

EFFECTIVENESS OF MODULAR APPROACH IN TEACHING AND LEARNING ON CHEMISTRY OF GASES AND THEIR APPLICATIONS AT UNIVERSITY OF PERPETUAL HELP SYSTEM LAGUNA (UPHSL)

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Abstract

The study is aimed to determine the effectiveness of modular teaching on the achievements of students on chemistry of gases and their applications. The study used experimental research design. Equivalent group study design was used. The collected data of both groups were analyzed and interpreted using mean, standard deviation and t-test, and conclusions were drawn. The results of the study were in the favor of modular teaching approach, therefore, it is suggested that this approach should be widely used in conventional classroom at various levels of education.

Keywords: *Modular teaching, Effective teaching, Individualized instruction, Self-learning.*

INTRODUCTION

Today's teaching and learning comes in different styles and forms thus teachers are now experimenting on the new trends and methods on teaching and learning which aim at improving the quality of education. One of the emanating new methods in teaching and learning today is the use of modular approach where in the teacher intervention is minimal or limited. This style of teaching and learning is a student-centered since the student has to learn everything in the module by his own effort and phase. This method is different from the traditional classroom setting where in a teacher presents the lesson and the student learned the concept. Davies (2009) defined module as a unit of work in a course of instruction that is virtually self-contained and a method of teaching that is based on the concept of building up skills and knowledge in discrete units.

Greager and Murray (2001) enumerated the advantages offered to the teacher who uses the modular approach. These are: it provides the opportunity for organizing numerous sequences to reflect special interest of the teacher and students; it allows the teacher to focus on the deficiencies of students in the subject matter; it serves to eliminate the necessity of covering subject matter already known to students. With the use of modules, the progress of students is assessed and the routine aspect on instruction is reduced giving the teacher a chance to enjoy her personal contact with the students

Samonte (2004) developed, evaluated and tried out an environmental outdoor education module for the use of students of St. Scholastica College. She found out that majority of the students' comments and responses to the guide questions and personal insights were positive. The remarks and suggestions were sufficient reasons for considering the modules suitable and purposeful. She concluded that the module was able to a great extent to meet the criteria set in terms of content, instructional characteristics and effectiveness

Aquino-Danganan (2001) proposed instructional modules in developing computational skills in College Algebra. She concluded that the proposed instructional modules had titles, instruction to

the learners, rationale, objectives, pretest with answer keys, worksheet assignment, progress check with answer key and post-test with answer key. The format and language of each were properly organized, clear and simple. The objectives of each module were specific and were based on the course syllabus. The topics were properly developed and explained and the activities and exercises facilitated student learning in College Algebra

The study of Greager and Murray, Samonte and Aquino – Danganan are related to the present research paper since they all deal on assessment of self-instructional materials and their positive effects on students achievement. They are different since they deal on other subject areas or disciplines. The present study is similar to Aquino-Danganan's work in the sense that they made use of pre-service Education students as subjects of the study, it involves a computational subject and is also a subject in the teacher education program. The researcher also considered the factors affecting the students achievement on chemistry of gases and their applications. This includes mathematical abilities, reading comprehension, and study habits of the students. It is also the task of the researcher to find out if the same result will come out in chemistry which is a computational subject.

The purpose of this study was to examine the effect of modular teaching on academic achievement of freshman education students at UPHSL on chemistry of gases and their applications.

METHODOLOGY

Research Design

This study utilized the pretest-posttest experimental design using freshman education students at UPHSL assigned into two groups; the experimental and the control groups. The experimental group underwent modular instruction while the control group did not. This research design according to Shuttleworth (2009) follows a procedure where in control group receives no treatment, unlike the experimental group, over the same period of time, however both take exactly the same test.

Population and Sample

The aim of this study was to investigate the relative effectiveness of modular teaching on the academic achievement of freshmen education students in chemistry. Therefore, students studying the topic on gases constituted the population of study.

Two sections A and B of freshmen education students was taken as sample of the study. Sample students were divided into two groups, i.e. the experimental group and the control group. Both the groups were randomly equated. Each group was comprised of 28 students.

Research Instruments

Researcher made pretest and posttest were the research instruments. Both tests were almost parallel with the same difficulty level. Each test was composed of multiple choice test items. These test items were based on the selected topics on gases and their application. (i) Pressure-Volume Relationship (ii) Universal Gas Law Problems (iii) Avogadro's Law (iv) Ideal Gas equation (v) Kinetic Molecular Theory. These topics were taught during the experiment to both

the experimental and the control groups, and were intended to measure the learning outcomes. The experiment last for 4 weeks.

Validity and Reliability

The experts committee of the researcher approved the tests. All the tests items were based on the text of the topic taught to the sample students. The coefficient of reliability was determined through the use of Spearman-Brown formula, estimating reliability form the comparable halves of the test, which was found to be 0.75.

Data Analysis

Raw scores obtained from pretest and posttest were presented in tabular form for the purpose of interpretation. Forthe manipulation of data, the means, standard deviations, and differences of means were computed for each group. Significance of difference between the mean scores of both the experimental and control groups on the variable of pretest scores, posttest scores was tested at 0.05 level by applying t-test.

