

## Learning Styles In Relation To Different Instructional Strategies for Enhancing Learners' Performance in Life-Science in Jharkhand (India)

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### ABSTRACT

This study aims to investigate the impact of Traditional Instructional Strategies (TIS) and Blended Instructional Strategies (BIS) in 'life science', a school subject, in relation to various learning styles of learners based on Honey and Mumford. In this study researchers identified a sample of 120 students from IX<sup>th</sup> standard in Jharkhand, a province state dominated by tribes in eastern India following multi-stage sampling method. The data analyzed by SPSS, using statistical techniques, Mean and t-test. The findings reveals that the learners possessing Reflective, Active, and Pragmatist type of learning style perform better if taught following BIS compared to the identical groups when taught through TIS. The theorist type of learners are not affected with different instructional strategies whether it is blended or traditional.

**Keywords:** Learning Styles, Traditional Instructional Strategies (TIS), Blended Instructional Strategies (BIS), Performance in Life science.

### INTRODUCTION

Current education scenario encroach deep sense of learners' performance. To maximize learners' learning experience in terms of performance, various factors acting simultaneously such as student-teacher effort for learning, instructional strategies, teaching learning environment, teaching resources, learning resources. Apart from these, the learning styles of the learners' are also helpful in enhancing the performance. Learning style is the ability of learner to concentrate 'to process, internalize and remember the new and difficult academic information' (Dunn & Dunn 1993, as cited by Dunn, R. & Griggs, A. 2000, p.8). Here, the teacher has the most important task of providing variety of activities and strategies of learning that meets the uniqueness in different type of learners and thus providing encouragement towards higher level of achievement. Lovelace supported that the tutors' instructions to the students' learning styles increases academic achievement and improves attitudes towards learning among all students (Hieman, T.2006 p.56).

Having a look-back into the old teaching and learning process or traditional learning system,

it is apparent that the pupils religiously followed the lecture delivered by the teachers. It contained more of recitation from texts. In such situation, learners became the passive listeners. The learning process however can be turned more effective by enriching traditional methods with new technologies in education and instruction delivery. This will make learning more effective as it will cater to the individual learning style of every learner. Thus educators who believe in enhancing learning by the use of technologies should preferably move towards blended instruction for better learning and enhanced achievement, keeping in view the instructional objectives.

### RATIONALE

Dunn, R. & Griggs, A. (2000) holds that several studies proved that learning styles of the learner plays important role in enhancing learners' performance. Learning styles are directly related to how students achieve in school. Learners are flexible in their use of different learning styles and can adapt with varying degrees of success to different learning situations (Sternberg, R.1990). In life-science, concepts can be grasped by

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observation, experimentation, analyzing, synthesizing, knowing and applying the facts in real-life situation and learner prefer learning differentially in different learning situations too. So learning styles of the learner in Life-science also taken important consideration in this study.

Current science curriculum underwent revision time and again in various states and accorded vast standard according to the complex need of changing human life, advancement in science and knowledge enhancement. For achieving those changing standards only traditional instructional strategy is felt not sufficient. Therefore, full-fledged techniques and technologies are recommended in blended instructional strategy, which need to be adopted for diversified modern classroom for better learning.

It is worth noting to mention that the year 2015 was announced as a Quality Education year in Jharkhand because the data of the previous years reveals that most of the students are not interested in science studies ((in the year 2012, 108854 students enrolled in science, in 2013 decreased by 81831, 2014 it was 84852, and in 2015 it was 78957) reported in 'Students of Jharkhand not opting Science', 2015). This decrement of enrolment of students is mainly due to poor achievements in science subjects, compared to other streams. So concerning the above issues this study has been taken-up by the researchers.

### REVIEW OF RELATED RESEARCH LITERATURE

Since quite some time, researchers in the arena of instruction are attracted over the very dimension and across globe, good many studies has already been conducted on the very domain, relating allied areas of instruction. The researchers tried to explore those studies prior to undertake the present one. Glance perusals of the outcomes of those studies, which are having direct bearing with the present study are presented as follows:

#### Studies on Different Instructional Strategies and Learning Styles

Experimental studies conducted by *Jadhav, K.D. (2013), Orly C., Amy, P., and Liz, C. (2012). Roya, S., Mehdi, S., Faramarz, S.A. (2014), Moazamil, F.Bahrampour, E.Md.Azar, R., Jahedi, F., and Moattari, M.(2014).*,

