary level, I_C= Grade C at intermediary level, I_D= Grade D at intermediary level, I_E= Grade E at intermediary level, U_A1= Grade A1 at university level, U_A= Grade A at university level, U_B=Grade B at university level, U_C= Grade C at university level, U_D= Grade D at university level, U_E= Grade E at university level)

Fig. 4. Similarity tree for learning styles and academic performance at secondary, intermediary and university level

To see the similarities and association between variables 'Academic performance and Learning styles', the Hierarchical Classification Tree of similarities (produced by the CHIC (Cohesive Hierarchical Implicative Classification) software 5.0) was used. The variables are clearly organized around three broad classes of performance levels Higher Average and Lower. At this level of similarity index (0.820164) corresponding to a cut off the similarity tree between node 15 and node 16, seven classes are obtained, including 3 singletons. The diverging, accommodating and performance category S_E are not aggregated and remain isolated. Figure 4 also shows that grade A1 and A at secondary, intermediary and grade A at university level as in C2 clustered with the converging learning style. The grades D at secondary, intermediary, and university level and grade E at university level are grouped in a same class C1 associated with the assimilating learning style. The other grades and learning styles remained isolated.

It is also evident from the highlighted groups that students with higher grades at secondary level remain at the same level in intermediary and university education and students with lower grades at secondary and intermediary level also tend to have same performance at university level except grade A1 at university level.



[Classification at level: 8; (Diverging S_A); (Similarity: 0.658836)]

(S_H= High achievement at secondary level, S_M= Average achievement at secondary level, S_L= Low achievement at secondary level, I_H= High achievement at intermediary level, I_M= Average achievement at intermediary level, I_L= Low achievement at intermediary level, U_H= High achievement at university level, U_M= Average achievement at university level, U_L= Low achievement at university level)

Fig. 5. Similarity tree for learning styles and academic performance as high, average and low achievements at secondary, intermediary and university level

To facilitate analysis and interpretation, the variable academic performance is restricted to only three categories High (Grades A1 & A), Average (Grades B & C) and Low (Grades D & E) achievements. To see the similarities and association between variables 'Academic performance and Learning styles', the Hierarchical Classification Tree of similarities was used. The variables are clearly organized around two broad classes of performance levels High and Average-Low. At this level of similarity index (0.658836) corresponding to a cut off the similarity tree between node 08 and node 09, five classes are obtained, including one singleton (Figure 5). The accommodating style and performance categories I_A and U_A are not aggregated and remained isolated. It is also evident that High achievers at secondary, intermediary and grade A at university level clustered with the converging learning style. The low achievers at secondary, intermediary, and university level are associated with the assimilating learning style. It is also clear from the highlighted groups that students with higher grades at secondary level remain at the same level in intermediary and university education and students with lower grades at secondary and intermediary level also tend to have same performance at university level.

Table 18. Cross Tabulation of Students' Nature of House and Learning Styles (N=218)

Nature of house		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
Others	Observed Count	4	1	0	**5**	10
	Expected Count	6.4	1.9	.2	1.4	10
Owned	Observed Count	110	**37**	5	23	175
	Expected Count	112.4	33.7	4.0	24.9	175

Rented	Observed Count	**26**	4	0	3	33
	Expected Count	21.2	6.4	.8	4.7	33
	Total	140	42	5	31	218
χ^2=14.679, df =6, p-value= .023						

Table 18 shows that language students' nature of house has significant association (χ^2=14.679, p=.023) with their learning styles. It is also concluded that the students with their owned houses show more association with the accommodating, and rented houses with the diverging and others with the assimilating learning styles.

Table 19. Cross Tabulation of Students' Head of household's Gender and Learning Styles

Head of household		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
Male	Observed Count	124	32	5	28	189
	Expected Count	121.4	36.4	4.3	26.9	189
Female	Observed Count	16	10	0	3	29
	Expected Count	18.6	5.6	.7	4.1	29
	Total	140	42	5	31	218
χ^2=5.567, df=3, p-value=.135						

Table 19 shows that gender of head of household of language learners has no significant association (χ^2=5.567, p=.135) with the learning styles of the university level students.

Table 20. Cross Tabulation of Students' Area of House and Learning Styles (N=218)

Area of house		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
Less than 5 Marla	Observed Count	42	11	0	7	60
	Expected Count	38.5	11.6	1.4	8.5	60.0
5-17 Marla	Observed Count	53	20	3	16	92
	Expected Count	59.1	17.7	2.1	13.1	92.0
11-15 Marla	Observed Count	15	4	0	3	22
	Expected Count	14.1	4.2	.5	3.1	22.0
16-27 Marla	Observed Count	14	4	2	1	21
	Expected Count	13.5	4.0	.5	3.0	21.0
21-25 Marla	Observed Count	11	2	0	1	14
	Expected Count	9.0	2.7	.3	2.0	14.0
Above 25 Marla	Observed Count	5	1	0	3	9
	Expected Count	5.8	1.7	.2	1.3	9.0
	Total	140	42	5	31	218
χ^2=15.017, df=15, p-value=.450						

Area of house of Master level language learners has no significant association (χ^2=15.017, p=.450) with their learning styles. It means that the size of house does not matter for the preference of learning styles for language learners (Table 20).

