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Teaching Methods, Learning Styles and Achievement on Levels of Learning of Bloom's Taxonomy

1. **Ghulam Ali Akbar** PhD Scholar, Department of STEM Education, Division of Education, University of Education, Lahore Email: alijaam51214@gmail.com
2. **Dr. Muhammad Amin** Associate Professor, Department of ELPS, Division of Education, University of Education, Lahore Email: amin@ue.edu.pk

Abstract

This study was conducted to investigate the effect of teaching methods compatible with students learning styles on their "achievement on levels of learning" with respect to their learning styles. First three levels of blooms taxonomy were focused i.e. knowledge, comprehension and application. Learning styles of participants were determined by Kolb's Learning Styles Inventory (KLSI, 1984). Teaching methods compatible with students learning styles were assumed on the basis of literature keeping in view the preferred characteristics of participants of respective learning styles. It was true experimental research design. The study was carried out in a public sector school with 80 participants of grade seven in the subject of general science. They were divided into two groups Control (N=40) and Experimental (40). Each group has the participant of four learning styles i.e. assimilator, convergent, divergent and accommodators. These styles were taken from the Work of Kolb (1984). Tiered/differentiated Lessons were developed and this was the intervention to the experimental group. While control group were taught in traditional way i.e. through lecture method. The experiment continued for 8 weeks (48 working days). A post-test was conducted. And scores of both the groups were compared by One-way ANOVA. The results indicate that both the groups were not significantly different on levels of learning in general. But they were significantly different with respect to learning styles on their achievement at first three levels of learning of Bloom's Taxonomy.

Keywords: Teaching Methods, Learning Styles, Achievement, Levels of Learning

Introduction

There are many students in the classroom who are present physically but not psychologically. About 40 percent students do not try hard and pay attention to their work in the classroom. Many of them try to be absent from class and use unfair means to pass the examination. They do not have any interest in their studies because they think they cannot do that and get bored. Consequently, they are unable to understand the importance of effort, leave school and claim that their classes were not interesting. Two third of them say that no one cared about their success in school (Tomlinson, 2014 p.1).

Due to same expectations from every individual in classroom. Same pedagogy and instructional technique for all and in turn assessing everyone on equal assessment procedure, regardless of their abilities, intelligence, learning style and performance, to award final grades students are often at disadvantage. Although the teacher in present day classroom work with the students of same age but his concern is that how he should divide himself, resources and time to address the needs of every individual. Students in a classroom are very diverse, this diversity can be cognitive, social, economic, linguistic, cultural, and religious (Tomlinson, 2014).

In schools' education based on students learning style is common practice, this practice mostly use auditor, visual and kinesthetic learning styles (Lynch, 2015; Newton, 2015). The reason behind this which is most often given by the educationist is that it causes better learning. For example, auditory learners will recall information more often if it is presented in auditory for and visual learner will recall information most often if it is presented in visual form. But it is not complete information, no doubt we feel it logical and clear but there are studies which put question on the phenomenon (e been multiple studies calling this methodology into question (Constantinidou and Baker, 2002; Kratzig and Arbuthnott, 2006; Massa and Mayer, 2006; Kassaian, 2007; Kolloffel, 2012; Hansen and Cottrell, 2013; Rogowsky et al., 2015; Knoll et al., 2017).

Despite the fact that studies put question on learning style based educatin, it is globally accepted and effective as well (Dekker et al. 2012). But still they lack in empirical evidence (Macdonaled at al. 2017). Pashlar at al. (2009) although accepted the lack of of evidence in learning style based education but reported a review of literature on learning style and contentented that students learn better when why they are taught according to respective learning style. A number of comprehensive reviews have been conducted on learning styles. They studied the impact of learning style based teaching learning on the education as a whole (Howard-Jones, 2015; Willingham et al., 2015; Kirschner, 2017) and they also included effect instruction based on learning style on students learning (Arbuthnott and Kratzig, 2015; Cuevas, 2015; Kirschner, 2017; Aslaksen and Loras, 2018). But these studie were not conducted at school level.