RESULTS

Table 1. Significance of difference between mean scores of the experimental and control groups on pretest

GROUP	N	M	SD	SEd	t value
A	28	34.5	6.32	1.68	*0.22
B	28	34.14	6.22		

* Not significant df = 54 t- value at 0.05 level =2.01

Table 1 indicates that the difference between the mean scores of the experimental group and control groups on pretest was found to be insignificant at 0.05 level. Because the obtained t-value is 0.22, which is less than the table value. Hence, the null hypothesis, “there is no significant difference between the mean scores of experimental and control groups on pretest” was accepted and both the groups could be treated as equal.

Table 2. Significance of difference between mean scores of the experimental and the control groups on posttest

GROUP	N	M	SD	SEd	t value
A	28	67.71	9.97	2.80	* 4.48
B	28	55.39	11.02		

* Not significant df = 54 t- value at 0.05 level =2.01

Table 2 indicates that the difference between mean scores of the experimental and the control groups on posttest was found to be significant at 0.05 level. Hence, the null hypothesis, “ there is no significant difference between the mean scores of experimental and control group on posttest”, was rejected, in the light of t-value obtained which is greater than the, table value at 0.05 level which is significant at 0.05 level. Hence, the null hypothesis was rejected. At posttest performance of experimental group was better than control group. These results support the

concept of Aquino-Danganan (1981), that modular approach creates interest in the individuals and they demonstrated significantly higher achievements than the individuals taught by traditional approach.

DISCUSSIONS

Modular teaching is a new teaching strategy in classroom settings, for arranging learning experiences in education and it has been receiving much attention. The strategy of learning modules has become a part of all level of teaching. A learning module is a self - learning package dealing with one specific subject matter/ unit. It can be used in any setting convenient to the learner and may be completed at the learner's own pace. Sufficient theories and practices are available for the practical application of modular teaching in our classrooms. Therefore a study was conducted in order to check the effectiveness of modular teaching. Obtained data was analyzed, interpreted and conclusions were drawn. Comparison of pretest scores of both the experimental and the control group by applying statistical analysis reflected that there existed no significant difference between the two groups and both the groups were almost equal with respect to biological basic knowledge. Therefore, the null hypothesis, "there is no significant difference between the mean scores of the experimental and control groups on pretest," was accepted at 0.05 level.

The experimental group performed significantly better than the control group on posttest. The difference between the posttest mean scores of the two groups was significant at 0.05 level. Thus the null hypothesis, "there is no significant difference between the academic achievement of the students taught by modular teaching method and the students taught by traditional method of teaching," was rejected at 0.05 level in the favor of the experimental group.

As Salandanan (2001) explained, instructional materials offer the best means by which a teacher can provide direction in her students' daily search for new understandings and verifications. Even the best teachers trained in the latest teaching methods, well-informed about facts, and aware of the goals of education can fail in planning and implementing a course if she is not equipped with appropriate instructional materials. Knowledge of how to develop a course syllabus, a teaching unit or a simple learning activity can undoubtedly enhance her competence in communicating to the students the coverage and sequences of the content to be taken up. One such instructional material is the self-instructional module. A self-instructional module is a self-contained, independent unit of instruction prepared for the purpose of attaining defined instructional objectives. It is characteristically self-directing since it includes instruction on how the various investigations will be pursued. Classroom instruction using modules is described as self-pacing where the students progress through the learning tasks at their own rate.. On the whole, it appears that modular learning group perform significantly better than the group taught by traditional method of teaching. This increased motivation was linked with setting of short-term objectives and the intensity of teaching approach.

The Modularization also promoted positive changes in student attitude toward teaching and learning. Self-instructional materials develop the self-esteem of learners and give them a confidence boost. This is possible because the learners are given the framework within which to think things out for themselves. More importantly, the learners are given the credit for the newly acquired knowledge. Most self-instructional materials are purpose-built and are structured to

meet the learners' needs. Race (2009) further emphasized that the main principle underlying the use of self-instructional materials is to make learning reactive, interesting, successful and humane

Conclusions

In the light of the statistical analysis and the finding of the study, the following conclusions were drawn.

1 On the whole, modular teaching is more effective as teaching learning process on chemistry of gases and their applications traditional teaching method. Because in modular teaching the students are provided the opportunities of learning at their own pace, according to their ability level and needs.

2 Modular approach is more effective as compared to traditional method since the students in the experimental group excel in the posttest compared to the traditional group.

3 The modular approach is considered to create interest among the students as they are free to learn at their own pace.

Recommendations

In the light of findings and conclusions of the study, following recommendations were made.

1 This study proved that modular teaching is more effective mode of instruction on chemistry of gases and their applications as compared to traditional method of teaching. This method should be applied to others subjects as well as other level of education. Therefore the teachers of chemistry should use modular teaching to improve the academic achievements of the students.

2 Modular teaching is a new technique in classroom setting, chemistry teachers should be provided training in module writing and teaching.

3 The results of single study are insufficient to decide about the maximum use of modular approach in our classroom setting. Thus a series of studies on modular approach in different situations and at different levels should be carried out.

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