

To Develop, Use and Judge the Efficacy of Programmed Lessons in Chemistry for XIIth Class Students

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Abstract

The present research study was aimed at the supplying of reliable proof for establishing the effectiveness of the Programmed Learning for the subject Chemistry of XIIth Science. Due to this the main focus of the research study was the relationship between two variables i.e. content knowledge acquisition in Chemistry and the method of learning. For this study the Post-test only, equivalent group design was used because it has advantages such as use of randomization, control of the group and exposure to treatment.

The study has been conducted on two groups each containing 50 students was to be designated as the control group and experimental group. In this research study the statistical measures such as mean, standard deviation were computed and the statistical significance of the difference between the two means was tested by using t-test.

Introduction

There are social and educational interactions that take place in every school. Therefore, becomes the ideal epitome of the human society. Teaching and Learning are the immediate goals. To achieve these goals Skinner, B.F. developed the technique of programmed learning.

Some definitions of programmed learning have been supplied by Jagtap, H.N. (2000). Out of which one is as follows.

The arrangement of tiny bits of knowledge into logical sequence is called the programme, and its process is called programmed learning. (Stofel Fred, p.160) Programmed learning is a significant stage in educational technology. The researchers have effectively applied this technique on a large scale in India and in western countries. It is very often proper to accept and use this practical technique.

The researcher had considered all these details and factors. In order to apply this technique in a scientific way for XIIth Science, this research study had been undertaken.

Review of Related Researches

According to Best and Kahn (2007), summary of previous researches provides evidence that the researcher is familiar with what is already known and what is still unknown and untested. This will help the researcher to avoid duplication of any previous study. While doing the review of related researches the researcher came across 8 researches of Ph. D level and 3 researches conducted by different institutes individually. Mostly survey method was used to carry on the researches and tests were used to collect the data.

The review helped to confirm the variables of the study and supported the need of the study. It also facilitated the finalization of the method of the study. Experimental research method was adopted for the present study.

Need of the Research Study

Programmed learning is a technique that has proved to be useful and efficacious. Therefore, it needs to be applied for all the subjects and at all the levels of education. However the technique of programmed learning is not as simple as it appears. The programmed lessons are the tools that cause learning through self-study. Therefore, it follows that for mastering learning, the programmed lessons have to be qualitatively good. In order to establish the quantity programmed lessons, the research study of this type was needed.

The research of this type was also required to estimate the probable level of learning that can be expected for utilizing this technique. This type of research study was necessary to decide use of programmed lessons was superior to traditional methods of teaching Chemistry for XIIth Science. Viz. the lecture method. When programmed lessons are used instead of demonstration and lectures, what would be the general level of improvements in the knowledge acquisition of learners?

All these facts needed to be statistically and experimentally proved. Therefore, the research study such as the present one was required.

Significance of the Research Study

Programmed learning is an efficacious technique of learning. So, the present research study is significant because it is associated with a significant discipline Educational Technology, of knowledge and its efficacious technique.

This research study is applicational study. It means it applies the technique of Programmed Learning for the self-study of Chemistry at the level of XIIth Science. It promotes the use of Educational Technology to a specific subject. Therefore, this study is significant.

The students of XIIth Science are the direct and real beneficiaries of this research study. Therefore, this research study is significant for students exclusively.

This research study is significant for researcher himself because it had afforded mental satisfaction to him.

Statement of the Research Problem

To Develop, Use and Judge the Efficacy of Programmed Lessons in Chemistry for XIIth Class Students

Operational definitions of Technical Terms

1. **Programmed Learning:** Learning by means of materials of chemistry that break up the task into minimal steps, requiring an active response for each step, and providing immediate check on the correctness of the responses.
2. **Programmed Learning Lessons:** A set of programmed learning frames developed for micro-knowledge of the Chemistry of XIIth Science.
3. **Efficacy of Programmed Learning Lessons:** The inherent efficiency of programmed learning lessons for imparting knowledge and understanding to learners through self study.

Objectives of the Research Study

The present research study has the following objectives.

- 1) To develop the linear programmes according to the programmed learning technique for the self-study of the unit 'Chemical Thermodynamics and Energetics' from XIIth Science Chemistry.
- 2) To supply those linear programmes of Chemistry to students for self study.
- 3) To study the efficacy of linear programmes by using a relevant achievement test.

Hypotheses

- 1) There is no significant difference between the mean scores on the achievement test in Chemical Thermodynamics and Energetics administered to female students of the control group and the experimental group.
- 2) There is no significant difference between the mean scores on the achievement test in Chemical Thermodynamics and Energetics administered to male students of the control group and the experimental group.
- 3) There is no significant difference between the mean scores on the achievement test in Chemical Thermodynamics and Energetics administered to the control group students and the experimental group.

Research Methodology of the Research Study

Best, J.W. and Kahn, J.V. (2007) use 'four point analysis' for classify the educational research, and mention four types as- Historical Research, Descriptive Research, Qualitative Research and Experimental Research.

Of these four types, it was proper and necessary to plan the present research study according to the Experimental Research.

The present research aimed at the supplying the reliable proofs for establishing the effectiveness of the programmed learning for the subject, Chemistry. Therefore, the focus of the research study was the relationships between the two variables. Viz. content knowledge acquisition in Chemistry, and the method of learning.

Research Design

There are three types of Experimental Designs, viz. pre-experimental design, true experimental design and quasi-experimental design.

Of these three, the true experimental design category was used because it has advantages such as use of randomization, control of the equivalence of the group and exposure to treatment.

There are three designs in the true experimental design category. Of these, the design entitled, 'The Post test-Only, Equivalent Group Design' was used.

Sample of the Research Study

A sample is the representative portions of the population. The two divisions selected by the researcher constitute a sample of the study.

