Impact Factor : 1.883 Peer-Reviewed Journal ISSN : 2278 – 5639
Global Online Electronic International Interdisciplinary Research Journal (GOEIIRJ)
{Bi-Monthly} Volume – IV, Issue – II August 2015

A STUDY OF ACADEMIC ACHIEVEMENT OF B ED STUDENTS IN RELATION TO LEARNING STYLES

Ms Hema R Bhadawkar,
Assistant Professor, K J Somaiya College of Education, Training and Research
And,
Dr. Vasundhrara Padmanabhan,
Principal, K J Somaiya College of Education, Training and Research

Abstract :

Learners process and comprehend information in a variety of ways, and varying teachers' teaching strategies and classroom activities to respond to different learning styles will allow for more student engagement. "Learning is a dynamic process that consists of making sense and meaning out of new information and connecting it to what is already known. To learn well and deeply, students need to be active participants in that process. This typically involves doing something – for example, thinking, reading, discussing, problem-solving, or reflecting." (Barkley, 2010, p. 94)

The authors were curious to know if learning style was a correlate of academic achievement of B Ed students. The participants of the study were 1037 students drawn proportionately from14 B Ed colleges. The findings reveal that there is no significant relationship between learning styles and academic achievement of participants. The results indicate the need to focus on multi-sensory approach to cater to diverse learning styles of student teachers.

Introduction

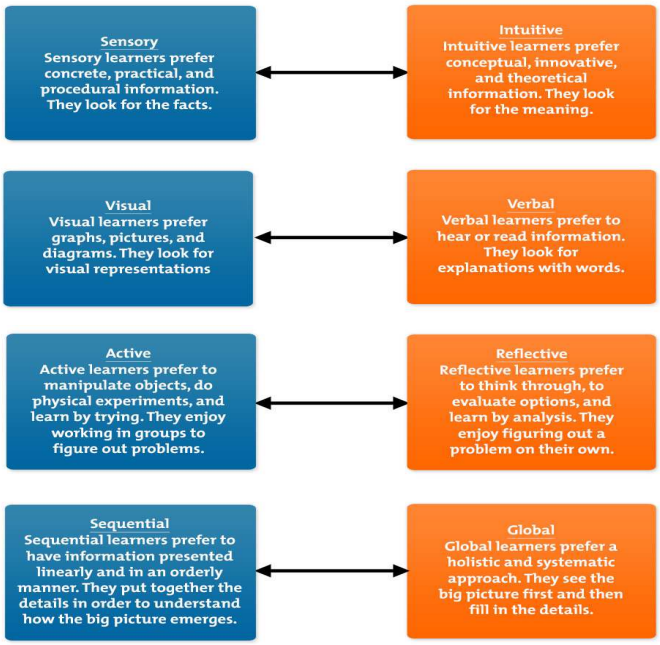
Each person prefers different learning styles and techniques. Learning styles group common ways that people learn. Everyone has a mix of learning styles. Some people may find that they have a dominant style of learning, with far less use of the other styles. Others may find that they use different styles in different circumstances. There is no right mix. Nor are your styles fixed. We can develop ability in less dominant styles, as well as further develop styles that we already use well.

Traditional schooling used (and continues to use) mainly linguistic and logical teaching methods. It also uses a limited range of learning and teaching techniques. Many schools still rely on classroom and book-based teaching, much repetition, and pressured exams for reinforcement and review. A result is that we often label those who use these learning styles and techniques as "smart" as compared to those who use less preferred learning styles often find themselves in lower classes, with various not-so-complimentary labels "dumb".

