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Effectiveness of Modular Approach in Learning Physics by The Plus Two Higher Secondary Students

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Abstract

Teaching is not simply passing on information, the content, the subject matter as if it were absolute truth. The content of education often will be societal knowledge and not unquestioning truth. Teaching therefore should be considered as process of critically analysing this knowledge and developing new perspectives based upon individual experience and knowledge. The present study is an earnest attempt to develop modules for learning Physics at Plus two level and to measure their effectiveness over the traditional lecture method in learning the same by the Plus two students. The experimental group boys taught through modular approach have shown significantly better performance then the control group boys taught through traditional lecture method. The experimental group girls and boys performed significantly better than the control group girls. The experimental group girls significantly improved their learning and achievement after teaching through modular approach. Further, their achievement is higher in the post test than the pretest.

1. Introduction

Education defines any precise universally acceptable definition. Definitions of education generally either describe past practice or prescribe what education should be. The three criteria of education should be.

i) Education implies transmission of what is worthwhile to those who will become committed to it.
ii) Education involves knowledge and understanding and some kind of cognitive perspective which are not inert.
iii) Education may not accept some procedures of transmission that the learners do not accept willingly and voluntarily.

The criteria refer to the matter, the manner and cognitive perspectives of education. The matter, the what of education, the subject matter taught should be worthwhile for the development of learners. The manner, the process, the how of education should be " participation in a shared experience of exploring a common world" according to peters. Active and critical exploration is the means of acquiring knowledge and understanding and integrating the acquired knowledge into the learner's personal view of the world. The processes of acquisition and integration of knowledge should be outcome of some kind of consciousness and consent on the part of the learner.

Education proper then will identify processes for intentional initiation of a student into modes of thought and through which knowledge and understanding are required. Even when the matter is of value, is worthwhile for the development of the learner, it should not be forces upon reluctant minds. The educational process should be collaborative. It should be based on an interdependence and respect between the teacher and the taught.

Teaching is not simply passing on information, the content, the subject matter as if it were absolute truth. The content of education often will be societal knowledge and not unquestioning truth. Teaching therefore should be considered as process of critically analysing this knowledge and developing new perspectives based upon individual experience and knowledge. Teaching is the integration and balancing of content and process issues. Teacher and student are thus interdependent and are in a collaborative relationship.

Education is a special kind of learning concerned with the integration of differing and seemingly opposing views and ideas; not the fragmentation of learning that leads to narrow ideological and dogmatic views of life and living.

Education is closely integrated with the philosophy of life, its goals and purposes and situations. Swami Vivekananda in an exalting tone, proclaims that "Education is the manifestation of perfection already in man". According to him inculcation of education should bring to light the inherent perfection lying latent in the individual.

Tagore viewed education as " the process of evolving unique, creative patterns of self-expression towards the realisation of the universal man". He aimed at an education sought to do justice to the economic, aesthetic, intellectual, social and spiritual aspects of man's existence.

STATEMENT OF THE PROBLEM

Effectiveness of Modular Approach in Learning Physics By The Plus Two Higher Secondary Students.

MEANING OF CERTAIN TERMS USED IN THE STUDY

EFFECTIVENESS:

According to Oxford Dictionary "Effectiveness is being able to bring about the result intended".

MODULAR APPROACH:

HIGHER SECONDARY STUDENTS:

MODULE

Subramania Pillai defines module as " self-contained and self-instructional package dealing with a single conceptual unit of subject matter"

In this study module is a self-contained, suitably tested auto instructional material. It is learning package which contains everything needed by the student for self-instruction.

HYPOTHESES OF THE STUDY

i) There exists no significant difference between the pretest scores of control group and experimental group in learning Physics.

ii) There exists significant difference between the pre-test and post-test mean scores of control group when the subject is taught through traditional lecture method.

iii) There exists significant difference between the pre-test and post-test mean scores of experimental group when the subject is taught through modular approach.

iv) There exists significant difference between the post-test mean scores of control group and experimental group.

v) There exists no significant difference between the pre-test mean score of boys and girls in control group.

vi) There exists significant difference between the post-test mean scores of boys and girls in control group.

vii) There is no significant difference between the pre-test mean scores of boys and girls in experimental group.

viii) There exists significant difference between post-test mean scores of boys and girls in experimental group.

ix) There is no significant difference between pre-test mean scores of boys in control group and pretest mean scores of boys in experimental group.

x) There is no significant difference between pre-test mean scores of girls in control group and pre-test mean scores of girls in experimental group.

xi) There exists significant difference between post-test mean scores of boys in control group and post mean scores of boys in experimental group.

xii) There exists significant difference between post-test mean scores of girls in control group and post-test mean scores of girls in experimental group.

xiii) There exists significant difference between pre-test and post-test mean scores of boys in experimental group.

xiv) There exists significant difference between pre-test and post-test mean scores of girls in experimental group.