While reviewing recent literature the researcher found two studies which were relevant to learning styles one was of Martin (2010) and other was of Mahadjoubi and Akblosty (2012) both of them did not studied any effect of instruction on student's achievement. they used visual, auditory and kinesthetic (VAK) model and reported that students show differences while being involved in different learning styles.

Pashler et al. (2009) described an experiment for learning style of students and compatible instruction. The experiment was true experimental design i.e. division of subjects into two groups on the basis of thir learning style and teaching them with their preferred learning style and investigating the impact of compatible instruction on their achievement. Following this experiment, Rogowsky et al. (2015) could not report any evidence for instruction based on compatible learning style increases achievement. they used two learning style inventories;

A learning style inventory which was standardized and for adults (Building Excellence online learning styles assessment inventory for ages 17 and older; Rundle and Dunn, 2010). They did not used Kolb's Learning Style Inventory, there study was with adults and they their self-reported conclusion is that their results cannot be generalized on children.

Differentiated teaching and assessment is supported by, multiple intelligence theory, sociocultural learning theory of Vygotsky and zone of proximal development, and the brain research. Learning style is one of the basis for differentiation (Subban, 2006), students learn better when they are given instructions with their preferred learning style(Tulbure,2011). Tomlinson (2014) the expert of the field also contend that differentiated instruction is a philosophy of teaching and assessment which focus on the idea that students learn better when they are accommodated according to their learning styles.

With the emergence of multiple intelligence theory and diverse social roles it is necessary to teach and assess learners keeping in mind the needs of every individual. A teacher is not supposed to treat every student of his class equally in sense of cognitive abilities, socio-economic background and learning style (Subban, 2006).

Learning style of students is a key thing to be identified to teach the students successfully (Graf, 2008). Different learning styles have different results of student (Mubeen, 2018). When we teach keeping in mind students learning style it is more effective (Reid and Joy, 2015). Compatibility of students learning style and learning setting increase students achievement (Ha, N, 2021). Rogowsky, Calhoun and Tallal (2020) studied instruction based on student learning styles experimentally under the heading providing instruction based on learning style does not improve learning. They used Rundle and Dunn learning style inventory to identify learning styles. They just focused on auditory and visual learning styles and used listening and reading method and found one teaching method is not fit for all learning style.

Kolb in his inventory has given four learning styles as assimilator, accommodator, divergent and convergent. He also highlighted how the students with learning styles prefers to learn (KLSI, 1984). But what method a teacher should use for a particular learning style still need an experimental ground to make informed decision. Very little work found on the topic. And the researcher did not found an experimental background at elementary classes to support learning style and their compatible teaching methods to use at classroom level. This study used teaching methods related with indicators/characteristics highlighted by Kolb and investigated their effect on student's achievement on levels of learning by bloom (1956). This study focused first three levels in posttest i.e. Knowledge, comprehension and application.

Every individual in the classroom is different and needs to be taught according to his interest, Learning style and preferences (Tomlinson, 2014). Students learn better when they are given instructions which are compatible with their learning style (Tulbure,2011). Tomlinson (2014) the expert in the field also contend that students learn better when they are accommodated according to their learning Style. There is no enough support for compatibility of instruction and learning style of students in literature (Grasha and Natalia, 2000).

Some studies have been conducted on the compatibility of teaching methods with learning styles and on the effect of learning style on student's achievement separately. But they are just opinions and are not experimentally proven. For instance, Zhou (2011) studied teaching styles and learning styles in college English and recommended that knowing learners preferred learning styles is helpful for teacher to plan lessons, develop meaningful activities and to adapt their teaching. Hydrie et al (2021) conducted a cross-sectional survey at a university in Pakistan and found association between teaching methodologies and learning styles.

The only related study after systematic literature review was of Rogowsky, Calhoun and Tallal (2020) under the heading of "instruction based on students preferred learning style does not improve learning". They investigated auditory and visual learning style and studied their effect on students reading comprehension. This study aimed at finding relationship between learning style and suitable instructions. The results showed that one teaching method is not accurate for all. Another related study was about effect of learning styles on students' achievement and reported positive results (Ha, 2021).