Our learning styles have more influence than we may realize. Our preferred styles guide the

way we learn. They also change the way we internally represent experiences, the way we recall information, and even the words we choose. By recognizing and understanding our own learning styles, we can use techniques better suited to us. This improves the speed and quality of our learning. One of the most accepted understandings of learning styles is that students' learning styles fall into three "categories:" Visual Learners, Auditory Learners and Kinesthetic Learners. These learning styles are found within educational theorist Neil Fleming's VARK model of Student Learning. VARK is an acronym that refers to the four types of learning styles: Visual, Auditory, Reading/Writing Preference, and Kinesthetic. (The VARK model is also referred to as the VAK model, eliminating Reading/Writing as a category of preferential learning.) The VARK model acknowledges that students have different approaches to how they process information, referred to as "preferred learning modes." The main ideas of VARK are outlined in Learning Styles Again: VARKing up the right tree! (Fleming & Baume, 2006)

The Index of Learning Styles, by Dr Richard Feldman and Barbara Soloman



Reproduced with permission from Dr Richard Feldman (2002)

Students' preferred learning modes have significant influence on their behavior and learning. Students' preferred learning modes should be matched with appropriate learning strategies. Information that is accessed through students' use of their modality preferences shows an increase in their levels of comprehension, motivation and metacognition.

Identifying students as visual, auditory, reading/writing or kinesthetic learners, and aligning overall curriculum with these learning styles, will prove to be beneficial for entire classroom. Allowing students to access information in terms they are comfortable with will increase their academic confidence.

Learning Styles and Academic Achievement

A compatible learning style with the teaching style of a course instructor enables the students to retain the information much longer, apply it more efficiently and effectively, and have more positive post-course attitudes toward the subject than their counterparts who experience learning/teaching styles mismatches (Felder, 1993). In other words, since there are individual differences in learning style, adapting academic materials to these differences will facilitate learning and thus help increase learning benefits "especially for low and moderate achieving students" (Zin, Zaman & Noah, 2002). Therefore understanding students' learning styles and their impact on their academic achievement is important for teachers for it is the first step in ensuring students' achievement. Both low and average achievers are found to earn higher scores on standardized achievement and attitude tests when they are taught within the realm of their learning styles (Dunn, Beaudry and Klavas 1989).

Those students with multiple learning styles tend to gain more and obtain higher scores compared to those who rely solely on one style (Dunn, Beaudry & Klavas 1989). Additionally, the differences in learning styles have also been reported between gifted and the underachievers; between the learning disabled and average achievers; among different types of special education students; and among secondary students in comprehensive schools and their counterparts in vocational education and industrial arts (Dunn & Dunn 1986). Some special students favour kinaesthetic instruction, such as experiential, active and hands-on, while many others are more auditory and visually oriented (Dunn 1991).

Low achievers tend to have poor auditory memory (Dunn and Dunn, 1986). Although they often want to do well in school, their inability to remember information through lecture, discussion, or reading causes their low achievement especially in traditional classroom environment. Low achievers not only learn differently from the high achievers, they also vary among themselves. Impulsive students, when compared to reflective ones, show poor academic achievement (Kagan and Kagan,1970); Field Independent students achieve more than Field Dependent ones (Chapelle,1995). Matching teaching and learning styles can significantly enhance academic achievement at the primary and secondary school levels (Smith & Renzulli, 1984). Students learn more when information is obtainable in a variety of approaches (Felder,1995). Learning styles can either hamper or increase academic performance in several aspects (Riding & Cheema,1991). Learning styles can, to some extent, be modified (Sternberg,1997). Thus, being aware of learning styles and their roles in

academic achievement is of a great importance for educational psychologists, teachers and researchers.

B Ed students are to be trained in designing activities to match the learning styles of the students; multisensory approach is the need of the hour. The authors were curious to know if learning style was a correlate of academic achievement of B Ed students.

Need and Significance of the Study

There was a time when some students were stamped as '*dumb*' or '*not teachable*'. But now, students demand to be taught in the style in which they learn! Even parents are becoming aware of multiple intelligences and the learning styles. Everyone can learn! The onus is on the teachers who will have to match their teaching style to the learning styles of the students! The future expects teachers to create inclusive environment, to be aware of learning style of the students and make every student learn optimally. The researcher, therefore, felt the need to if learning styles as a variable was a correlate of academic achievement of B Ed students.