SCOPE OF THE STUDY

This study is primarily focused on the effectiveness of teaching Physics subject through modular approach to the Higher Secondary Plus two students. Keeping this view in mind, the researcher has developed modules for certain units of Physics Subject topic for the plus two students.

This is an experimental study restricted to measure the effectiveness of modular approach over the traditional lecture method in promoting the achievement of plus two student in learning Physics Subject.

NEED FOR AND IMPORTANCE OF THE STUDY

Science is a door through which a child contemplates the past grasps the present and approaches the future. The role that science plays in the mental, emotional and social development of a person can never really be sufficiently emphasized. It is through science that a person perceives not only his past, present and future, but also his own relationship with himself and his environment. Hence the study of language should be and is a very important aspect of any educational programme. Science provides for both progress and presentation of intellectual life. It also provides for free and fresh thinking.

One of the greatest difficulties experienced, seems to be the general lack of awareness that the old teaching methodology is not only hackneyed and futile but **it** should yield place to the new teaching technology. There is much the science teacher can do to improve the quality of teaching Physics.

The traditional learning of Physics becomes dull, routine area of study. There is no basis for it being curriculum area. An enthusiastic teacher who is highly knowledgeable about the subject matter of Physics can do much to encourage student learning. In modular approach the learning materials are adjusted or modified to suit the mental level of students who are learning Physics by the Plus two level. Hence, learning Physics through modular approach will definitely increase the achievement of students.

The present study is an earnest attempt to develop modules for learning Physics at Plus two level and to measure their effectiveness over the traditional lecture method in learning the same by the Plus two students.

RESULTS AND DISCUSSION

The effectiveness of Modular Approach was measured through the achievement test with a set of 100 items. Each item in the achievement test carries one mark for right response and zero for wrong response. The same achievement test and same scoring procedure was used to measure the effectiveness of the Traditional lecture method also.

Before giving treatment to both and Experimental groups of students, a pretest was conducted. The total score obtained by each respondent in the achievement test in the pretest was calculated. After teaching the Experimental group for a period of 20 days a post-test was conducted. The total scores obtained by each student in the achievement test was calculated. The control group students were taught through traditional lecture method and a post-test was also conducted to them. Based on the total score, Mean and Standard Deviation for the Pretest and Post-test for each group were calculated.

HYPOTHESIS 1

There exists no significant difference between the pretest mean scores of control group and experimental group in learning Physics Subject.

Name of the Group	N	Mean	S.D	t-Value	Significant / Not significant
Control Group	20	38.95	7.92	0.83	Not Significant
Experimental Group	20	36.90	7.62		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.83, the obtained 't' value is lesser than the table value. Hence the null Hypothesis is accepted. Hence, there exists no significant difference between the pretest mean scores of control group and experimental group in learning Physics Subject.

From the above, it is concluded that the control group and the experimental group in the present study were matched ones before the experiment.

HYPOTHESIS 2

There exists significant difference between the pretest and post-test mean scores of control group when the subject is taught through traditional lecture method.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Pretest	20	38.95	9.92		
Post-test	20	41.07	9.34	0.6958	Significant

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.6958, the obtained 't' value is lesser than the table value. Hence the null Hypothesis is accepted. Hence, there exists significant difference between the pretest and post-test mean scores of control group when the subject is taught through traditional lecture method.

HYPOTHESIS 3

There is no significant difference between the pretest and post-test mean scores of experimental group when the subject is taught through modular approach.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Pretest	20	36.9	7.62		
Post-test	20	67.2	6.83	13.24	Significant

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 13.24, the obtained 't' value is greater than the table value. Hence the null Hypothesis is rejected. Hence, there exists significant difference between the pretest and post-test mean scores of experimental group when the subject is taught through Modular Approach.

Further the mean values obtained by experimental group students in the pretest and post-test scores discloses that their achievement is higher in the post-test than the pretest. It means that the experimental group students have made a vertical progress in their performance.

