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Effect of Brain-Based Instructional Strategies on Achievement in Science of Elementary School Students with different Learning Styles

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Abstract

No two individuals are alike and so are their learning styles. Brain-based learning strategies that are based on the core principles of human brain development can be promising in improving the achievement of students catering to the need of diverse learners with varying learning styles. These strategies are having a sound basis in Neurosciences and these strategies can be instrumental towards students' performance as well as retention. The current research attempts to examine the effect of these strategies on achievement in science of elementary students with different learning styles. The sample of 100 students was taken which was randomly divided into two groups namely Experimental and Control Group. The students in the experimental group who received teaching using brain-based instructional methodologies outperformed than students in the control group on achievement test. In addition, students in the experimental groups with accommodation and divergent learning styles had considerably higher mean scores on achievement in science as compared to convergent and assimilation learning styles. Hence, the students' achievement in science improved significantly when they were taught using brain-based teaching methodologies.

Keywords: Brain-based Learning, Achievement in Science, Learning Styles.

INTRODUCTION

Science education is paramount in development of a nation. Science as a subject has been made compulsory from elementary level of teaching. New Education Policy advocates the providing joyful learning experiences to teach this practical subject. (NPE, 2020). Scientific knowledge is free from bias and has its grounds in logic. It is pertinent to teach science by providing the students the real and experiential learning and hence, its teaching should not be confined to the four walls of a traditional classroom. The complexity of the subject can be simplified by regulating human brain in a manner that it should comprehend the scientific concepts easily using the neural impulses. With the advent of science and technology, smart classes have undoubtedly provided a novel experience to human learning, yet, brain-based learning techniques that utilize the available resources and most importantly the focus on improving the neural connection can lead to a more permanent learning without being dependent on technology. Brain-based learning involves teachers creating conditions that increase student motivation, engagement and long-term retention by tapping into the natural ways the brain receives, processes and stores information. This approach can be applied to classroom teaching methods, lesson planning,

curriculum design and any other educational engagement. As long as the planning and delivery is rooted in the latest research on the science of learning, it's considered brain-based instruction. New information and experiences can physically reshape the brain's neural pathways; the more we practice new skills or review new information, the stronger those pathways become and the better we retain the information or ability.

The neuroplasticity of our brain is impacted by motivation, stress, and difficulty, as well as our emotional state during the learning process, in both positive and negative ways. Comprehending the mechanisms of neuroplasticity, particularly in the growing brains of children, might aid educators and curriculum designers in creating lessons that are more likely to "stick." Teachers witness this neuroplasticity at work as their pupils learn new material or acquire new abilities in the classroom.

(Dr. Bobbi Hansen, 2016) identifies four key principles of brain-based learning:

1. **Experience:** New experiences only reshape the brain when we are actively participating in those experiences.
2. **Flow:** Stress affects memory, so instructors need to facilitate a "flow state" in which students are comfortable, safe and focused.
3. **"Sticky" learning:** Utilize teaching methods that result in higher knowledge retention, such as learning by doing or student-led instruction.
4. **Brain-informed teaching practices:** Identify and implement the teaching strategies that will best support the current group of students.

From the above mentioned principles, instructional strategies have been developed with a view to aid learning by humans. When creating the brain-based lesson plans, educators can incorporate the following advanced strategies:

- Integrate spoken and written content to improve learning as well as retention. Emphasizing activities that are practical, imaginative, impactful emotionally, and hands-on.
- Prioritize instruction and exercises that foster critical thinking in pupils rather than memorization.
- Preparing lessons that can teach students social and team-building skills in addition to the course material.
- By providing Model lessons and assignments on real-world problems that students can connect to.
- Include opportunities for students to practice the course material in every lesson or before going on to the next unit.
- Regardless of the school level, incorporate breaks or exercise into your teaching. Make sure that neither the curriculum nor the physical setting of the classroom cause unneeded stress or worry.