Many studies have been conducted on learning style and student's achievement but few studies on teaching method compatible with learning style. Researcher found few studies on teaching method compatible with learning style and their effect on students' achievement (Hydrie et al, 2021; Ha, 2021; Rogowsky, 2020; Zhou, 2011) but they all lack in true experimentation at classroom level.

No study was found as per knowledge of the researcher to support Kolb's learning styles with true experiment at classroom level. Kolb recommended appropriate learning styles and how the students with those learning styles will prefer to learn. No study was found, as per knowledge of the researcher, to study this phenomenon experimentally at classroom level. Hence what teaching methods are compatible with certain learning style and what effect they have on students' achievement, still needs research support. In turn this study identified learning styles of student on the basis of Kolb's learning style inventory (KLSI 1984) and compatible teaching methods with students learning styles on the basis of literature and investigated their effect on students' "achievement on levels of learning".

Objectives of the study

The objective of this study were to:

1. Investigate the effect of teaching methods compatible with students learning styles on their "achievement on levels of learning"
2. To investigate if the participants with different learning styles score differently on levels of learning

Hypothesis of the study

H1 = Students when taught with teaching methods compatible with their learning style perform differently at levels of learning of blooms taxonomy

H2 = Students with different learning styles perform differently at levels of learning of bloom's taxonomy

Null Hypothesis

Ho 1= Students when taught with teaching methods compatible with their learning style do not perform differently at levels of learning of blooms taxonomy

Ho 2= Students with different learning styles do not perform differently at levels of learning of bloom's taxonomy

Research Methodology and Procedure

This study was conducted under true experimental research. It was pretest posttest control group design. The study was carried out with 80 students of grade 7 in a public sector school in the subject of general science. The students were divided in two groups randomly Experimental group (N=40) and control group (N=40). The experimental group were given the intervention for 48 working days. The intervention was teaching with, teaching methods compatible with students learning styles. the

control group were taught through traditional teaching as per routine of the school. a research module was developed. It was lesson plans specially designed for students with different learning styles. the basis of the lesson plans (leaning styles and teaching methods) were in Kolb Learning Styles Inventory (KLS1-1984). The data were analyzed by using Statistical Package for Social Sciences (SPSS). One-way ANOVA was conducted to compare the mean scores on control and experimental group.

These learning styles and their compatible teaching methods were derived on the basis of Kolb's s learning style inventor (KLSI-1, 1984). The following teaching methods has been used corresponding to students learning styles.

Students Learning Style (KLSI,1984)	Compatible Teaching Method
Convergent	Problem solving method
Divergent	Discussion Method
Assimilator	Lecture Method
Accommodative	Project Method

Participants

This study was carried out in a public sector high school with 80 participants of grade seven in the subject of general science.

Data Collection tools

The data were collected on a post-test. Assembled by the researcher from items developed by Punjab Examination Commission (PEC). It contained items of Knowledge, Comprehension and Application levels defined by PEC. Learning styles were identified by using Kolb's Learning Styles Inventory (KLSI, 1984). Tired/differentiated lessons were used as intervention to the experimental group.

Validity of the procedure

Presence of pre-test and control group with in true experimental design controlled maximum sources of invalidity of procedure.

Data Analysis

The data were analyzed by using Statistical Package for Social Sciences (SPSS). One-way ANOVA was applied.

Achievement of participants of experimental and control groups on levels of learnings

Experimental Group

The analysis under this heading indicate whether experimental group perform differently at knowledge comprehension and application levels of bloom's cognitive domain.

