A Study of the Effect of Modular Teaching on Achievement in Chemistry of Xth Grade Students

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Abstract

This study was conducted in order to check the Effect of Modular Teaching in Chemistry at Secondary level . The students of CBSE Board Schools studying chemistry constituted the population of the study. Two sections of 40 students of 10th class of CBSE board schools were taken as the sample of the study. A treatment of developed modules was provided to experimental group while control group was taught by using traditional method for a period of fifteen days. At the end of treatment, the researcher administered post test to measure the achievement of the students.. Data analysis reveled that the experimental group scored significantly higher than the control group on posttest showing the supremacy of modular approach over traditional method of teaching. The study revealed that modular approach was more effective instructional paradigm for Chemistry as compared to the traditional method of teaching.

Key-words: Modular teaching, achievement in Chemistry

A module is a new teaching strategy for arranging learning experiences in education. The strategy of learning module has become a part of all level of teaching. It is a self-learning package dealing with one specific subject matter and can be used in any setting convenient to the learner. A module is a well organized high quality student text based on clear level, prerequisites and learning objectives of a topic (Demrel,2010).

A module is a specific type of learning resource. Modules are essentially self-contained, self instructional packages, with learning paced by each student according to his/her own needs and ability. A module covers either a single element of subject matter or a group of content element forming a discrete unit of subject matter or area of skill. A module has clearly defined, objectives, preferably in behavioural forms (Daries, 1981).

In modular learning, teacher becomes a facilitator of learning rather than the practical dispense of knowledge. Sufficient theory and practice are available for the application of modular teaching in our classrooms.

Therefore, as a prelude, experimental study was conducted to examine the effect of modular teaching on the academic achievement of X grade students in chemistry.

Components of a Module

A handbook on 'Developing Instructional Module for Teachers Directions' by UNESCO (1998) specified the components of a module as follows:

i) **Title** - The title of the module should be clear and concise.

ii) **Introduction**-The introduction should give the background and rationale of the module as well as the target population for whom the module has been developed.

iii) **Overview**- It introduces the learner to the theme of the module, its purpose, structure, organization and uses. It should give an overall impression of the module and its contents.

iv) **Instruction to the users-** The component should include clear instructions to the learner as to how he should proceed and what he has to do after each step or stage. These instructions include how to take pre-test, formative test, and summative test and how to undertake learning activities etc. Instructions for evaluation may also be given.

v) **Pre Test-** The pretest is taken by the learner at the beginning. This helps to find out the level of knowledge and skills that the learner already has. It helps the learner to find for himself the entry points in the module. If the ability of the learner is up to the standard fixed by the module developer, he may be advised to skip the module and go on to the next one. But if it is below the standard, he is asked to study the module.

vi) **Objectives-**The instructional objectives of the module should be clearly stated. They should specify the expected learning outcomes in terms of behaviour.

vii) **Learning Activities-**Learning activities should be provided in a planned and sequential manner. These activities enable the learner to develop behaviour in a pre-determined direction.

The following are some of the principles, which should be kept in mind while developing the learning activities:

a) Learning activities should be planned on the basis of the entry behaviour of the learners. Entry behaviour means the previous knowledge of the learner about the instructional objectives.

b) The learning activities should be based on the need of the learner.

c) The learning activities should be based on the terminal behaviour i.e. the ultimate outcome of learning activities.

d) The learning activities should provide for individual differences. The activities should provide for individual differences. The activities should provide for freedom and flexibility in the learning process.

e) The learning activities should be properly graded so that the learner proceeds step by step in the order of difficulty.

f) The learning activities should be of different types using different media and methodology.

g) The methodology used in learning activities should promote imagination, divergent thinking and creative innovative behaviour, on the part of the learners.

h) The learning activities should provide maximum interaction among the students and the teachers.

(i) The learning activities should be varied enough to cater to the students interests, abilities and learning styles.

(j) The learning activities should provide the learner with enough knowledge of his progress.

(viii) **Formative Evaluation-**Formative evaluation are done at the end of each learning unit of the module. The formative evaluation help the learner to know whether he has achieved the expected behavioural outcome. If not he should go through the learning activities again in consultation with the teacher.

(ix) **Summative Evaluation:** The summative evaluation helps in knowing how well the learner has attained the expected learning outcomes.

Rationale

This study was aimed to find out the **Effect of Modular Teaching in Chemistry for X Grade Students**. The study was conducted in the field of chemistry as there are many challenges in this field.

The current paradigm for teaching recognizes that knowledge is constructed, discovered, and extended by students as they interact with their environment. The modules, therefore, are based on a question from the student's surroundings.

Teaching with modules creates a lively, dynamic environment where learning, thinking, and doing science are of primary importance (Stewart, 1999).

Statement of the problem

A study of the effect of modular teaching on achievement in Chemistry of X grade Students.

Objective

Objective of the study was to compare the achievement of students in chemistry taught through modular teaching and those taught through regular teaching methods.

Hypothesis

(1) There is no significant difference between the mean gain scores of achievement of students in chemistry taught through modular teaching and those taught through regular teaching methods.