From the above it is concluded that the modular approach boosted up the performance of the experimental group students.

HYPOTHESIS 4

There is no significant difference between the post-test mean scores of control group and experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Control group	20	50.7	9.34	6.16	Significant
Experimental Group	20	67.2	6.83		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 6.16, the obtained 't' value is greater than the table value. Hence the null Hypothesis is rejected. Hence, there is a significant difference between the post-test mean scores of control group and experimental group.

Further the mean values obtained by the students in traditional lecture method and modular approach reveal that the achievement of the students in modular approach is higher than the traditional lecture method. It means using modular approach in learning Physics Subject by the plus two students is more effective than the traditional lecture method of teaching.

From the above it is concluded that the there is significant difference in the learning of Physics Subject by plus two students taught through traditional lecture method and modular approach. Further the achievement of students is higher is model approach than the traditional lecture method.

HYPOTHESIS 5

There exists no significant difference between the pretest mean score of boys and girls in control group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Boys	10	39.3	7.72	0.19	Significant
Girls	10	38.6	8.10		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.19, the obtained 't' value is greater than the table value. Hence the null Hypothesis is accepted. Hence, there exists no significant difference between the pre-test mean score of boys and girls in control group.

From the above it is concluded that Sex has not influenced the learning of Physics Subject by the control group boys and girls.

HYPOTHESIS 6

There is no significant difference between the post-test mean scores of boys and girls in control group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Boys	10	51.6	10.36	0.43	Significant
Girls	10	49.8	8.29		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.43, the obtained 't' value is less than the table value. Hence the null Hypothesis is accepted. Hence, there exists no significant difference between the pre-test mean score of boys and girls in control group.

From the above it is concluded that Sex has not influenced the control group boys and girls in learning Physics Subject taught through traditional lecture method.

HYPOTHESIS 7

There exists no significant difference between the pre-test mean scores of boys and girls in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Boys	10	37.3	7.37		
Girls	10	36.5	7.83	0.25	Significant

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.25, the obtained 't' value is less than the table value. Hence the null hypothesis is accepted. Hence, there exists no significant difference between the pre-test mean scores of boys and girls in experimental group.

From the above it is concluded that Sex has not influenced the pretest performance of boys and girls in the experimental group.

HYPOTHESIS 8

There is no significant difference between post-test mean scores of boys and girls in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Boys	10	64.9	7.50		
Girls	10	69.5	6.16	1.49	Significant

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 1.49, the obtained 't' value is less than the table value. Hence the null hypothesis is accepted. Hence, there exists no significant difference between the post-test mean scores of boys and girls in experimental group.

From the above it is concluded that Sex has not influenced the post-test performance of boys and girls in the experimental group.

HYPOTHESIS 9

There exists no significant difference between pretest mean scores of boys in control group and pretest mean scores of boys in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Control Group	10	39.3	7.72	0.59	Significant
Experimental Group	10	37.3	7.37		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.59, the obtained 't' value is less than the table value. Hence the null hypothesis is accepted. Hence, there exists no significant difference between pretest mean scores of boys in control group and pretest mean scores of boys in experimental group.

From the above it is concluded that there is no significant difference between control group boys and experimental group boys in the pre-test performance.

HYPOTHESIS 10

There exists no significant difference between pre-test mean scores of girls in control group and pre-test mean scores of girls in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Control Group	10	38.6	8.10	0.58	Significant
Experimental Group	10	36.5	7.83		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 0.58, the obtained 't' value is less than the table value. Hence the null hypothesis is accepted. Hence, there exists no significant difference between pre-test mean scores of girls in control group and pre-test mean scores of girls in experimental group.

From the above it is concluded that there is no significant difference in the pre-test performance of girls in control group and experimental group.

HYPOTHESIS 11

There is no significant difference between post-test mean scores of boys in control group and post-test mean scores of boys in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Control Group	10	51.6	10.36	3.29	Significant
Experimental Group	10	64.9	7.50		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 3.29, the obtained 't' value is greater than the table value. Hence the null hypothesis is rejected. Hence, there is a significant difference between post-test mean scores of boys in control group and post-test mean scores of boys in experimental group.

From the above it is concluded that there is a significant difference between the post-test performance of the control group boys taught through traditional lecture method and the experimental group boys taught through modular approach.

