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Linguistic Constructive Approach in Science Class

Prasannakumar Doss

Assistant Professor, Department of Education, University of Ladakh, Kargil campus, India
E-mail: praskumar78@gmail.com

Corresponding author: praskumar78@gmail.com

***Abstract*— The present study examines the effectiveness of Linguistic constructive approach in enhancing achievement in Science among V Standard students. An experimental design has been adopted. Linguistic constructive approach is independent variable and achievement in science is the dependent variable. Thirty students of standard 5th of a local School here the sample of subjects. The data of achievement in science on pre and post assessment were collected and computed for analysis. From statistical findings it is concluded that the Linguistic constructive approach enhancing the achievement in science of the students.**

***Keywords*—Approach; Linguistic Constructive; Science Class**

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I. INTRODUCTION

The relation between language and cognitive development has been of interest to linguists and cognitive psychologists for decades (Wilcox, 2021). The proper use of language facilitates the development of these cognitive facilities which are so essential for school learning. Listening, reading, speaking and writing are all integral part of the language behavior (Kim, 2020a, 2020b; Skehan, 2019). Pupils listen with greater attention when they know that they will be expected to respond to the messages being communicated. The teachers can encourage listening by incorporating different types of stimuli for recalling facts, expressing opinions, analyzing specific factors and evaluating on the basis of information provided in the message (Ayllón, 2019; Fauth, 2019; Stephan, 2019).

Constructivism is an epistemology, a theory of knowledge used to explain how we know, what we know (L. J. Zhang, 2020; Zhou, 2018). This can be of great relevance to the teachers and trainers as referent. This perspective asserts that knowledge resides in the individual and their knowledge is not transferred from the heads of the teachers to those of the students (Li, 2020; Papi, 2020; Zou, 2018). Learning and making sense of what happens ultimately rests with the individual child. Children's values, beliefs, feelings influence their conceptual development (Canfield, 2020; Conte, 2019; Goriot, 2018).

'Cognitivists' as the supporters of interactional view on language acquisition have maintained that language is learned as a result of the active role the child takes in that learning (Archibald, 2019; Koyama, 2021; Robinson, 2019). The theory proposes that the child is born with the propensity to act on the environment, process information and reach conclusions about the structure of language. The relation between language and cognitive development has been of interest to linguists and cognitive psychologists for decades (Babik, 2022; Cammack, 2020; Morgan, 2020). Though Piaget, the pioneer in the field of cognitive sciences was very emphatic in his views and regarded language as subordinate to fundamental thought processes but language ought not to be regarded as a 'passive' instrument operating on behalf of the intellect. Language plays a significant role in the development of concepts (Hill, 2019).

'Cognitive conflict' arises where the child is exposed to some new information which contradicts with the existing information (Hsu, 2022). This causes disequilibrium and in resolving the conflict concepts are formed. Vygotsky (1962) described the concept as 'cognitive dissonance'. In his evocative book 'thought and language' clearly distinguishes between the 'stream of thought' and the 'stream of language'. A stage theory was developed to understand the development of language (Giorgi, 2021; Penfold, 2022; Sreena, 2019). Stress was placed on the development of meaning of a word. Vygotsky places his views regarding the relation of thought and language in the perspective of theories phylogeny of intellectual development.

It has been argued by psycholinguists, the reflexive use of language brings with it an increased consciousness of the role of language (Chaparro, 2022; Schlaman, 2019; Wofford, 2019). With this increased consciousness comes control over one's own behaviour and extends to control over one's thinking. This changes the character of thinking along with the ways in which attention, memory and other cognitive functions are organized. The proper use of language facilitates the development of these cognitive facilities which are so essential for school learning (Volodina, 2020; Yoon, 2021; Zakaria, 2019). The cognitive or intellectual development is a process of the decontextualization of word-meanings by means of child - adult social interactions in which the child's zone of proximal development is fruitfully utilized (Cammack, 2020; Casey, 2018; Piccolo, 2022). Vygotsky (1982) was the first cognitive psychologist who conclusively stated that children tend to improve their learning in the company of those who are more skilled or knowledgeable. Potential learning ability or the Zone of Proximal Development is defined as the "distance between the actual development level as determined by independent problem solving and the potential development as determined by problem solving under adult guidance or in collaboration with more capable peers". These interactions help to further the cognitive and conceptual abilities of the child (Berthele, 2022; Paulus, 2018; Schaeffer, 2018).