Research Method

Here the researcher did the research on the basis of manipulation of one variable to see its effect on the other variable. In this research one variable was teaching method and its effect was seen on achievement. In this study the cause-effect relationship of the two variables was seen. Hence, to conduct this research experimental method was used.

Sample

Two groups, one taught through modular teaching and other taught as usual, of CBSE (Central Board of Secondary Education) Board school, Varanasi, U.P. were taken as sample of the study Experimental group students were taught by modular teaching method where as the control group were taught by the traditional method. Each group comprised of 40 students.

Sampling technique

The Cluster Random Sampling Technique was used, in which all the CBSE (Central Board of Secondary Education) board schools of Varanasi were listed and from among them sample was randomly selected.

Tools

A self-structured achievement tests was used as a tool for pre-test and post-test.This test was composed of twenty five multiple choice test items matching items pertaining to a combination of learning domains. These test items were based on the selected units of 10^{th} class chemistry selected from the chapter metals, non metals and metallurgy.

Data collection

Modular teaching experimental program was prepared for 15 days schedule in which a module with three units was taught to the experimental group. During the experiment, two different treatment patterns were applied. Same direct instruction strategy with same lesson plans and activities except for the control

group was provided with traditional routine situation in the classroom while experimental group was provided with modular teaching method as treatment. The experiment started with a pre-test on the chapter 'Metallurgy' which was administered to both the groups. After that the experiment started and continued for 12 days after which a post-test was administered to measure the achievement of the sample subjects. There were 40 students in each group and the mean difference between the post-test and pre-test scores of both the groups served as data to measure achievement of the students as a result of treatment.

Data Analysis Technique

Significance of difference between the mean scores of both the experimental and control groups on the variables of pre-test scores and post-test scores was tested at 0.05 level by applying t-test.

Result and Interpretation

Table 1: Comparison of Mean Gain Scores of Achievement of Students in Chemistry taught through Modular Teaching and those taught through Regular Teaching Methods:

Groups	*N*	M_{Gain}	*S.D.*	*df*	*t-value*	*Significant level*
Experimental (Taught through modular teaching)	40	10.85	3.40	78	3.2	0.05
Control (Taught through regular teaching methods)	40	3.90	2.34			

The above table indicates that the 't' value 3.2 which was found to be significant at 0.05 level with df 78, indicates that there is significant difference between the mean gain scores of achievement of students in chemistry taught through modular teaching and those taught through regular teaching methods. Therefore the null hypothesis, 'there is no significant difference between the mean gain scores of achievement of students in chemistry taught through modular teaching and those taught through regular teaching methods' is rejected. Further, the mean scores of experimental group is greater than control group and significant.It proves that the effect of modular teaching on achievements is high than regular teaching methods.

Conclusion

There is significant difference between the achievements of students in chemistry taught through modular teaching and those taught through regular teaching methods. The higher value of mean gain score of achievement indicates that the effect of modular teaching on the achievement of students in Chemistry is significantly greater than the effect of regular teaching methods.

On the whole, modular teaching is more effective as teaching learning process for Chemistry as compared to the regular teaching methods.

Implications

Based on the above conclusion related to this study following implications can be drawn for students and teachers:

For students :

1. Students can progress at their own rate, because they have full control on the rate of study.
2. Student can himself decide whether he has learnt the subject matter fully.

3. He must be involved in the learning process by which his commitment to the task is enhanced.
4. It helps to develop a sense of responsibility for one's own learning.
5. Students are not forced to cover materials which are already familiar to them.
6. A large pool of modules will permit students to explore portions of subject of particulars interest without having to enroll in a full course containing topics not relevant to their needs.
7. Some modules can be checked out and studied at home.
8. The consequence of failure is reduced. Each student can master each module completely before proceeding to the next.

For teachers :

1. The use of the modules providers and opportunity for organizing numerous sequence of experience of reflect specially interest of the teacher.
2. The modular approach provides a way of assessing the student's progress in learning.
3. Modules reduce the routine aspects of instruction, leaving the teacher free to engage in personal contact with the student.
4. The independent nature of self instructional units facilities the updating of study materials without major revisions.
5. Modules can serve as models for teachers who wish to develop their own materials using their own individuality.
6. Self instructional units can be exchanged between institutions.

References

1. Best,J.W. & Kahn,J.V.(2001). **Research in Education.** New Delhi: Prentice Hall of India,P.149.
2. Daries,I.(1981). **Instructional Techniques**. New York: McGraw Hill Book Company, P.72.
3. Demrel,Y. Modular Teaching and Open Ended Design Projects. Retrieved from **http://cee.che.ufl.edu/AIChE_CEE_DEMIREL_Extended.pdf** retrieved on 12.11.2010.
4. Garret,H.E.(2005). **Statistics in Psychology and Education.** New Delhi: Paragon International Publishers,P.461.
5. Stewart, J. L. et.al (1999).Chemconnections-A Guide to teaching with modules. Retrieved from **http://chemlinks.beloit.edu/guide/superim.pdf** retrieved on 12.11.2010
6. UNESCO (1988). **Developing Instructional Modules for Teacher Education.** Bangkok:Regional Office for Education in Asia and Oceania, P.61-62.

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