EFFECT OF WILLIAMS' COGNITIVE – AFFECTIVE INTERACTION MODEL ON ACHIEVEMENT IN MATHEMATICS

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Abstract

This study was focused to see the effect of Williams' Cognitive – Affective Interaction model on achievement in mathematics. This was a true experimental study. The research was carried out in schools in Ludhiana district on a sample of 160 students. Two equal groups were formed on the basis of intelligence. Effect of Williams Model and Traditional Method of Teaching on achievement was assessed by tool developed by Investigator. The result revealed that Williams' model proved to be better for achievement over traditional method of teaching mathematics. Students of high intelligence differ significantly in their scores of achievement in Mathematics than students of low intelligence and there is no significant interaction between teaching strategies and intelligence on the achievement in Mathematics.

Keywords: Williams' Model, Traditional Method, Achievement in Mathematics.

Human beings are born with latent urges, abilities, capacities, interests, aptitudes and other personality traits. It is the prime concern of education to stimulate and guide these capabilities to the most desirable channels. To carry out these multidimensional objectives suitable Instructional strategies are essential. This led researchers to explore various models, methods and techniques, to enhance cognitive, affective and psychomotor capabilities of the learners. To meet the above instructional goals, a number of teaching strategies have been developed by educationists and psychologists based on available theories of learning. But there is no single best way that can be employed in all situations of teaching learning process.

Education, as we know, is the most effective means for development of the innate abilities of the individuals, appropriate educational programmes needs to be evolved in the form of teaching strategies and techniques for the development of creative potential among the learners. Present day classroom transaction systems provide little opportunity for creative pursuit. Many models of teaching have been developed to enhance creativity among the learners like Inductive Thinking model (Taba, 1966), Synectics Model (Gordon, 1961), Kaplan Model (1993), Maker's Model (1993), and Williams (1993). Among all of the above the Williams' Frank E. model of teaching is one such approach specifically meant for enhancing creativity among learners. Making our classrooms more interactive, interesting and teaching through creative programme enables the students to feel that mathematics is very practical, easy to learn and close to real life.

Williams had developed a cognitive-affective teaching model. William's argument was based on the principle “Thinking processes cannot really operate without feeling processes. Nearly all cognitive Behaviour has an affective component” For effective human development, the combination of both cognitive and affective domains is needed. The pupils' need for knowledge and information is closely related to his personality dispositions and his internal set of values. Williams discussed the

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theoretical basis and educational uses of 4 models of cognitive-affective behavior: (a) Piaget's stage theory of intellectual development, (b) Bloom's taxonomy of the cognitive domain, (c) Krathwohl's taxonomy of the affective domain, and (d) Guilford's structure of intellect model. A new model, an outgrowth is presented which is designed for use by the teacher in encouraging creativity in young children. Dimension 1 of the model lists subject matter, Dimension 2 lists 18 teaching strategies, and Dimension 3 lists 4 cognitive and 4 affective pupil behaviors. Use of the model in curriculum planning, teacher instruction, classification and analysis of instructional media, and in educational programs for the gifted are described. It is concluded that this model may narrow the distance between what is known about the cognitive-affective processes and how this is utilized in educational practices. This model is based upon studies of the creative person and process. This model has three dimensions:

Dimension 1 consists of subjects that comprise the school curriculum, Dimension 2 includes teacher behaviour, these comprise 18 strategies to be used by the teacher to develop student thinking and creativity and Dimension 3 consists of eight student processes that have been shown empirically to be involved in creative thinking. The model has been devised to give students the opportunity for creative thinking (characterized by fluency, flexibility, originality, and elaboration).

Achievement refers to a degree or level of success or that of proficiency attained in some specific area concerning scholastic or academic work. In general, achievement refers to the scores obtained in the annual examination. It is one part of the wider term of educational growth and helps to know where the student stands. Achievement of a pupil refers to the knowledge attained and skill developed through school subjects. Achievement in mathematics is considered as mean gain scores obtained by the students in the mathematics area of school subjects. It is assessed by the school authorities on the basis of achievement test, which may either be standardized or non- standardized. Oxford Advanced Learner's Dictionary (2000)defined that Achievement is a thing that somebody has done successfully especially using his/her own efforts and skills whereas according to Merriam Webster's Collegiate Dictionary (2001) Achievement is an act of achieving a result gained by efforts, the quality and quantity of student's work. According to Dictionary of Education (2008), Academic Achievement is measure of knowledge gained through formal education usually indicated by test scores, grade point average and degree.

OBJECTIVES

- To investigate the significant difference in achievement in Mathematics of the groups taught through Williams' model and conventional teaching.
- To investigate the significant difference in aementchiev in Mathematics of the groups having high and low Intelligence.
- To investigate the significant interaction between teaching strategies and intelligence on ment in Mathematics.