HYPOTHESIS 12

There is no significant difference between post-test mean scores of girls in control group and post-test mean scores of girls in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Control Group	10	49.8	8.29	6.03	Significant
Experimental Group	10	69.5	6.16		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is6.03, the obtained 't' value is greater than the table value. Hence the null Hypothesis is rejected. Hence, there is no significant difference between post-test mean scores of girls in control group and post-test mean scores of girls in experimental group.

From the above it is concluded that there is a significant difference between the post-test performance of the control group taught through traditional lecture method and the experimental group girls taught through modular approach.

HYPOTHESIS 13

There no significant difference between pre-test and post-test mean scores of boys in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Pre-test	10	37.3	7.37	8.29	Significant
Post-test	10	64.9	7.50		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 8.29, the obtained 't' value is greater than the table value. Hence the null hypothesis is rejected. Hence, there is a significant difference between pre-test and post-test mean scores of boys in experimental group.

Further the mean values obtained by experimental group boys in Pre-test and Post-test scores shows that their achievement is higher in the post-test than in the pre-test. From the above it is concluded that the modular approach significantly improved the performance of the experimental group boys.

HYPOTHESIS 14

There is no significant difference between pre-test and post-test mean scores of girls in experimental group.

Name of the test	N	Mean	S.D	t-Value	Significant / Not significant
Pre-test	10	36.5	7.83	10.46	Significant
Post-test	10	69.5	6.16		

The table 't' value 0.05 level is 1.96. The obtained calculated 't' value for the above is 10.46, the obtained 't' value is greater than the table value. Hence the null hypothesis is rejected. Hence, there is a significant difference between pre-test and post-test mean scores of girls in experimental group.

From the above it is concluded that the modular approach significantly improved the performance of the experimental group girls.

FINDINGS

1. There is no significant difference in the pretest performance between control group and experimental group students. The absence of variation in their pretest performance bears testimony to the fact that both the control group and experimental group in the present study were the matched ones.
2. The control group students showed significant difference between the pretest and the post test scores when they were taugh through the traditional lecture method. Further, their performance in the post test was better than their performance in the pretest.
3. The experimental group students significantly improved their learning and achievement after teaching through modular approach. Further, their achievmenet is higher in the post test than in the pretest.
4. There is significant difference between the post test scores of control group taught through traditional lecture method and the experimental group taught through modular approach. Further, the achievement of experimental group is higher than the achievement of control group.
5. Sex has not influenced the learning of control group boys and girls.
6. Sex has not influenced the post test performance of boys and girls in control group taught through traditional lecture method.
7. There is no significant difference in the pretest performance of boyrs and girls in the experimental group.
8. Sex has not influenced the post test performance of boys and girls in the experimental group taught through modular approach.
9. There is no significant difference in the pretest performance of boys in control group and experimental group.
10. There is no significant difference in the pretest performance of girls in control group and experimental group.
11. The experimental group boys taught through modular approach have shown significantly better performance then the control group boys taught through traditional lecture method.
12. The experimental group girls performed significantly better than the control group girls.

13. The experimental group boys significantly improved their learning and achievement after teaching through modular approach. Further, their achievement is higher in the post test than in the pretest.
14. The experimental group girls significantly improved their learning and achievement after teaching through modular approach. Further, their achievement is higher in the post test than the pretest.
15. There exists no significant difference between the pretest mean scores of control group and experimental group in learning Physics Subject.
16. There exists significant difference between the pretest and post-test mean scores of control group when the subject is taught through traditional lecture method.
17. There exists significant difference between the pretest and post-test mean scores of EXPERIMENTAL group when the subject is taught through Modular Approach.
18. There is a significant difference between the post-test mean scores of control group and experimental group.
19. There exists no significant difference between the pretest mean score of boys and girls in control group.
20. There exists no significant difference between the pretest mean score of boys and girls in control group.
21. There exists no significant difference between the pre-test mean scores of boys and girls in experimental group.
22. There exists no significant difference between the post-test mean scores of boys and girls in experimental group.
23. There exists no significant difference between pretest mean scores of boys in control group and pretest mean scores of boys in experimental group.
24. There exists no significant difference between pre-test mean scores of girls in control group and pre-test mean scores of girls in experimental group.
25. There is a significant difference between post-test mean scores of boys in control group and post mean scores of boys in experimental group.
26. There is no significant difference between post-test mean scores of girls in control group and post-test mean scores of girls in experimental group.
27. There is a significant difference between pre-test and post-test mean scores of boys in experimental group.
28. There is a significant difference between pre-test and post-test mean scores of girls in experimental group.