The study will highlight the correlation between the student-teachers' Academic Achievement and their Learning Styles. The study will sensitize the teacher educators to teach and test students in their preferred learning styles and make them reflect on their accountability as facilitators of learning. The study will highlight the importance of multi-sensory approach to cater to diverse learning styles of students.

Objectives of the Study

- To ascertain the relationship of Academic Achievement of B.Ed. students with their Learning Styles;
- To compare the learning styles of B Ed students on the basis of their gender, type of institution and subject of specialization

Research Questions

RQ1. What is the level of academic achievement of B Ed students on the basis of their gender, type of institution and subject of specialization?

RQ2. To what extent do the Learning Styles of B Ed students differ on the basis of their gender, type of institution and subject of specialization**?**

Hypotheses

$H_0$1. There is no significant relationship of Academic Achievement of B.Ed. students with their Learning Styles.

$H_0$2.There is no significant difference in the Learning Style of B.Ed. students on the basis of type of institutions: i) Aided ii) Unaided;

$H_0$3.There is no significant difference in the Learning Style of B.Ed. students on the basis of their

subjects of specialization (Arts, Science and Commerce);

$H_0$4.There is no significant difference in the Learning Style of B.Ed. students on the basis of their gender.

$H_0$5. There is no significant main effect and the interaction effect of Learning Style and gender on Academic Achievement of B Ed students;

$H_0$6.There is no significant main effect and the interaction effect of Learning Style and subjects of specialization (Arts, Science and Commerce) on Academic Achievement of B Ed

Operational Definitions of Key Terms

Academic Achievement: It is defined as the final total score of students-teachers in B.Ed. course (both the semesters put together). It encompasses marks secured by the B Ed students in theory (10 papers) as well as practicum (internal assessment marks of all the practicum activities such as micro teaching, practice teaching, internship, book review, computer assisted presentations and research based project as well as marks on content test, assignments and tests.

Learning Styles: Individual differences observed in the acquisition and processing of information during the learning process result in style differences in learning. In the study, it is represented by the highest score obtained by the B Ed student on Learning Style Inventory by Dr. Brian K. Dille (2007) under Visual, Auditory and Tactile.

Student-teachers: Those individuals with a Bachelor's / Master's degree in the field of Arts, Commerce or Science and get instructed in B Ed program of University of Mumbai in the art and science of teaching and learning for one academic year leading to a Bachelor's degree in Education (B.Ed.) which qualifies them to become secondary and higher secondary school teachers.

Scope of the study

- The study was conducted within the geographical region of Greater Mumbai.
- The study involved only those B. Ed colleges in Greater Mumbai that are affiliated to the Mumbai University in the region of Greater Mumbai.
- The study focused on student-teachers' Academic Achievement in relation to their Learning Styles.
- The study employed the quantitative paradigm of research design.

Delimitations of the study

1. The study was delimited to
   - only English medium B Ed students;
   - teacher education institutions located in Greater Mumbai;
2. The tools for data collection are delimited to inventories which expect written responses from the students.

Research Design

The present study is a descriptive survey involving correlational and causal comparative methods. The correlational part of the study sought to determine whether, and to what degree, a statistical relationship exists between academic achievement and learning styles of B Ed students. The causal comparative part attempted to compare the learning styles of B Ed students on the basis of their gender, type of institution and subject of specialization.

Participants

In the present study, the researcher made use of ***stratified random sampling technique*** to select the sample for the study. For the purpose of the present study, a two-stage sampling technique was used as follows:

At the first stage of sampling, the B Ed colleges were stratified on the basis of their location in Mumbai Metropolis as follows:

- South Mumbai (from Colaba to Dadar) and South East Mumbai (from Chembur, Govandi, Mankhurd and Trombay)
- North Mumbai (from Dadar to Dahisar)
- Central Mumbai (from Chatrapathi Shivaji Terminus (CST) to Ulhasnagar)

At the second stage of sampling, the aided and unaided colleges were selected from these locations using stratified random sampling technique. In all, 14 B Ed colleges were selected of which 7 were aided and seven unaided. 1037 students were drawn proportionately from them of whom 929 were women and 108 were men; 506 from aided colleges and 531 from unaided colleges.