Table 1. Achievement of participants of experimental group at levels of learning

Knowledge		Comprehension		Application		F	Sig
M	SD	M	SD	M	SD	1.41	0.248
65.23	15.22	61.96	12.7	67.86	18.42		

One-way ANOVA was conducted to compare if achievement of participant in experimental group as whole is different on different levels of learnng according to Bloom's taxonomy (knowledge comprehension and application). The table indicate means of scores of experimental group at knowledge level (M=65.23 and SD=15.22) comprehension level (M=61.96 and SD=12.7) and at application level (M=67.86 and SD=18.42). The table above compares the mean scores of participants at knowledge, Comprehension and application level. At the $p > 0.05$ achievement of participants of experimental group are not significantly different at levels of learning as the F=1.41 and P=0.248. So Achievement of experimental group is not significantly different on knowledge, comprehension and application level of blooms taxonomy

Table 2- Achievement of participants of Experimental Group at Knowledge level

Assimilator		Convergent		Divergent		Accommodator		F	Sig.
M	SD	M	SD	M	SD	M	SD	4.841	.006
78.57	21.73	5.90	6.29	62.38	8.15	63.09	11.73		

One-way ANOVA was conducted to compare if achievement of participant with different learning styles in experimental group is different at knowledge levels according to Bloom's taxonomy. The table indicate means of scores of Assimilator (M=78.57 and SD=21.23) Convergent (M=5.90 and SD=6.29) Divergent (M=62.38 and SD=8.15) and Accommodator (M=63.09 and SD=11.73). The table above compares the mean scores of participants with different learning styles i.e. assimilator, convergent, divergent and accommodator. At the $p < 0.05$ achievement of participants of experimental group with different learning styles is significantly different as the F=4.841 and

P=0.006. So Achievement of participants of experimental group with different learning styles is significantly different.

Table 3- Multiple comparison of experimental group at knowledge level

Learning Styles	Comparative learning style	Mean Difference	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Assimilator	Convergent	21.66800*	5.98410	.005	5.5515	37.7845
	Divergent	16.19100*	5.98410	.049	.0745	32.3075
	Accommodator	15.47700	5.98410	.064	-.6395	31.5935
Convergent	Assimilator	-21.66800*	5.98410	.005	-37.7845	-5.5515
	Divergent	-5.47700	5.98410	.797	-21.5935	10.6395
	Accommodator	-6.19100	5.98410	.730	-22.3075	9.9255
Divergent	Assimilator	-16.19100*	5.98410	.049	-32.3075	-.0745
	Convergent	5.47700	5.98410	.797	-10.6395	21.5935
	Accommodator	-.71400	5.98410	.999	-16.8305	15.4025
Accommodator	Assimilator	-15.47700	5.98410	.064	-31.5935	.6395
	Convergent	6.19100	5.98410	.730	-9.9255	22.3075
	Divergent	.71400	5.98410	.999	-15.4025	16.8305

*. The mean difference is significant at the 0.05 level.

As the achievement scores of participant's with in experimental group with different learning style were significantly different at knowledge level. The post hot text has been applied which indicated that;

Assimilators are significantly different from convergent (MD=21.68, SE=5.98, P=0.005) and Divergent (MD=16.19, SE=5.98 P=0.049) but not from Accommodator as (MD=15.47, SE=5.98, P=0.064).

Participant with Convergent learning style are significantly different from Assimilators (MD=-21.66, SE=5.98, P=0.005) but not significantly different form divergent (MD=-5.47, SE=5.98, P=0.797) and accommodators (MD=-6.19, SE=5.98, P=0.73).

And Divergent are significantly different from assimilators (MD-16.19=, SE5.98=, P=0.049) but not from Convergent (MD5.47=, SE=5.98=, P=0.797) and accommodators (MD=-0.71, SE=5.98, P=0.999).

Finally, Accommodators are not significantly different form Assimilator (MD= -15.47, SE=5.98, P=0.064) convergent (ME=6.19, SE=5.98, P=0.730) and Divergent (ME=0.71, SE=5.98, p=0.999).

Experimental Group at comprehension level

This analysis indicates if students with different learning style perform differently at comprehension level.