*Giannousi, M., Vernadakis, N. Antoniou, P., and Kioumortzoglou, E.(2014)* reveals that students performed better with technology-assisted or blended instruction, compared to traditional instructional strategies. It shows effectiveness of blended instructional strategy on traditional instructional strategy. One of the studies by *Omer D. (2011)* indicated that learners were more engaged with problem based blended learning environment. The students' interaction and the level of academic challenge perceived were similar in both instructional strategies. It indicates that both the instructional strategies create some problem in maximizing learning. So the educator or instructor should teach in the very way that the learner can learn the whole content in an easy way. Other studies by *Erdem M., and Kabir P. N. (2014) & Anna Ya Ni (2012)* explored that face-to-face environment or traditional instructional strategy gained highest score than blended instructional strategy.

Studies carried out by *Mary, L. W. (2011) , Erika, J. R. (2005) , Seevrinda, N. N.(2012) ,Lori, A.W. (1988) , Shenoy, N. et al.(2013), Ikitde, G. A. and Bassey, E.U. ( 2013), Akinbobola, A.O. (2015) , Tulbure, C. (2001)* showed numerous conclusions regarding learning style and learning. Some resulted that learning styles as a factor influencing group development. Some observed that there is a relationship between student perceived classroom environment and instructor's teaching style by components of personality type. Some study showed that the subjects had a higher preference for multimodal learning, if biology students taught with guided inquiry teaching strategy in consideration of learning styles it will significantly affect the academic achievement, explored that guided discovery is the most effective instructional strategy for physics students with sensing/ intuitive learning style, demonstration is the most effective with sequential / global learning style and conventional strategy is the most effective with visual / verbal learning style. Some studies reflected that different learning styles achieve better academic scores when teaching strategies respond to their learning preferences.

So the researcher is inquisitive to know whether there remain any categories of learners who favoured the learning according to the instructional strategy. How learner perceive about course content? How learner involve in processing the information? In search of this

thirst area the researchers formulated the following objectives.

### **OBJECTIVE OF THE STUDY**

The basic objective of the present study is to explore the impact of traditional instructional strategies and blended instructional strategies in life science in relation to various learning styles of learners based on *Honey* and *Mumford*.

### **HYPOTHESIS**

The researchers, on the basis of findings of the previous studies, holds that there is no significant difference between achievement of traditional instructional strategies and blended instructional strategies in relation to various learning styles of learners based on *Honey* and *Mumford*. This single hypothesis comprises of five null hypotheses which gives the clear exploration of above stated objective

H<sub>1</sub>-There is no significant difference between mean achievement score of life science students in blended and traditional instructional strategies.

H<sub>2</sub>- There is no significant difference between mean achievement score of life science students of experimental (BIS) and control (TIS) group of reflective preference

H<sub>3</sub>- There is no significant difference between mean achievement score of life science students of active experimental (BIS) and active control (TIS) group.

H<sub>4</sub>- There is no significant difference between mean achievement score of life science students of theorist experimental (BIS) and theorist control (TIS) group.

H<sub>5</sub>- There is no significant difference between mean achievement score of life science students of pragmatist experimental (BIS) and pragmatist control (TIS) group.

### **OPERATIONAL DEFINITION**

Operational definitions, on which the present study hinges on are as follows:

#### **Learning styles**

Learning styles are the learning preference of individual. In this study learning styles refers to four types of learning styles proposed by *Honey* and *Mumford* i.e. Actives, Reflectives, Theorists and Pragmatists.

#### **Instructional Strategies**

Instructional strategy refers to plan or activity to deliver the content through stated method of instruction. In this study two types of instructional strategies taken into consideration

i.e. traditional instructional strategies and blended instructional strategies. Traditional instructional strategies refers to instructions deliver through traditional way such as chalk and talk method and blended instructional strategies (*Roy,R.2011*) refers to blended instructional strategy which uses the combination of various pedagogical approaches (e.g., constructivism, behaviourism, cognitivism) and theories to produce an optimal learning outcome based on First Principle of instruction by *Merrill, D.* for content delivery.

#### **Performance**

Performance for the present study refers to the achievement scores gained by students after different instructional strategy employed in experimental and control group.

#### **Life-science**

The Life-science comprises the field of science that involves the scientific study of living organisms.

### **METHODOLOGY**

#### **Design of the study**

The study was an experimental one; therefore an experimental designs used for the study. The study was based on true experimental design i.e. pre-test, post-test and equivalent group design.

#### **Population**

All IX<sup>th</sup> grade students comprise the population of the present study.