Tools for Data Collection

Personal Data Sheet

The researcher prepared the Personal Data Sheet which gave information on the Personal details of the students such as their name, name of the college, gender, type of the college (Aided / Unaided), Subject of specialisation (Art/ Commerce/ Science), qualification, and percentage of graduation, Total marks in Semester I, category (Open/Reserved) and place of residence (Urban/Rural).

Learning Style Inventory

Learning Style Inventory is a readymade tool standardized by Dr. Brian K. Dille (2007). The internal consistency reliability of the tool is 0.75. Learning Style Inventory consisted of twenty four items. Eight items are given under each learning style.

Scoring of the Scale:

The scoring was done using three-point rating scale. All the items of the scale were positively worded. The scoring was done as follows.Often - 5 points, Sometimes -3 points, Seldom -

1 point. The item numbers that represent a particular learning style are shown in the following table.

VISUAL		AUDITORY		TACTILE	
No	Scores	No	Scores	No	Scores
2		1		4	
3		5		6	
7		8		9	
10		11		12	
14		13		15	
16		18		17	
19		21		20	
22		24		23	
VPS =		APS =		TPS =	
VPS = Visual Preference		APS = Audio Preference		TPS = Tactile Preference	

The students were categorized as having Visual (V), Auditory(A) or Tactile (T) depending on their higher score in one of these three categories.

The academic achievement scores of participants –

The final total score of students-teachers in B.Ed. course (both the semesters put together) in theory (10 papers) as well as practicum (internal assessment marks of all the practicum activities such as micro teaching, practice teaching, internship, book review, computer assisted presentations and research based project as well as marks on content test, assignments and tests) was collected from the respective B Ed colleges.

The answering of the research questions

RQ1. What is the level of academic achievement of B Ed students on the basis of their gender, type of institution and subject of specialization?

Academic Achievement scores of female student-teachers is more than that of male student-teachers; Academic Achievement scores of student-teachers studying in unaided institutions is more than that of the aided institutions ;Academic Achievement scores of student-teachers with Science as the subject of specialization is more than that of those with Arts and Commerce as subjects of specialization.

Table No.1

Descriptive Analysis of Academic Achievement Scores of the Participants

	N	Mean	Median	Mode	SD	Percent Mean
Male	108	542.16	550.00	565.00	89.42	54.22
Female	929	554.15	558.00	550.00	83.81	55.42
Aided	506	548.09	544.50	447.00	87.07	54.81
Unaided	531	557.49	562.00	550.00	81.69	55.75
Arts	434	547.39	549.5	550.00	82.16	54.95
Commerce	270	551.04	559.50	600.00	85.11	55.10
Science	333	561.61	570.00	680.00	86.38	56.16

RQ2: To what extent do the Learning Styles of B Ed students differ on the basis of their gender, type of institution and subject of specialization?

There is almost no difference in percent mean scores of Visual Preference Scores of student teachers on the basis gender, type of institutions and subjects of specialization.

Female have more audio preference scores than the male student teachers. Student teachers studying in unaided institutions have more audio preference than student teachers studying in aided. Student teachers with Commerce as the subject of specialization have higher Audio preference as compared to student teachers with Arts and Science as the subject of specialization.

Males have more Tactile Preference Scores than the female student teachers. Student teachers studying in unaided institutions have more Tactile Preference Scores than student teachers studying in aided. Student teachers with Commerce as the subject of specialization have higher tactile preference as compared to student teachers with Arts and Science as subjects of specialization.