Table 4. Achievement of participants of Experimental Group at Comprehension level

Assimilator		Convergent		Divergent		Accommodator		F	Sig.
M	SD	M	SD	M	SD	M	SD	0.590	0.625
59.72	15.72	59.72	16.62	66.11	4.30	63.89	11.93		

One-way ANOVA was conducted to compare if achievement of participant with different learning styles in experimental group is different at comprehension level according to Bloom's taxonomy. The table indicate means of scores of Assimilator (M=59.72 and SD=1.72) Convergent (59.72 and SD=16.62) Divergent (M=66.11 and SD=4.30) and Accommodator (M=63.93 and SD=11.93). The table above compares the mean scores of participants with different learning styles i.e. assimilator, convergent, divergent and accommodator. At the p >0.05 achievement of participants of experimental group with different learning styles is not significantly different as the F=0.590 and P=0.625. So Achievement of participants of experimental group with different learning styles is not significantly different at comprehension level.

Table 5- Achievement of participants of Experimental Group at Application level

Assimilator		Convergent		Divergent		Accommodator		F	Sig.
M	SD	M	SD	M	SD	M	SD	2.94	0.046
54.54	9.81	72.72	9.09	67.27	25.42	75.90	19.40		

One-way ANOVA was conducted to compare if achievement of participant with different learning styles in experimental group is different at Application level according to Bloom's taxonomy. The table indicate means of scores of Assimilator (M=54.54 and SD=9.81) Convergent (M=72.72 and SD=9.09) Divergent (M=62.27 and SD=25.42) and Accommodator (M=75.90 and SD=19.40). The table above compares the mean scores of participants with different learning styles i.e. assimilator, convergent, divergent and accommodator. At the $p < 0.05$ achievement of participants of experimental group with different learning styles is significantly different as the F=2.94 and P=0.046. So Achievement of participants of experimental group with different learning styles is significantly different at application level.

Table 6- Multiple comparison of achievement of participants of experimental group at application level with respect to learning styles

Learning Styles	Comparitive learning styles	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
Assimilator	Convergent	-18.18200	7.75289	.107	-39.0623	2.6983
	Divergent	-12.72700	7.75289	.369	-33.6073	8.1533
	Accommodator	-21.36300*	7.75289	.043	-42.2433	-.4827
Convergent	Assimilator	18.18200	7.75289	.107	-2.6983	39.0623
	Divergent	5.45500	7.75289	.895	-15.4253	26.3353
	Accommodator	-3.18100	7.75289	.976	-24.0613	17.6993
Divergent	Assimilator	12.72700	7.75289	.369	-8.1533	33.6073
	Convergent	-5.45500	7.75289	.895	-26.3353	15.4253
	Accommodator	-8.63600	7.75289	.683	-29.5163	12.2443
Accommodator	Assimilator	21.36300*	7.75289	.043	.4827	42.2433
	Convergent	3.18100	7.75289	.976	-17.6993	24.0613
	Divergent	8.63600	7.75289	.683	-12.2443	29.5163

*. The mean difference is significant at the 0.05 level.

As the mean scores of participants with different learning styles with in experimental group were significantly different at application level at P=0.046 hence post hoc test has been conducted which indicate that;

Assimilators are significantly different from Accommodators (MD=-21.36, SE=7.75, P=0.043) but not from Convergent (MD=-18.18, SE=7.75, P=0.107) and Divergent (MD=6.19, SE=7.75, P=0.369).

Accommodators are significantly different form Assimilators (MD=21.36, SE=7.75, P=0.043) but not form Convergent (MD =3.81, SE=7.75, P=0.976) and divergent (MD=8.63, SE=7.75, P=0.683.

Control Group

Table 7- Achievement of participant of Control group at levels of learning

Knowledge		Comprehension		Application		F	Sig
M	SD	M	SD	M	SD	2.44	0.091
54.40	16.87	46.73	19.04	46.93	17.08		

One-way ANOVA was conducted to compare if achievement of participant in control group is different on different levels of learning according to Bloom's taxonomy (knowledge comprehension and application). The table indicate means of scores of control group at knowledge level (M=54.40 and SD=16.87) comprehension level (M=46.73 and SD=19.04) and at application level (M=46.93 and SD=17.08). The table above compares the mean scores of participants at knowledge, Comprehension and application level. At the $p > 0.05$ achievement of participants of control group is not significantly different at levels of learning as the F=2.44 and P=0.091 So Achievement of control group is not significantly different on knowledge, comprehension and application level of blooms taxonomy.