#### **Sample and sampling techniques**

Multistage sampling procedure was adopted to deduce sample for the study. At the first stage, two schools were selected purposively on the basis of resource availability. Resource availability has been categorized with two criteria, (1) minimum resource availability i.e. Life science lab with required equipment and (2) maximum resource availability i.e. well-equipped Life science lab, computer lab with internet facility.

In the control and experimental group, life-science students of IX<sup>th</sup> grade were randomly accorded as sample. On the basis of above mentioned criteria two secondary schools of Jharkhand state were selected. In this regard the size of sample for the study was 120 students of IX<sup>th</sup> grade.

### **TOOLS AND TECHNIQUES**

#### **Instructional Tools**

Instructional plan, according to blended instructional strategy and traditional instructional strategy were developed.

**Instructional Techniques**

For control group, instruction was based on traditional instructional strategies i.e. chalk and talk, demonstration and Lab method and for the experimental group it was provided on the basis of blended instructional strategy i.e. based on First principles of instruction(Roy,R.2011) by *Merrill, D. The First Principles of Instruction* by *D. Merrill* given emphasis as it comprises of five fundamental principles of effective instruction. The principles are *Task centered principle, Activation principle, Demonstration principle, Application principle* and *Integration principle*.

All these principles were defined in the proper manner so it accords all the approaches and useful theories for effective instruction.

**Measuring Tools**

The following measuring tools were used for the study:

The Learning Style inventory by *Honey and Mumford(1986)*-Based upon the work of *Kolb, Honey P. and Mumford A. (1986)* identified four distinct learning styles i.e. Actives, Reflectives, Theorist and Pragmatist, respectively, who learn by doing, learn by observing and thinking about what happened, learn by understanding the theory behind the action, learn by practicing information in real world situation, respectively.

In this study the learning style refers to the way in which learner approaches the problem or deals with different learning situation in accordance with *Honey and Mumford's Learning Style Inventory*.

Self-developed Life-science Achievement Test based on content knowledge of Life science book of IX<sup>th</sup> standard consist the chapter 'Tissue'. The questions are objective type comprises of fill-in-the-blanks, multiple choice type questions, correct sequence arrangement

and drawing focusing on instructional objectives.

**Procedure**

The researchers administered the Learning-Style inventory deduced by *Honey and Mumford (1986)* to classify the learner for experimental and control group into their preferred learning style. Researchers also administered pretest before giving the treatment in experimental group and also in control group and administered post achievement test on the basis of content knowledge.

**STATISTICAL TECHNIQUES AND ANALYSIS OF DATA**

The collected data were analyzed quantitatively. Mean, Standard Deviation, t-test have been used to test significance of difference between the achievement of the different learning styles' students in traditional and blended instructional strategy in Life science respectively from control group and experimental group. Data were analyzed with SPSS20 software.

**FINDINGS**

Findings of the study based on formulated objectives and hypothesis stated under this content area, which reads, 'to study the impact of traditional instructional strategies and blended instructional strategies in life science in relation to various learning-styles of learners based on *Honey and Mumford*. The hypothesis states, that there is no significant difference between achievement of traditional instructional strategies and blended instructional strategies in life science in relation to various learning styles of learners based on *Honey and Mumford*. To conclude the main hypothesis the five null hypotheses tested and analyzed data is presented in the following tables.

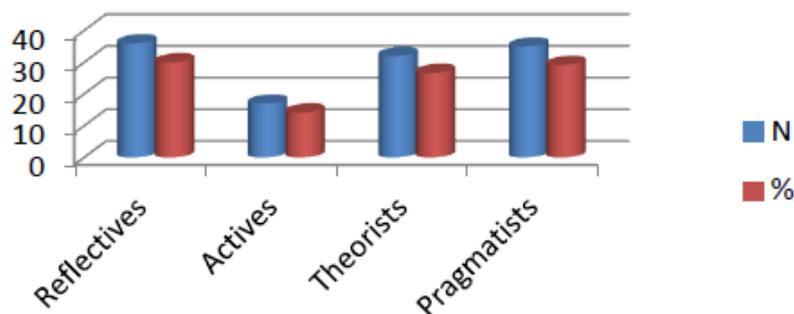
**Table1.** Represents the no. of students and their percentage of different learning preferences

<b>Learning styles of the learner</b>	<b>N</b>	<b>%</b>
Reflectives	36	30
Actives	17	14.17
Theorists	32	26.67
Pragmatists	35	29.17
Total students	120	100

In the present study 120 sample selected following multistage-sampling technique, for the purpose and out of 120 participants Reflectives(36) are more in numbers 30% of the

total, Pragmatists (35) are 29.17% of the total, Theorists(32) are 26.17% and Actives (17) are 14.17% of the total participants.