II. METHODE

The Linguistic Constructive Approach

The Linguistic Constructive Approach is initiated by the process of Scaffolding (Gentil, 2018; Raber, 2019; Xu, 2018). The term was first used by Bruner, Wood and Ross (1974). The teacher controls the learning that occurs between what is known and what is to be learned at a level appropriate to the learner (Liu, 2019; Munirah, 2018; L. J. Zhang, 2020). Scaffolding is the first initial impression on which the child can build, develop and refine his\her thoughts so that an idea emerges which is representative of the ultimate concept which is to be conveyed to the learner. The scaffolding provided by the teacher will be some extent help the learner in a sort of 'categorization'. The categorization will be based on the learner's existing cognitive structures and previous experience with relevant materials. The categorization of information is an intermediate step The hazy picture developed by the learner with reference to the concept can further be refined and clarified by provision of a 'criterion' which can be described in the form of a facilitative question by the teacher. This will result in the formation of 'pseudo-concepts'.

The second step in the Linguistic Constructive approach aims to introduce the scientific term (Barbier, 2018; "Erratum: (Linguistic Approaches to Bilingualism (2017) 7:5)," 2018; Lampropoulou, 2019). The scientific term is essentially a familiarizing process whereby the

comparative and differentiation functions are also facilitated. The initiation into the specific vocabulary of the subject takes place. This step is followed by 'extended verbal explanations'. As the name suggests it makes use of examples, illustrations and elaboration. Explanations involve narration, description and it follows a logical sequence. These also include simple questions to clarify the doubts.

This step is followed by 'guided activity' in the class room (S. Zhang, 2019). The use of methods like observation, discovery methods, collection and categorization of materials, experiments is encouraged. The teacher can select the most appropriate and suitable activity according to the demands of the concept under study. These learning methods should make use of descriptive language. The descriptive language is normally cut short. The child receives very little framework at the outset or during the activity. This puts the onus of selection on the learner and creates the need to hypothesize, define and eventually report and record as and when required. The final step is the Facilitative questions; The Facilitative questions can be framed to judge a child understands of the attained concept. The length and breadth of a concept is divulged through the verbatim the child uses to explain the term or a process. Questioning is one of the important teaching techniques. It is the starting point of any educative activity. It is basically a problem solving and thought provoking device.

Objectives of the study:

1. To identify the linguistic constructive approach on science learning.
2. To implement the linguistic constructive approach teaching in science.
3. To find out the effect of Linguistic constructive approach on students' achievement in science learning.

Hypotheses of the study:

- There is no significant mean difference between the control group and experimental group students in their mean score of achievement in the pre test.
- There is no significant mean difference between the control group and experimental group students in their mean score of achievement in the post test.
- There is no significant mean difference between pretest and post test score of achievement in control group students.
- There is no significant mean difference between pretest and post test score of achievement in experimental group students.
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Sample for the study

Sixty students studying in V^{th} standard in municipal middle school at Pudukkottai. Thirty students were taken as the experimental group and other thirty were taken as the control group.

Tools

1. Linguistic constructive approach. The LCA was constructed and validated by Rekha sapra (2011)
2. Science Achievement tests for Pretest and posttest. It is constructed by investigator

III. RESULT AND DISCUSSION

The following steps are in the experimentation

- Understanding the technology of Linguistic Constructive Approach.
- Identifying chapters related to appropriate problems for the application of LCA on the Science lessons in V standard.
- Trying out the Effectiveness of LCA with a small group of students as pilot study.
- Evaluating the effectiveness of LCA.
- Conducting pre–test to assess the entry behaviour of the students in the classroom.
- Comparing students based on pre – test achievement scores so as to enable them to be grouped in equal groups as control and experimental and establishing the equality of the two groups by mean and standard deviation of achievement scores in the pre-test.
- The students of experimental group to be taught through LCA and control group to be taught through the lecture dominated traditional method of teaching.
- Duration of the treatment was one month.
- Administering the posttest after the completion of instructional units.
- Entering, categorizing and analyzing the pre – test and post – test scores.