Table. 8- Achievement of participants of Control group at knowledge level

Assimilator		Convergent		Divergent		Accommodator		F	Sig.
M	SD	M	SD	M	SD	M	SD	3.01	0.043
62.14	18.00	60.23	12.14	51.90	17.27	43.33	14.71		

One-way ANOVA was conducted to compare if achievement of participant with different learning styles in control group are different at Knowledge level according to Bloom's taxonomy. The table indicate means of scores of Assimilator (M=62.14 and SD=18.00) Convergent (60.23 and

SD=12.14) Divergent (M=51.90 and SD=17.27) and Accommodator (M=43.33and SD=14.71). The table above compares the mean scores of participants with different learning styles i.e. assimilator, convergent, divergent and accommodator. At the p< 0.05 achievement of participants of control group with different learning styles is significantly different as the F=3.01 and P=0.043. So Achievement of participants of control group with different learning styles is significantly different at Knowledge level.

Multiple comparison in SPSS did not show any pair wise significant difference when post hoc test was applied to point out exact difference. the difference of assimilator from accommodator was at p value 0.052. SPSS showed significant difference as whole but not in pairwise.

Table. 9- Achievement of participants of Control group at comprehension level

Assimilator		**Convergent**		**Divergent**		**Accommodator**		**F**	**Sig.**
M	SD	M	SD	M	SD	M	SD	3.98	0.015
62.77	16.98	40.27	9.73	40.00	20.29	43.89	19.63		

One-way ANOVA was conducted to compare if achievement of participant with different learning styles in control group are different at comprehension level according to Bloom's taxonomy. The table indicate means of scores of Assimilator (M=62.77 and SD=16.98) Convergent (M=40.27 and SD=9.73) Divergent (M=40.00 and SD=20.29) and Accommodator (M=43.89 and SD=19.63). The table above compares the mean scores of participants with different learning styles i.e. assimilator, convergent, divergent and accommodator. At the p< 0.05 achievement of participants of control group with different learning styles is significantly different as the F=3.98 and P=0.015. So Achievement of participants of control group with different learning styles is significantly different at comprehension level.

Table. 10- Multiple comparison of achievement of participants of control group at comprehension level.

Learning styles	**Comparative learning styles**	**Mean Difference (I-J)**	**Std. Error**	**Sig.**	**95% Confidence Interval Lower Bound**	**Upper Bound**
Assimilator	Convergent	22.49900*	7.68232	.029	1.8088	43.1892
	Divergent	22.77700*	7.68232	.026	2.0868	43.4672
	Accommodator	18.88700	7.68232	.084	-1.8032	39.5772
Convergent	Assimilator	-22.49900*	7.68232	.029	-43.1892	-1.8088
	Divergent	.27800	7.68232	1.000	-20.4122	20.9682
	Accommodator	-3.61200	7.68232	.965	-24.3022	17.0782
Divergent	Assimilator	-22.77700*	7.68232	.026	-43.4672	-2.0868
	Convergent	-.27800	7.68232	1.000	-20.9682	20.4122
	Accommodator	-3.89000	7.68232	.957	-24.5802	16.8002
Accommodator	Assimilator	-18.88700	7.68232	.084	-39.5772	1.8032
	Convergent	3.61200	7.68232	.965	-17.0782	24.3022
	Divergent	3.89000	7.68232	.957	-16.8002	24.5802

*. The mean difference is significant at the 0.05 level.