Table No.2
Descriptive Analysis Learning styles of the Participants

		N	Mean	Median	Mode	SD	Percent Mean
VPS (Visual Preference Scores)	Male	54	32.89	34.00	36.00	4.78	77.78
	Female	524	32.95	32.00	32.00	3.88	77.98
	Aided	288	32.95	32.00	32.00	4.11	77.97
	Unaided	290	32.94	32.00	36.00	3.83	77.95
	Arts	231	32.92	32.00	32.00	3.98	77.87
	Commerce	148	32.66	32.00	32.00	3.87	77.07
	Science	199	33.20	34.00	36.00	4.03	78.74
APS (Audio Preference Scores)	Male	38	30.37	30.00	26.00	4.26	69.90
	Female	312	30.78	30.00	32.00	3.97	71.18
	Aided	150	30.38	30.00	30.00	4.00	69.94
	Unaided	200	31.00	32.00	30.00	3.98	71.88
	Arts	154	30.82	30.00	30.00	3.75	71.31
	Commerce	99	30.90	32.00	34.00	4.01	71.56
	Science	97	30.43	30.00	32.00	4.37	70.10
TPS (Tactile Preference Scores)	Male	16	31.13	32.00	32.00	4.67	72.27
	Female	93	28.49	28.00	24.00	5.17	64.05
	Aided	68	28.68	28.00	24.00	5.39	64.61
	Unaided	41	29.22	30.00	28.00	4.81	66.31
	Arts	49	28.86	30.00	24.00	4.93	65.18
	Commerce	23	29.57	30.00	32.00	3.86	67.39
	Science	37	28.49	28.00	24.00	6.17	64.02

Verification of the Hypotheses

Verification of the Hypothesis $H_0$1

$H_0$1.*There is no significant relationship of Academic Achievement of B.Ed. students with their Learning Styles.*

The technique used to test this hypothesis is Pearson's co-efficient of co-relation (r). The table shows the relevant statistics.

Table No.3

Significance of the Correlation Coefficient of Academic Achievement Scores and Learning Styles Scores of the Participants

Sr. No	Variables	N	df*	r	LOS**
1	AAS and LSS	1037	1035	-0.019	NS

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Academic Achievement and Learning Styles

From the Table, it could be observed that the obtained value of ***r*** is less than the table value at 0.05 level (0.062). Therefore, the null hypothesis is accepted.

Interpretation: There is no significant relationship between Academic Achievement and Learning styles of the participants.

Finding: There is no significant relationship of Academic Achievement of B.Ed. students with their Learning Styles.

Verification of the Hypothesis $H_0$2

There is no significant difference in the Learning Style of B.Ed. students on the basis of type of institutions: i) Aided ii) Unaided.

The technique used to test this hypothesis is't' test. The table shows the relevant statistics.

Table No.4

Significance of the Difference between the Means of Learning Style Scores of the Participants on the basis of their Institutional Type

Variable	Group	N	df*	Mean	SD	t ratio	Table Value		LOS**
							0.05	0.01	
Learning Style	Aided	506	1035	82.84	11.78	**0.44**	1.96	2.58	NS
	Unaided	531		82.54	10.35				

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation: From the table, it could be observed that the calculated t=0.44 among participants studying in Aided and Unaided institutions which is less than the table value at 0.05 level (1.96). Therefore, the null hypothesis is accepted.

Finding: There is no significant difference in the Learning Style of B.Ed. students on the basis of type of institutions: i) Aided ii) Unaided;

Verification of the Hypothesis $H_0$3

The hypotheses reads*: There is no significant difference in the Learning Style of B.Ed. students on the basis of their subjects of specialization (Arts, Science and Commerce).*

The technique used to test this hypothesis was 'one-way ANOVA'. The table shows the relevant statistics.

Table No.5
Analysis of Variance of Learning Style Scores of the Participants on the basis of their Subjects of Specialization

Sources of variance	df*	SS	MSS	F	Table Value		LOS**
					0.05	0.01	
Among means	2	61.5897	30.7948	**0.251**	19.5	99.5	NS
Within groups	1034	126784.80	122.616				
Total	1036	7387843.55					

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation: From the table, it could be observed that the calculated F=0.251 among participants with subjects of specializations as Arts, Science and Commerce is less than the table value at 0.05 level (19.5). Therefore, the null hypothesis is accepted.

Finding: There is no significant difference in the Learning Style of B.Ed. students on the basis of their subjects of specialization (Arts, Science and Commerce)

Verification of the Hypothesis $H_0$4

The hypotheses reads: There is no significant difference in the Learning Style of B.Ed. students on the basis of their gender.