The teacher plays a crucial part in establishing a classroom setting where she may connect her instruction to the students' learning experiences. The connection should be so reliable that information and experiences seem to flow continuously. All student types must be included in the flow, with specific attention to those with special needs. The environment in the classroom is diverse. Research today has shifted its focus from autocratic and teacher-oriented instructional strategies to democratic teaching strategies, where students are given due importance and respect to their individuality and abilities, in order to meet the needs of diverse learners and improve their academic achievement.

Teaching strategies must cater to the developmental needs of the students with special needs. Brain-based instructional strategies are pioneer in implementing such teaching in classroom that utilize the developmental principles of human brain and its needs.

Giving hands on interactive learning to students is found to be helpful in increasing retention. Prigge, 2002 has suggested some of the strategies which can actually improve the students' achievement. The strategies suggested are as follows:

- Teaching students about their brain
- Discussing about the Proper sleep hours required for better retention
- Telling importance of water and glucose for human brain.
- Making students aware about different learning styles.
- Establishing positive and interactive atmosphere.
- Integrating media in classroom teaching
- Encouraging students ideas about learning
- Using movement and music
- Utilizing first and last minutes of teaching involving students

All the above mentioned techniques enable human brain to actively participate and retain the learned information. Present investigation was conducted keeping the following objectives in mind.

Objectives

The objectives of the research are:

1. To study the effectiveness of brain-based instructional strategy on Achievement in science of elementary level students with different Learning Styles..
2. To prepare lesson plans based on brain-based instructional strategy.
3. To prepare achievement test in science.
4. To compare the achievement in science of elementary students of experimental group and control group.
5. To compare the effect of Brain-based Instructional Strategy on Elementary level students with different Learning Styles.

Method and Design

The current investigation falls under the domain of experimental research. Pre-test post-test Control group design was adopted by the researcher. In the current study the investigator applied the brain based approach to experimental group in order to study its effect on achievement in science of students with different Learning Styles. Pre test scores were obtained from students with different learning styles. After providing experimental treatment, the post test scores on achievement in science were obtained from students with different learning styles. The scores obtained from both the groups are given in Table 1.1 and 1.2.

GROUP	N	Mean	SD	SEM	D	SED	Df	t	Sig.
EXPERIMENTAL GROUP (Brain-based Instrucional Strategy)	50	10.37	4.32	0.84	5.51	1.014	98	3.974	.01
CONTROL GROUP (Traditional Teaching Strategy)	50	05.32	4.11	0.64					

Table 1.1

Table showing t-value for difference in mean score of achievement of experimental and control group

Learning Styles	N	Mean	Std. Deviation	Std. Error
Accommodation	12	9.92	4.37	1.82
Assimilation	13	8.30	4.18	1.78
Convergent	12	8.21	4.51	1.80
Divergent	13	9.10	3.91	1.73
Total	50	10.21	5.32	.82

Table showing mean score of achievement of experimental group students with different Learning Styles

Table 1.2

Sample

The study was carried out on a sample of 100 elementary school students of Chandigarh City. Researcher randomly selected two groups of 50 students each as experimental and control group.

Tools

In the current investigation researcher implied following tools:
Achievement Test in Science (Prepared by Investigator)
Kolb's Learning Style Inventory
Lesson Plans on Brain based strategy using blended mode of teaching.

Statistical Tools

In the present investigation, researcher used t-test and F-test to compare the mean gain score on achievement in Science of Experimental and Control Group students with different learning styles.

Results and Discussion

Findings and comments are presented below according to the research hypotheses.

1. There exists statistically significant difference between the mean scores of the pre-test and post-test measurements of the experimental group on the achievement in science of elementary school students.
2. The students of experimental group outperformed on achievement in science as compared to the control group which was taught by conventional method of teaching.
3. There exists a significant mean gain on achievement in science of elementary school students of Experimental group with Accommodation Learning Style.
4. There exists no significant mean gain on achievement in science of elementary school students of Experimental and Control group students with Assimilation Learning Style.
5. There exists no significant mean gain on achievement in science of elementary school students of Experimental group and Control group students with Convergent Learning Style.

6. There exists a significant mean gain on achievement in science of elementary school students of Experimental group with Divergent Learning Style.

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