Table 21 shows that the family size of the language learners has no significant association (χ^2=19.239, p=.861) with their learning styles. It can be concluded that family size does not influence for language learners in their learning.

Table 21. Cross Tabulation of Students' Family Size and Learning Styles (N=218)

Family size (No. of family members		Learning Style				Total
		Diverging	Accommodating	Converging	Assimilating	
3	Observed Count	5	2	0	2	9
	Expected Count	5.8	1.7	.2	1.3	9
4	Observed Count	3	3	0	1	7
	Expected Count	4.5	1.3	.2	1.0	7
5	Observed Count	11	5	1	2	19
	Expected Count	12.2	3.7	.4	2.7	19
6	Observed Count	29	6	0	6	41
	Expected Count	26.3	7.9	.9	5.8	41
7	Observed Count	27	9	3	6	45
	Expected Count	28.9	8.7	1.0	6.4	45
8	Observed Count	25	10	1	6	42
	Expected Count	27.0	8.1	1.0	6.0	42
9	Observed Count	16	3	0	2	21
	Expected Count	13.5	4.0	.5	3.0	21
10	Observed Count	10	0	0	4	14
	Expected Count	9.0	2.7	.3	2.0	14
11	Observed Count	10	3	0	2	15
	Expected Count	9.6	2.9	.3	2.1	15
12	Observed Count	4	1	0	0	5
	Expected Count	3.2	1.0	.1	.7	5
	Total	140	42	5	31	218
χ^2=19.239, df =27, p-value=.861						

7 Conclusions

The quality of learning remained a serious concern for educators and psychologists throughout the history. Different experts have taken it from different viewpoints. In the last century Carl Jung focused on learning from human personality perspective. Benjamin Bloom explained the mechanism of learning based on cognitive, affective and psychomotor skills. Later it was proposed by Anthony Gregorc that learning is based on learner's perceptual, concrete, abstract, and sequential preferences. After all David Kolb presented a new dimension that learning is a result of feeling and thinking [3]. He said that learning is a process by which knowledge is produced through transformation of experiences. Learning Style analysis showed that the majority of the sample students (64.2%) showed the diverging learning style. The accommodating learning style was for 19.3% of respondents and 14.2% showed the assimilating learning style. Only 2.37% of students in sample showed the converging learning style as their most preferred learning style. The field of study wise comparison of students for preferred learning style highlighted that the most of the respondents from all the departments such as French Language (50.0%), English Language (60.0%), Arabic Language (63.9%), Urdu Language (66.7%), Persian Language (71.9%), and Punjabi Language (72.0%) preferred the diverging learning style.

Students of Arabic, Persian and Punjabi language have no preference for the converging learning style as well as Persian students has also no preference for the assimilating learning style.

Students' gender and nature of house of students have significant association with their learning styles. Female students and students with their owned house show more association than the other categories. On the other hand students' age, marital status, domicile, medium of instruction, area of house, family size and gender of head of household has no significant association with learning styles of language students belonging to six different field of study. This study covered six departments for extending its scope to a wide range of language learners from diverse fields of specialization. The majority of the higher education students across all the specialization fields attended their school with Urdu as medium of instruction. The quality of learning at secondary school level is significantly associated with the learning styles, where as this significant association vanishes at the intermediary and university level performance. The minute analysis revealed that higher achievers at all three levels are related to the converging (thinking and doing) learning styles and the low achievers show their tendency towards the assimilating (thinking and watching) learning styles. These differences with results of the other studies may be due to the cultural differences of Pakistan. This may also be due to the teacher trainings of school teachers. But at the intermediary and university levels the teachers in Pakistan have no such teaching trainings that may result in the fact that the role of learning styles in quality of learning seems absent. This study should be replicated on a larger sample at national level with the language students and their current academic performance at master level instead of their performance in previous exams to get more insight in the relationship of learning styles and academic achievement.

References

[1] R. Dunn, Rita Dunn answers questions on learning styles. *Educational Leadership, 48*(2), 15-19, 1990.