Data analysis

The data collected from the control group and the experimental group students were tabulated and analyzed statistically. In descriptive analysis mean and standard deviation were calculated and in differential analysis't' test was computed. The findings were arrived and discussed.

Statistical Technique

The data were used to calculate the arithmetic mean, standard deviation for descriptive analysis. The "t" test was used as a statistical technique for differential analysis.

Table1
Comparison of mean and S.D of the Control and Experimental groups.

S.No	Students	Pre test	Post test
1	Control group	M1=30.65	M2=35.62
		S.D=9.98	S.D=11.97
2	Experimental group	M1=31.56	M2=82.33
		S.D=10.83	S.D=6.28

The control group students' achievement means scores in post test is slightly higher than the pre-test. The experimental group students' achievement means scores in post test is greater than the pretest. The pretest achievement mean scores of control and experimental group are almost equal. The post- test achievement means scores of experimental group is greater than the controlled group. Hence the Linguistic constructive approach is more effective than lecture dominated traditional method in learning Science at standard V.

Table 2
Comparison of mean, S.D and't' Scores of the Control and Experimental groups.

No	Test	Control Group	Experimental Group	't'	Remarks
1	Pre-test	M1=30.65	M2=31.56	0.68	NS
		S.D=9.98	S.D=10.83		
2	Post-Test	M1=35.62	M2=82.33	4.41	S
		S.D=11.97	S.D=6.28		

There is significant mean difference between the pretest and post test scores of the experimental group. So, it indicates that teaching through Linguistic Constructive approach improves student achievement in Science. The mean scores of the control group are not significantly differed in the post test than in the pre testv

Table 3
Comparison of mean, S.D and 't' Scores of the pre and posts.

No	Students	Pretest	Post test	't'	Re marks
1	Control group	M1=30.65	M2=35.62	0.49	NS
		S.D=9.98	S.D=11.97		
2	Experimental group	M1=31.56	M2=82.33	26.27	S

There is no significant difference between the control group and the experimental group in the pre-test. There is significant mean difference between the post test scores of the control group and experimental group. So the treatment is considered to be effective.

Findings of the study

- The control group students' achievement mean scores in post test is slightly higher than the pretest
- The experimental group students' achievement mean scores in post test is greater than the pretest.
- The pretest achievement means scores of control and experimental group are almost equal.
- The post test achievement means scores of experimental groups is greater than the controlled group.
- There is significant mean difference between the pretest and post test scores of the experimental group. So it indicates that teaching through Linguistic Constructive approach improves student achievement in Science.
- The mean scores of the control group are not significantly differed in the post test than in the pre test
- There is no significant difference between the control group and the experimental group in the pre test.
- There is significant mean difference between the post test scores of the control group and experimental group. So the treatment is considered to be effective.

- The Linguistic constructive approach is more effective than lecture dominated traditional method in learning Science at standard V.

Educational Implication

- During this approach there is a lot of provisions of adequate explanations to understand the Science concepts are very useful to the learners.
- Using of simple language at the time of presentation of lessons is very much felt comfortable.
- The discovery methods, experiments, demonstrations and projects should be expression and by the teachers. There a method needs to strengthen by the proper use of language.
- This approach is able to modify the Curriculum to be child centered.

This Linguistic constructive approach provide more opportunity to the primary learners to interacting physical and mental ways in the learning environment.

IV. CONCLUSIONS

Teachers believed that linguistic constructive approach of teaching are vehicles of communication of scientific process skills. They believed in the philosophy of models of teaching as strategies to improve teaching and examples of latest development in the field of education whose knowledge would improve the teaching competence of teachers. Linguistic constructive approach could prove to be a very important tool in the hands of a primary school teacher in teaching of science.

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