As the difference among the achievement of participants with different learning styles in control group was different on comprehension level at p= 0.015 hence post hoc test has been applied to find where the exact difference is the test indicate that. Assimilators are significantly different form Convergents (MD=22.49 and SE=7.68) at p value 0.029 and Divergents (MD=22.49 and SE=7.68) at p value 0026 . Convergent are significantly diferent from assmilivaror (MD=22.49 and SE=7.68) at p value 0.029. No difference lies among other combinations

Table.11- Achievement of participants of Control group at application level

Assimilator		**Convergent**		**Divergent**		**Accommodator**		**F**	**Sig.**
M	SD	M	SD	M	SD	M	SD	2.17	0.108
57.90	13.92	49.90	7.89	47.80	13.95	44.40	12.83		

One-way ANOVA was conducted to compare if achievement of participant with different learning styles in control group are different at application level according to Bloom's taxonomy. The table indicate means of scores of Assimilator (M=57.90 and SD=13.92) Convergent (M=49.90 and SD=7.89) Divergent (M=47.80 and SD=13.95) and Accommodator (M=44.40 and SD=1283). The table above compares the mean scores of participants with different learning styles i.e. assimilator, convergent, divergent and accommodator. At the p< 0.05 achievement of participants of control group

with different learning styles is not significantly different at application level as the F=2.17 and P=0.108. So Achievement of participants of control group with different learning styles is not significantly different at application level.

Findings

Experimental Group at Knowledge, Comprehension and Application level

1. After comparison of the mean scores of participants of experimental group at knowledge, Comprehension and application level it was found that there is no significant difference among the participants of experimental group with respect to learning levels as the $p > 0.05$. so achievement of participants of experimental group are not significantly different at levels of learning as the F=1.41 and P=0.248.

Achievement of participant in experimental group at knowledge level with respect to learning style

2. Achievement of participants of experimental group with different learning styles is significantly different as the F=4.841 and P=0.006. So Achievement of participants of experimental group with different learning styles is significantly different.
3. Assimilators are significantly different from convergent (MD=21.68, SE=5.98, P=0.005) and Divergent (MD=16.19, SE=5.98 P=0.049) but not from Accommodator as (MD=15.47, SE=5.98, P=0.064).
4. Participant with Convergent learning style are significantly different from Assimilators (MD=-21.66, SE=5.98, P=0.005) but not significantly different form divergent (MD=-5.47, SE=5.98, P=0.797) and accommodators (MD=-6.19, SE=5.98, P=0.73).
5. Divergent are significantly different from assimilators (MD-16.19=, SE5.98=, P=0.049) but not from Convergent (MD5.47=, SE=5.98=, P=0.797) and accommodators (MD=-0.71, SE=5.98, P=0.999).
6. Accommodators are not significantly different form Assimilator (MD= -15.47, SE=5.98, P=0.064) convergent (ME=6.19, SE=5.98, P=0.730) and Divergent (ME=0.71, SE=5.98, p=0.999).

Experimental Group at comprehension level

7. Achievement of participants of experimental group with different learning styles is not significantly different as the F=0.590 and P=0.625. So Achievement of participants of experimental group with different learning styles is not significantly different at comprehension level.

Experimental Group at Application level

8. Achievement of participants of experimental group with different learning styles is significantly different at Application level as the F=2.94 and P=0.046. So Achievement of participants of experimental group with different learning styles is significantly different at application level.

Multiple comparison of experimental group at application level with respect to learning styles

9. Assimilators are significantly different from Accommodators (MD=-21.36, SE=7.75, P=0.043) but not from Convergent (MD=-18.18, SE=7.75, P=0.107) and Divergent (MD=6.19, SE=7.75, P=0.369).
10. Accommodators are significantly different form Assimilators (MD=21.36, SE=7.75, P=0.043) but not form Convergent (MD =3.81, SE=7.75, P=0.976) and divergent (MD=8.63, SE=7.75, P=0.683.

Control Group

Control group at levels of learning

11. achievement of participants of control group is not significantly different at levels of learning as the F=2.44 and P=0.091 So Achievement of control group is not significantly different on knowledge, comprehension and application level of blooms taxonomy.

Control group at knowledge level

12. Achievement of participants of control group with different learning styles is significantly different at Knowledge level as the F=3.01 and P=0.043. So Achievement of participants of control group with different learning styles is significantly different at Knowledge level

Control group at comprehension level

13. Achievement of participants of control group with different learning styles is significantly different at comprehension level as the F=3.98 and P=0.015. So Achievement of participants of control group with different learning styles is significantly different at comprehension level.