[2] G. Hutt, *Experiential learning spaces: Hermetic transformational leadership for psychological safety, consciousness development and math anxiety related inferiority complex depotentiation*. Available: http://etd.ohiolink.edu/view.cgi?acc_num= case1175892374, 2007

[3] D.A. Kolb, *Experiential learning: Experience as the source of learning and development*. Englewood Cliffs, NJ: Prentice Hall, 1984.

[4] E.V. Hainer, B. Fagan, T. Bratt, L. Baker, N. Arnold, *Integrating learning styles and skills in the ESL classroom: An approach to lesson planning*. Available: https://www.sube.com/uploads/fI/lO/fIlOZEiJHj5WT0Q-GRhYQ/Integrating_earnin styles and_skillsin ESLclassroom.pdf, 1990.

[5] J. Dewey, *Human nature and conduct*. New York: Henry Holt & Co, 1922.

[6] D.A. Kolb, *Learning style inventory*. Version 3. Boston: Hay/McBer, 1999.

[7] A.Y. Kolb, D.A. Kolb, *The Kolb learning style inventory-version 3.1 technical specification*. Boston: HayGroup, 2005.

[8] O.O. Demirbas, H. Demirkan, "Learning styles of design students and the relationship of academic performance and gender in design education," *Learning and Instruction, 17*(3), 345-359, 2007.

[9] R.D. Kopsovich, *Study of correlations between learning styles of students and their mathematics scores on the Texas assessment of academic skills test.* Available: http://www.library.unt.edu/theses/open/20012/kopsovich_ rosalind/ dissertation.pdf, 2001.

[10] R. Dunn, K. Dunn, *Teaching students through their individual learning styles*. Reston, VA: Reston Publishing Company, Inc, 1978.

[11] C.C. Shih, J. Gamon, "Web-based learning: Relationships among student

motivation, attitude, learning styles, and achievement," *Journal of Agricultural Education*, no. *42*(4), 12-20, 2001.

[12] P. Smith, D. Blake, *Facilitating learning through effective teaching: At a glance*. Adelaide, SA: National Centre for Vocational Education Research, 2005.

[13] F. Reissman, "The strategy of style," *Teachers College Record*, *65*(6), 484-489, 1964.

[14] R. Dunn, J.S. Beadry, A. Klavas, "Survey of research on learning styles," *Educational Leadership*, no. 46(6), pp. 50-58, 1989.

[15] P. Rowland, C.L. Stuessy, "Matching mode of CAI to cognitive style: An exploratory study," *Journal of Computers in Mathematics and Science Teaching*, no. 7(4), pp. 36-40, 1988.

[16] W.H. Berquist, S.R. Phillips, *A handbook for faculty development*. Washington, D.C.: The Council for the Advancement of Small Colleges, 1975.

[17] C. Claxton, P. Murrell, "Learning styles: Implications for improving educational practices," *Higher Education Report No. 4*. Washington, DC: George Washington University, 1987.

[18] W.P. Yeh, "*Learning styles, learner characteristics, and preferred instructional activities in computer-based technical training for adults*." Available: http:// digital.library.okstate.edu/etd/umi-okstate-1239.pdf, 2004

[19] J.C. Régnier, "Cognitive styles, learning and teaching mathematics," *Proceedings of the 19th International conference for the psychology of mathematics education*, Vol. 1, p. 219, 1995.

[20] A.L. Franzoni, S. Assar, "Student learning styles adaptation method based on tecahing strategies and electronic media," *Journal of Educational Technology and Society*, no. 12 (4), pp. 15-29, 2009.

[21] A. Honigsfeld, R. Dunn, "Learning styles characteristic of adult learners," *Delta Kappa Gamma Bulletin*, no. 72(2), pp. 14-19, 2006.

[22] D.A. Kolb, R.E. Boyatzis, C. Mainemelis, *Experiential learning theory: Previous research and new directions.* Available: http://74.125.95.132/ search?q= cache:upDlU9pP_gMJ:www.d.umn.edu/ ~kgilbert/educ5165, 1999.

[23] L.F. Zhang, R.J. Sternberg, (Eds.) *Perspectives on the nature of intellectual styles.* New York: Springer Publishing Company, 2009.

Muhammad Shahid FAROOQ holds a PhD (Educational Sciences) from Université Lumière Lyon2, France and a PhD (Special Education) from University of the Punjab, Pakistan. He has a vast experience in the field of teaching at different levels. Currently he is a faculty member at University of the Punjab, Pakistan. He is the author of many journal articles in the field of quality management, inclusive education, didactics, and on other educational issues.

Jean-Claude REGNIER holds a PhD degree. He is currently working as professeur des universités at University of Lyon-Lyon2, France. He has many journal articles and books in his credit. He has vast experience in the fields of teaching and research. He has supervised many national and international Master, M.Phil and PhD students from diverse countries of the world. His areas of interest are didactics of Mathematics and Statistics.