Concept Attainment in Geometry through CLD Model among Class V Students

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CONCEPT LEARNING has been an important component of the teaching-learning process. Concepts are products of reasoning and once developed play an important role in further thinking. Children at all levels of development constantly learn situations. Poor understanding of concepts can lead to dead ends while their proper understanding can advance one's comprehension of the subject.

Development of concepts in mathematics is most important for children to develop better understanding. Mathematics is a subject of significance by itself and also concominant to other subject areas for which it is a compulsory subject at the school level. Geometry, a major part of mathematics is included from the primary level. Attainment of concepts in geometry facilitate learning in mathematics as well as is useful in day-to-day life.

For the development and attainment of concepts the guidelines provided by Klausmeier's "Conceptual Learning and Development Model" is popularly known as the CLD Model. This model postulates four levels of concept attainment, i.e. (i) classificatory level; (ii) discrimination and naming the attributes level; (iii) inferring relevant and irrelevant attributes level; and (iv) the use of concept attained at classificatory and formal level which specifies the cognitive operations involved in the attainment of concepts.

The mental process of concrete level requires attention to the distinctive features of an object and forming a memory image which represents the objects as a unique bundle of features. Concepts attainment at the concrete level involves only the discrimination of an object from other objects, attainment of the identity level involves both discriminating various forms of the same object from other objects and also generalising the forms as equivalent. In classificatory level one can be able to correctly classify a large number of instances as examples and non-examples, but cannot accurately describe the basis for his grouping in terms of the defining attributes of the concepts. Hypothesising relevant attributes and rules, remembering and evaluating hypotheses using positive and negative instances are two important mental processes involved at this stage.

To find out the attainment of concepts in mathematics a number of studies have been reviewed which revealed the following: (i) There was no significant difference between boys and girls on the effect of graph comprehension (Curcio, 1987); (ii) There was no sex difference in logical reasoning

or use of geometry problem-solving performance (Battista, 1990); (iii) Males had higher scores in creativity and intelligence as compared to females (Agarwal et al. 1999); (iv) In the skill of planning science practical, the average score of boys was more than that of girls, but not found statistically significant. But in the skill of observation, girls performed better than boys though the difference was not satistically significant (Reeta Sharma, 2000).

In the entire chain of educational system elementary education system plays a very important role in the education of child. According to *National Curriculum Framework for School Education,* "mathematics has been an inseparable part of school curriculum ever since the beginning of formal education and it continues to be so." The fundamental aspects of mathematics, i.e. geometry as well as arithmetic at primary level and upper primary level should be given proper importance. To meet the challenge of quality elementary education for all, our instructional process should be concept-based and activity-oriented.

By seeing the importance of concept-based education on mathematics at primary level, the investigator conducted the study to find "Concept attainment in geometry through CLD model among Class V Students".

Objectives

In view of the above, the objectives of the present study were:

(1) To examine the effect of Conceptual Learning and Development (CLD) model of teaching on the attainment of geometrical concepts among Class V school children.

(2) To find out the difference in the attainment of geometrical concepts at different levels among Class V school children of different gender.

Hypotheses

On the basis of above objectives, the following hypotheses were developed:

(1) There is a significant difference in the mean gain score of concept attainment task in geometry at various levels of concept attainment during post-test over pre-test among the experimental and control group of children of Class V irrespective of sex.

(2) There is a significant difference in the mean gain scores of concept attainment task at different levels in geometry during post-test over pre-test among Class V school children of different gender.

Design of the Study

The present study attempts to examine the effects of instruction based on Conceptual Learning and Development (CLD) model on the attainment of geometrical concepts among Class V children as a function of their sex. The experiment followed pre-test versus post-test control group design for evaluating different hypotheses.

Sample

Out of 95 students of Class V in Government Upper Primary school,

Gotamara, 60 students were slected randomly for investigation. The children were divided randomly into two groups, one formed the control group and the other the experimental group, each group had 30 students. Care was taken to select 15 boys and 15 girls in each group.

Procedure

The investigator selected 6 geometrical concepts from the syllabi of mathematics of Class V. The lesson plan for each concept was developed by the investigator on the basis of cognitive operations specified in CLD model. The children of experimental groups received the treatment by the investigator but the control groups received the instructions through traditional mode of teaching by their own teachers.

Concept Attainment (CA) task was developed by taking 6 geometrical concepts, i.e. angle; triangle; parallelogram; rhombus; rectangle and square. Four different sub-tests were developed by the investigator carrying all the six geometrical concepts. Tlhe CA task was based on the objectives related to four different levels of CLD model of Klausmeier. Before treatment, the CAT was administered on both the experimental group and the control group and the scores were treated as the pre-test scores. After the treatment, the same sub-test was administered again to get post-test scores of every individual. From these scores true gain scores were calculated which were then subjected to statistical analysis like mean, standard deviation and t-test of significance.

Analysis

The present study was undertaken to try out the concept-based instructional treatment on the attainment of geometric concepts among Class V children of different sex. Accordingly, the study followed the pre-test versus post-test scored true gain scores were calculated.