Multiple comparison of control group at comprehension level.

14. Assimilators are significantly different form Convergent (MD=22.49 and SE=7.68) at p value 0.029 and Divergent (MD=22.49 and SE=7.68) at p value 0026.
15. Convergent are significantly different from assimilators (MD=22.49 and SE=7.68) at p value 0.029. No difference lies among other combinations

Control group at application level

16. Achievement of participants of control group with different learning styles is not significantly different at application level as the F=2.17 and P=0.108. So Achievement of participants of control group with different learning styles is not significantly different at application level.

Discussion

In this paper the objective of the research was to investigate the relation among teaching methods, learning styles and achievement of students on first three levels of Bloom's Taxonomy. This study involves intervention of differentiated teaching which make it unique along with learning styles by Kolb (1884).

JilardiDamavandi, et al. (2011) reported that convergent and assimilators score high on assessment procedure, in this study convergent were found significantly different from assimilators at comprehension level. Similarly, Wang, et al. (2006) pointed out that those students who have preferences close to divergent learning style likely to have higher academic achievement. As there were two groups in this study, the mean score of experimental group are high at application level while mean score of control are high at knowledge level. So for as the participants of experimental group are concerned, in multiple comparison Assimilators performed better at knowledge level, divergent performed better at comprehension level and Accommodators performed better at application level. Hence further studies are required to nourish this theory. In control group assimilators outperformed other learning styles.

As the researcher has been an elementary school educator for five years, on the basis of his experience, it is because of dominated lecture method teaching in Pakistani culture. During experiment it was also noticed that assimilators are more active in control group. Mean scores of assimilators are high in both experimental and control group. It is also an evidence to promote learning styles based teaching. As the traditional method in mainstream classroom is lecture hence the assimilators in the control group were learning according to their preferred learning style. Hence they outperformed participants of convergent, divergent, and accommodators in both the groups with respect to mean scores. The other reason can be the assessment procedure, as the assessment procedure is content orient. Hence perhaps assimilators are more comfortable with content oriented assessment. This shall to be investigated in future studies.

Conclusion

On the basis of results and findings it has been concluded that when students are taught with compatible teaching methods with their learning styles, it does not affect student's achievement at first three levels of blooms taxonomy i.e. Knowledge, comprehension and application. As the findings of this study show that both the groups control and experimental are not significantly different at first three levels of learning. Hence null hypothesis 1 is accepted.

But students with different learning styles perform differently at levels of learning. Hence null hypothesis 2 is rejected. In present study the achievement of participants of experimental group with different learning styles is significantly different at knowledge level. Assimilators are significantly different from convergent and Divergent but not from Accommodator. Participant with Convergent learning style are significantly different from Assimilators but not significantly different form divergent and accommodators. Divergent are significantly different from assimilators but not from Convergent and accommodators.

Participants of experimental group are not significantly different at comprehension level but they are on application level Assimilators are significantly different from Accommodators. Accommodators are significantly different form Assimilators.

Achievement of participants of control group with different learning styles is significantly different at Knowledge and comprehension level. Assimilators are significantly different form Convergent and divergent. Achievement of participants of control group with different learning styles is not significantly different at application level.

Finally, both the groups experimental and control are significantly different at knowledge level with respect to learning styles of students. Experimental group is significantly different at application level while control group is significantly different at comprehension level. Experimental Group did not show any difference at comprehension level while control group did not show any difference at application level. This point indicates that if students are taught with teaching methods compatible with their learning styles they make difference at application level items in the assessment procedure. Hence it is concluded that teaching methods compatible with students learning styles effect their achievement on first three levels of bloom's taxonomy.

Recommendations

On the basis of Conclusion this study recommends;

1. Compatible teaching methods with students learning styles should be used.
2. Further studies should be conducted to highlight on which level of learning a participant with particular learning styles perform better.
3. Guidelines to identify learning styles should be considered in text book to help teachers for learning style identification as this study highlight student with different learning styles perform differently at levels of learning.

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