The technique used to test this hypothesis is't' test. The table shows the relevant statistics.

Table No.6

Significance of the Difference between the Means of Learning Style Scores of the Participants on the basis of their Gender

Variable	Group	N	df*	Mean	SD	t ratio	Table Value		LOS**
							0.05	0.01	
Learning Style	Female	929	1035	**82.67**	10.98	**0.18**	1.96	2.58	NS
	Male	108		82.87	11.79				

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation: From the table, it could be observed that the calculated t=1.28 among participants on the basis of gender which is less than the table value at 0.05 level (1.96). Therefore, the null hypothesis is accepted.

Finding: There is no significant difference in the Learning Style of B.Ed. students on the basis of their gender.

Verification of the Hypothesis $H_0$5

$H_0$5 *There is no significant main effect and the interaction effect of Learning Style and gender on Academic Achievement of B Ed students.*

The statistical technique used to test this hypothesis is Two Way ANOVA. The table shows the relevant statistics.

Table No.7

Main Effect and Interaction Effects of the Learning Style and gender on Academic Achievement of participants

Sources	Sum of Squares	df*	Mean Square	F-ratio	LOS**
SS between Learning Style **Scores**	17118.56	2	8559	**1.2**	NS
SS between Gender Scores	13924.24	1	13924	**1.96**	NS
Interaction	18909.39	2	9455	**1.33**	NS
Residual Error	7337891.36	1031	7117		
Corrected Total	7387843.55	1036			

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation:

1. The calculated F= 1.2 (SS between Learning Style **Scores)** is not significant at 0.05 level and therefore, the null hypothesis is accepted. Hence, it can be concluded that there is no significant main effect of Learning Style on the Academic Achievement B Ed students at 0.05 level.
2. The calculated F = 1.96 (**SS between** gender scores) is not significant at 0.05 level and therefore the null hypothesis is accepted. Hence, it can be concluded that there is no significant main effect of Gender **on** the Academic Achievement B Ed students.
3. The calculated F = 1.33 (Interaction) is not significant at 0.05 level and therefore, the null hypothesis accepted. There is no significant interaction effect of Learning Style and gender on Academic Achievement of B Ed students.

Finding :

There is no significant main effect and the interaction effect of Learning Style and gender on Academic Achievement of B Ed students.

Verification of the Hypothesis $H_0$6

$H_0$6.*There is no significant main effect and the interaction effect of Learning Style and subjects of specialization (Arts, Science and Commerce) on Academic Achievement of B Ed students.*
The statistical technique used to test this hypothesis is Two Way ANOVA. The table shows the relevant statistics.

Table No.8

Main Effect and Interaction Effects of the Learning Style and subjects of specialization (Arts, Science and Commerce) on Academic Achievement of participants

Sources	Sum of Squares	df*	Mean Square	F- ratio	LOS**
SS between Learning Style Scores	17118.56	2	8559	1.2	NS
SS between subjects of specialization (Arts, Science and Commerce) Scores	39359.26	2	19680	2.77	NS
Interaction	24963.31	4	6241	0.88	NS
Residual Error	7306402.42	1028	7107		
Corrected Total	7387843.55	1036			

df: degrees of freedom; LOS**-Level of Significance; NS: Not Significant.*

Interpretation:

1. The calculated F= 1.2 (SS between Learning Style **Scores)** is not significant at 0.05 level and therefore, the null hypothesis is accepted. Hence, it can be concluded that there is no significant main effect of Learning Style on the Academic Achievement B Ed students at 0.05 level.
2. The calculated F = 2.77 (**SS between** subjects of specialization scores) is not significant at 0.05 level and therefore the null hypothesis is accepted. Hence, it can be concluded that there is no significant main effect of subjects of specialization **on** the Academic Achievement B Ed students.
3. The calculated F = 1.33 (Interaction) is not significant at 0.05 level and therefore, the null hypothesis accepted. There is no significant interaction effect of Learning Style and subjects of specialization on Academic Achievement of B Ed students.