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**Fig1.** Graph presented the no. of students and their percentage of different learning preferences

H<sub>1</sub> -There is no significant difference between in blended and traditional instructional mean achievement score of life science students strategies.

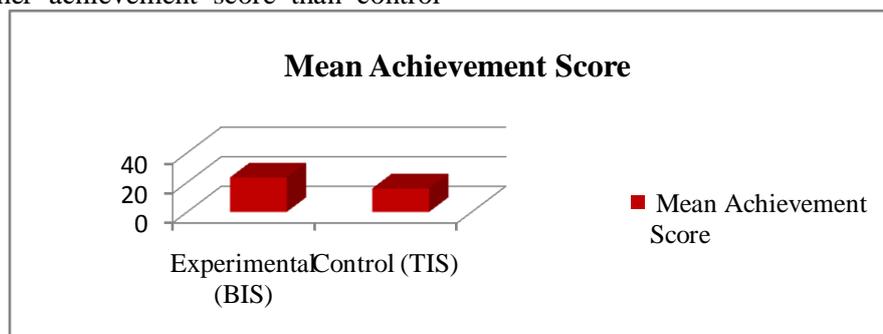
**Table2.** Comparison of Mean achievement score and t-value of experimental (BIS) and control (TIS) group

Groups	N	Mean	Mean diff.	SD	t	df	Sig (2-tailed)
experimental (BIS)	60	23.32	7.39	4.82	7.91	118	0.01
control (TIS)	60	15.93	7.39	5.38			

The experimental and control group shows mean difference of 7.39,  $t$  (at  $df$  118) = 7.91,  $p < 0.01$ .

Here  $t = 7.91$  at 0.01 level of significance indicates there is a higher significant difference between experimental and control group.

The result reveals that experimental group having instruction through traditional strategy having instruction through blended strategy gained higher achievement score than control group



The graph depicted above represents the mean achievement score of experimental (BIS) and control (TIS) group

H<sub>2</sub>- There is no significant difference between mean achievement score of life science students of reflective experimental (BIS) and reflective control (TIS) group

**Table3.** Comparison of Mean achievement score and t-value of reflective experimental (BIS) and reflective control (TIS) group

Groups	N	Mean	SD	SEM	Mean Diff.	SED	df	t	Sig. (2-tailed)
Reflective BIS	17	24.59	4.21	1.02	8.64	2.04	34	4.24	0.01
Reflective TIS	19	15.95	7.39	1.70					

The post-test scores calculated by t-test method to gain the mean achievement scores and t value. The reflective experimental and control group shows mean difference of 8.64, where  $SD_1 = 4.21$ ,  $SD_2 = 7.39$ ,  $t$  (at  $df$  34) = 4.24. Table represents  $t = 4.24$  at 0.01 level of significance indicates there is a significant difference between mean achievement score of life science students of experimental (BIS) and control (TIS) group of reflective preference. The mean achievement score of reflective experimental group is 24.59 and of reflective control group is 15.95 this shows clearly that.

The reflective experimental group gain high achievements in blended instructional strategy

than reflective control group in traditional instructional strategy.

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H<sub>3</sub>- There is no significant difference between mean achievement score of life science students of active experimental (BIS) and active control (TIS) group.

**Table4.** Comparison of Mean achievement score and t-value of life science students of active experimental (BIS) and active control (TIS) group.

Groups	N	Mean	SD	SEM	Mean Diff.	SED	df	t	Sig. (2-tailed)
Active BIS	6	20.17	5.71	2.33	5.80	2.198	15	2.64	0.05
Active TIS	11	14.36	3.44	1.04					

The active experimental and active control group resulted mean difference = 5.80,  $SD_1 = 5.71, SD_2 = 3.44$ , and  $t$  (at  $df_{15}$ ) = 2.64, which is significant at 0.05 level. Here  $t = 2.64$  at 0.05 level of significance indicates there is significant difference between mean achievement score of life science students of active experimental (BIS) and active control (TIS) group. The table shows the mean achievement score of life science students of active experimental (BIS) group is 20.17 and of active control (TIS) group is 14.36 which indicates that

The active experimental group performed better than active control group. of theorist experimental (BIS) and theorist control (TIS) group.

H<sub>4</sub>- There is no significant difference between mean achievement score of life science students

**Table5.** Comparison of Mean achievement score and t-value of life science students of theorist experimental (BIS) and theorist control (TIS) group.