A simple lottery method of probability sampling method was used to select the two divisions and to ascertain the control group and the experimental group. This random sampling was a must for the Post test-only, Equivalent Groups Design. There are 50 students in each group. Out of which 25 female students and 25 male students each in Experimental and Control groups respectively.

Table-1: Details of Control and Experimental Groups

Sr.No.	Groups	Females	Males	Total
1	Control Group	25	25	50
2	Experimental Group	25	25	50
	Total	50	50	100

Research Variables

Table-2: Research Variables

Sr.No	Group	Independent Variable	Dependent Variable
1	Experimental	Self-study through linear Programmed Lessons (Experimental Input)	Academic Achievement in Chemistry
2	Control	Use of Lecture Method i.e. Lack of Experimental Input	Academic Achievement in Chemistry

Tools used for the Research Study

- 1) The Programmed Lessons
- 2) The Achievement Test

These tools were developed by the researcher himself.

Statistical Techniques used

- 1) Mean
- 2) Standard Deviation
- 3) T-test for testing statistical significance of the difference between two means.

Testing of Hypotheses

Hypothesis-1: There is no significant difference between the mean scores on the achievement

test in Chemical Thermodynamics and Energetics administered to female students of the control group and the experimental group.

Table-3: Data for Testing the Statistical Significance of the Difference between the two

means of the scores procured by the female students

Sr.No	Group	N	Mean	S.D	t-Value	Level of significance
1	Control Group	25	17.30	4.90	14.48	0.05 Significant
2	Experimental Group	25	33.18	6.01		

The ideal t-value at 0.05 level of significance is 2.06 and calculated t-value is 14.48. The calculated t-value 14.48 exceeds the ideal t-value 2.06.

Therefore, the difference between the mean scores of the female students mobilized in the control group and the experimental group is statistically significant.

Hypothesis-2: There is no significant difference between the mean scores on the achievement

test in Chemical Thermodynamics and Energetics administered to male students of the control group and the experimental group.

Table-4: Data for Testing the Statistical Significance of the Difference between the two

means of the scores procured by the male students

Sr.No	Group	N	Mean	S.D	t-Value	Level of Significance
1	Control Group	25	19.68	5.48	11.46	0.05 Significant
2	Experimental group	25	33.05	6.17		

The ideal t-value at 0.05 level of significance is 2.06 and calculated t-value is 11.46. The calculated t-value 11.46 is greater than the ideal t-value 2.06.

Therefore, the difference between the mean scores of the male students mobilized in the control group and the experimental group is statistically significant.

Hypothesis-3: There is no significant difference between the mean scores on the achievement

test in Chemical Thermodynamics and Energetics administered to control group students and the experimental group students.

Table-5: Data for Testing the Statistical Significance of the Difference between the two means of the Scores of Control and Experimental Group.

Sr.No	Group	N	Mean	S.D	t-Value	Level of Significance
1	Control Group	50	18.70	5.56	12.71	0.05 Significant
2	Experimental Group	50	33.38	5.98		

The ideal t-value at 0.05 level of significance is 2.01 and the calculated t-value is 12.71. The calculated t-value 12.71 exceeds the ideal t-value 2.01.

Therefore, the difference between the mean scores of the total experimental group students and control group students is statistically significant.

Conclusions

Hypothesis-1:

According to table 3, the difference between the mean scores of the female students mobilized in the control group and experimental group is 15.88 and its t-value is 14.48. The calculated t-value 14.48 is greater than the ideal t-value 2.06 at 0.05 level of significance. Therefore, the difference between two means is significant and real.

Therefore---

- 1) The hypothesis 1, that is given above is rejected, and
- 2) The modified hypothesis, there exist a significant difference between the mean scores on the achievement test in Chemical Thermodynamics and Energetics administered to female students of the control and the experimental group is accepted.

It is hereby concluded that since the female students of the experimental group had used the programmed lessons for their study, they could have significant achievement in content learning and post testing. The control group female students performance was not as significant as the female students performance in the experimental group.

Hypothesis 2:

According to table 4, the difference between the mean scores of the male students mobilized in the control group and experimental group is 13.37 and its t-value is 11.46. The calculated t-value 11.46 is greater than the ideal t-value 2.06 at 0.05 level of significance. Therefore, the difference between two means is significant and real.

Therefore---

- 1) The hypothesis 2, that is given above is rejected, and
- 2) The modified hypothesis, there exist a significant difference between the mean scores on the achievement test in Chemical Thermodynamics and Energetics administered to male students of the control and the experimental group is accepted.

It is hereby concluded that the performance in the post test of experimental group male students was superior to the performance of the male students in the control group. This significant performance and achievement can be attributed to the use of programmed lessons.

Hypothesis 3:

According to table 5, the difference between the mean scores of the total students mobilized in the control group and experimental group is 14.68 and its t-value is 12.71. The calculated t-value 12.71 is greater than the ideal t-value 2.01 at 0.05 level of significance. Therefore, the difference between two means is significant and real.

Therefore---

- 1) The hypothesis 3, that is given above is rejected, and
- 2) The modified hypothesis, there exist a significant difference between the mean scores on the achievement test in Chemical Thermodynamics and Energetics administered to students of the control and the experimental group is accepted.

It is hereby concluded that the performance in the post test of experimental group students was superior to the performance of the students in the control group. This significant performance and achievement can be attributed to the use of programmed lessons.

All these conclusions prove the superiority of the experimental group students performance and achievement in the post test. It is clear that their significant achievement is due to the programmed lessons which were used as the instructional inputs. Therefore, in this study, it is concluded that programmed learning is superior technique to the Lecture method in teaching of the unit, Chemical Thermodynamics and Energetics.

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