METHOD

SAMPLE

A sample comprising 160 students was raised for the study. The sample included male as well as female students studying in the class IX.

DESIGN

To study the effectiveness of Williams' cognitive-affective interaction model of teachingon the achievement and creativity in mathematics, “pre-test post-test parallel group” design was used.

PROCEDURE

The investigator developed a test of achievement in Mathematics for the 9th class students. In the first step, Intelligence test was employed on 160 students to classify the sample into two matched groups (Group A and Group B). In pre-test phase both the groups were given Mathematical creativity test. The obtained scores were tabulated. One group was assigned to the treatment. This was termed as

experimental group and the other was termed as control group. The experimental group was taught by William's Cognitive-affective Interaction Model strategy (with modules prepared by researcher) for a period of 50 sessions at the rate of 30 minute per day. On the other hand control group was taught the same concepts with the help of conventional method for the same period. After completion of the treatment the Achievement test in mathematics again administered to both the groups as post-test. Analysis was done as per the objectives of the study.

MEASURES

- Teaching modules based on Williams' Model and Conventional teaching for different Mathematical concepts for Class IX developed by the investigator.
- Achievement test in Mathematics developed by investigator.
- Verbal Intelligence Test (VIT) by Ojha and Roy Choudhary (2001) revised version.

ANALYSIS AND INTERPRETATION OF DATA

Table 1: t-test Group Statistics on gain scores of achievement

	Groups	N	Mean	Standard Deviation	t-ratio
Gain Scores Achievement	Controlled Group	80	2.91	4.23	6.47
	Experimental Group	80	7.33	4.49	
	Low Intelligence	44	4.00	3.118	3.55
	High Intelligence	44	7.34	5.396	

Table 1 reveals that values of mean for controlled group and experimental group are 2.91 and 7.33 respectively. The value of t-ratio is 6.47 which is significant. Therefore, the hypothesis ' There will be no significant difference in achievement in Mathematics of the groups taught through Williams' Model and traditional Method' is rejected at bothi.e. 0.05 and 0.01 levels of significance, which means that the achievement in Mathematics of the groups taught through Williams' Model and traditional Method are significantly different. The achievement in Mathematics of experimental group (Mean= 7.33) is thus significantly higher as compared to controlled group (Mean= 2.91).

Mean for Low intelligence and high intelligence are 4.00 and 7.34 respectively. The t-ratio value is 3.55 which is significant. Therefore the hypothesis, 'There will be no significant difference in creativity in Mathematics of the groups having low and high Intelligence' is rejected at both 0.05 and 0.01 levels of significance.

Table 2: Tests of Between-Subjects Effects: Dependent Variable: Scores of achievement

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	647.034[a]	3	215.67	14.283	0.00
Intercept	2829.55	1	2829.55	187.38	0.00
Intelligence	245.55	1	245.55	16.26	0.00
Group	397.37	1	397.37	26.31	0.00
Intelligence * Group	4.10	1	4.10	0.27	0.60
Error	1268.40	84	15.10		
Total	4745.00	88			
Corrected Total	1915.44	87			

Table reveals that the F-statistic corresponding to intelligence is 16.26, which is significant at p<0.01. The F-statistic corresponding to group (method of teaching) is 26.31, which is significant at p<0.01. The interaction between Intelligence and group is non-significant as p=0.60 with F statistic 0.27. Therefore the null hypothesis (There will be no significant interaction between teaching strategies and intelligence on the achievement in Mathematics) is only partially supported.

It can thus be concluded that intelligence has a significant effect on the Achievement in Mathematics F (1, 84) =16.26 , p<0.01 as well as method of teaching also has a significant effect on the Achievement in Mathematics F (1, 84) = 26.31 p < 0.01 therefore null hypothesis is rejected at 0.05 and 0.01 levels respectively whereas the interaction between Intelligence and method of teaching does not affect the Achievement in Mathematics significantly as F (1, 84) = 0.27, p = 0.60, therefore null hypothesis is accepted in this case.

Implications of the study:

- Achievement in mathematics of group taught through Williams' model is significantly more as compared to group taught through traditional method. Thus Williams' model proved to be better for enhancing achievement over traditional method of teaching mathematics. Therefore Williams's method should be applied in mathematics classrooms to enhance achievement in mathematics among students studying in Government schools of Punjab.
- Students having low and high intelligence differ significantly in their achievement in Mathematics. Hence, teaching through Williams's model is more effective for high intelligence group than students of low level of intelligence. So, students of high intelligence can be taught through Williams' model to enhance their achievement more.
- There is no significant interaction between teaching strategies and intelligence on the achievement in Mathematics. Achievement being universal so is inculcated among all the students irrespective of intelligence, gender or locale.

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