Groups	N	Mean	SD	SEM	Mean Diff.	SED	df	t	Sig. (2-tailed)
Theorist BIS	18	23.67	4.69	1.11	-.62	1.71	30	-.36	.72
Theorist TIS	14	24.29	4.92	1.32					

The theorist experimental and theorist control group shows mean difference = -.62,  $SD_1 = 4.69, SD_2 = 4.92$ , and  $t$  (at  $df_{30}$ ) = -.36. Here  $t = -.36 < \text{crit. } t_{2.04}$  at 0.05 level of significance. So the null hypothesis cannot be reject means there is no significance difference between mean achievement score of life science students of theorist experimental (BIS) group and theorist control (TIS) group.

So the theorist learners, who were given instruction through blended strategy performs equally like theorists learners, who were given instruction through traditional strategy.

H<sub>5</sub>- There is no significant difference between mean achievement score of life science students of pragmatist experimental (BIS) and pragmatist control (TIS) group.

**Table6.** Comparison of Mean achievement score and t-value of life science students of theorist experimental (BIS) and theorist control (TIS) group.

Groups	N	Mean	SD	SEM	Mean Diff.	SED	df	t	Sig. (2-tailed)
Pragmatist BIS	19	22.84	5.04	1.16	7.84	1.68	33	4.68	0.01
Pragmatist TIS	16	15.00	4.83	1.208					

The pragmatist experimental group and pragmatist control group shows mean difference = 7.84,  $SD_1 = 5.04, SD_2 = 4.83$ ,  $t$  (at  $df_{33}$ ) = 4.68. Here  $t = 4.68$  at 0.01 level of significance indicates there is a significant difference between mean achievement score of life science students of pragmatist experimental (BIS) and pragmatist control (TIS) group. The table shows the mean achievement score of life science students of pragmatist experimental (BIS) group is 22.84 and of active control (TIS) group is 15.00 which results that

The pragmatist learners of experimental group perform better than pragmatist learners of control group.

more in number pragmatist and theorist were relatively up and down in number. The main hypothesis was there is no significant difference between achievement of traditional instructional strategies and blended instructional strategies in relation to various learning styles of learners based on Honey and Mumford which comprises with five null hypotheses to explore the

## DISCUSSION

The study presents the different learning preferences of students in life science in which actives were less in number and reflective were

scenario. The first hypothesis stated as there is no significant difference between mean achievement score of life science students in blended and traditional instructional strategies and result reflected that there was higher significant difference between experimental and control group means blended instructional strategy is more better than traditional instructional strategy and this finding supported by Jadhav, K.D. (2013), Orly C., Amy, P., and Liz, C. (2012).Roya, S., Mehdi, S., Faramarz, S.A. (2014), Moazamil, F.Bahrapour, E.Md.Azar, R., Jahedi, F., and Moattari, M.(2014), Giannousi, M.,Vernadakis, N.Antoniou, P., and Kioumortzoglou, E.(2014).The second hypothesis was there is no significant difference between mean achievement score of life science students of reflective experimental (BIS) and reflective control (TIS) group and in support of this hypothesis result indicates learners having reflective preference of experimental group gain high achievement compare to learners having reflective preference of traditional group. The third hypothesis stated as there is no significant difference between mean achievement score of life science students of active experimental (BIS) and active control (TIS) group and study reveals that the active experimental group performed better than active control group. Active learners more achieved through blended instruction than traditional instruction. The fourth hypothesis was there is no significant difference between mean achievement score of life science students of theorist experimental (BIS) and theorist control (TIS) group and result indicates that really there is no significant difference between mean achievement score of life science students of theorist experimental (BIS) and theorist control (TIS) group means theorists are not affected with the different instructional strategies. The last hypothesis was there is no significant difference between mean achievement score of life science students of pragmatist experimental (BIS) and pragmatist control (TIS) group and findings shows that the pragmatist learners of experimental group perform better than pragmatist learners of control group.

### **CONCLUSION**

The study reveals that performance of learners' of different learning styles effectively enhanced in blended instructional strategies. The secondary

students of life science belonging to Reflective, Actives and Pragmatists type of learning style, while underwent instruction through blended strategies, performing better than Reflective, Actives, and Pragmatists type of learners taking instruction through traditional strategies. In case of theorists the study reflected they performed equally in blended and traditional instructional strategies. So the instructor or the teachers should take care of adopting instructional strategies and learners' learning styles.

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