Finding: There is no significant main effect and the interaction effect of Learning Style and subjects of specialization (Arts, Science and Commerce) on Academic Achievement of B Ed students.

Conclusion: The results suggest that there is no correlation between learning styles of B Ed students and their academic achievement. There is no main effect or interaction effect of gender or subjects of specialization on the academic achievement of B Ed students.

Suggestions for teacher educators on accommodating different learning styles

Classrooms can have as many learning styles and preferences as students, but most learners prefer visual, auditory or kinaesthetic styles. Although most teachers present material to students in a variety of ways, keeping all students involved throughout the day becomes challenging. Being aware of the different learning styles in classroom helps teachers to ensure that all students have an opportunity to access learning, through visual, auditory or kinaesthetic pathways.

Visual learners can be engaged in classroom activities by utilizing visual presentation of material including charts, hand-outs, graphs and graphic organizers. These students want to see information and have written instructions. Encourage visual learners to take notes and highlight important information. When approaching written material, encourage visual learners to read subheadings and examine illustrations before reading text. These students respond well to color-coding of information. When studying for a test, suggest that visual learners create flash cards for review. They will learn math facts, formulas and spelling words by simply looking at them and committing them to memory.

Auditory learners present a different set of challenges. When presenting new material, allow these students to tape record your lectures or instructions to play back later for studying. Auditory learners work well in groups where they are allowed to discuss the material. Beware of putting all auditory learners together; however, as they may all want to talk at once. After presenting new information, let these students repeat the information aloud or turn to a classmate to restate or

summarize the information. Put new information, such as math facts or spelling words, into a rhythm or tune that they can chant aloud.

Kinaesthetic learners, plan for movement throughout class time. Including lab-style work gives them the opportunity to learn by doing, which they prefer. These students also like to get up and move around, so planning for frequent, short breaks or opportunities for movement helps them stay focused. If information is presented in a lecture format, encourage note-taking and underlining to provide movement. If possible, include skits and role-playing for them. For reading, give these students a colored overlay to use over text to help keep them focused. Add physical movements along with rhythm and song to memorization tasks, such as math facts and spelling.

Finally, multi sensory approach is the best of all.

References

Barkley, E.F. (2010). Student engagement techniques: A handbook for college faculty. San Francisco, CA: Jossey-Bass

Chapelle, C. (1995). Field-dependence/field-independence in the second language classroom. In J. Reid (ed.), Learning styles in the ESL/EFL classroom. Boston: Heinle and Heinle Publishers.

Dunn, R., & Dunn, K. (1986). The Dunn and Dunn learning style model of instruction. [Online] Available : http://www.unc.edu/depts/ncpts/publications/ learnstyles.htm (August 10, 2009)

Dunn, R., Beaudry, J.S., & Klavas, A. (1989). Survey of research on learning styles. Educational Leadership, 46(6), 50-58.

Felder, R., & Henriques, E. R. (1995). Learning and teaching styles in foreign and second language education. Foreign Language Annals, 28(1), 21-31.

Fleming, N., & Baume, D. (2006). Learning styles again: varking up the right tree!, Educational Developments. SEDA Ltd, issue 7.4 Nov, 4-7.

Kagan, J. & Kagan, N. (1970). Individual variation in cognitive processes. In P. Mussen (Ed.), Carmichael's manual of child psychology (3rd Ed. Vol. 1). New York: Wiley.

Riding,R.J.,& Cheema, I. (1991).Cognitive Styles :An overview and integration. Eduvcational Psychology,11,193-215.

Smith, L. & Renzulli, J. (1984). Learning style preference: A practical approach for classroom teachers. Theory into Practice, 23(10), 45-50.

Sternberg, R. J. & Grigorenko, E. L. (1997). Are cognitive styles still in style? American Psychologist, 52, 700-712.

Zin, N. A., Zaman, H. B., & Noah, S. A. (2002). Multimedia Mathematics Tutor: Matching Instruction to Student's Learning Styles. ICCE, 1433.