Table 1: Mean and Standard Deviations on the Gain Scores of the Concept Attainment Test at four different levels of Concept Attainment during Pre-test and Post-test

Levels	*Sex*	*Experimnental Mean*	*Group S.D.*	*Control Mean*	*Group S.D.*
1. Classificatory Level	B (M)	11.74	5.87	4.62	0.91
	G (F)	10.49	2.69	1.69	1.80
2. Discrimination and naming the attribute	B (M)	16.8	14.79	1.69	3.38
	G (F)	27.99	26.79	1.93	3.42
3. Inferring relevant and irrelevant attributes	B (M)	18.19	15.62	1.30	3.38
	G (F)	17.81	14.82	5.22	17.76
4. Use of concepts attained at classificatory and formal level	B (M)	7.06	6.16	–3.06	2.84
	G (F)	5.83	8.75	–3.06	3.91

Table 1 shows the mean and standard deviations of gain scores on concept attainment tests at four different levels during pre-teat and post-test.

From this table, it was found that among Class V students, the experimental girls group scored highest mean gain score (27.99) at discrimination and naming the attributes level among all the groups from all levels of concept attainment. Again this group also shows highest standard deviation at this level from all four levels indicating more heterogenous group. Similarly, the same experimental girls group scored lowest mean gain (5.83) among all experimental groups at the use of concepts attained at classificatory and formal level. At every level of concept attainment, in comparision to experimental groups the corresponding control groups scored lower mean gain and also lower standard deviations (except control girls group at inferring relevant and irrelevant attributes level).

The mean gain scores thus obtained, was subjected to the test of significant (t-test) at four different levels which is given in Table 2.

From this table, it is observed that all groups except control group children at classificatory level show no significant difference among boys and girls groups. Experimental boys and girls of Class V show no significant difference at all levels due to concept-based instruction which was given to them during treatment.

Thus, sex plays no significant rule in concept attainment of experimental students as well as control groups students of Class V at four different levels of concept attainment.

Discussion

From the analysis of results, it was observed that the treatment was found effective equally among both boys and girls of Class V. When the raw scores of boys and girls were compared, it was

Table 2: Test of Significante (t-test) for the Main Effect of Sex on the Attainment of Geometric Concepts at four different Levels on Concept Attainment during Pre-test and Post-test

Levels	*Groups*	*t-Value Post-test Vs. Pre-Test*	*P*
1. Classificatory Level	VEB Vs. VEG	0.67	NS
	VCB Vs. VCG	5.57	0.01
2. Discrimination and naming the Attribute	VEB Vs. VEG	1.54	NS
	VCB Vs. VCG	0.20	NS
3. Inferring relevant and Irrelevant Attributes	VEB Vs. VEG	0.06	NS
	VCB Vs. VCG	0.86	NS
4. Use of concepts attained at Classificatory and formal level	VEB Vs. VEG	0.44	Ns
	VCB Vs. VCG	0.00	NS

found that boys of Class V performed better than girls at all the four levels. However, the difference in the gain scores of both boys and girls were found non-significant. This was possible due to the changes in outlook of the society for girls, as a result of which equal importance to both boys and girls was given. During instruction, it was observed that the children of both sexes of experimental group were able to transfer what they learned to attend. Thus, the results in every level reject the hypothesis that boys would perform significantly better on concept attainment tests at all levels. Same performance of both boys and girls in Class V is attributed to their ability to analyse and differentiate the defining and irrelevant attributes equally. The most important factor is the instruction during which the investigator tried to motivate the students and create an intention to learn various attributes. During teaching, the investigator also pointed out the relevant attributes of a concept and provided sufficient feedback and reinforcement to facilitate each individual to learn all relevant attributes. Further, specific care for girls inside and outside the school now-a-days enhances their mental ability, so that there is no significant difference in the mean gain score of concept attainment task at all levels among Class V students. This finding was also supported by the study conducted by Battista (1990) and by Sharma and Reeta (2000).

Major Findings

Thus, this study revealed the following results:

(1) It is revealed that children belonging to experimental groups achieved significantly better than the corresponding control groups of children in the concept attainment test. Thus, the instructional strategy based on CLD model was effective among the children of both sexes belonging to Class V in the attainment of geometrical concepts at all the four levels.

(2) Boys of Class V did not differ significantly from the girls in the attainment of geometrical concepts at all the four levels. Thus, sex did not influence significantly on the attainment of geometrical concepts due to instructional treatment.

Educational Implications

Concepts that students encounter in any given subject during an academic year are usually included in the instructional materials they use. Better performance of experimental students due to CLD-based instructional strategy implies that this new innovative instructional strategy should be incorporated in various components of school education such as curriculum, methods of teaching, textbooks, examination and also in advanced educational programmes.

Conclusion

Concept learning in the schools today need to be emphasised. With substantial research and individual efforts, the instructional materials based on concept attainment for school children are to be

developed in different subjects. This will enhance the competency and achievement of both boys and girls students. On the other hand, this better achievement will decrease the number of dropouts and tuus fulfil the aim of "Education for All".

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