



Improving Quality of School Science and Technology Education

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Key words E – Learning, Programmed Learning

Abstract:

21st century is considered as the age of technology and people need to help scientific aptitude so there is the need to assess and maintain the quality of science education specifically at primary and the secondary level. This research paper is the comparative study of E-Learning and Programmed Learning. It concludes that E-Learning is more effective method not enough nor with significant difference. Besides this there is a significant difference in educational achievement between students of high and low intelligence.

The research paper observes that introduction of E-Learning and Programmed Learning in other form of self study material in an applied. In B.Ed. during practice teaching can form equip the students to meet the challenges of 21st century.

1. Introduction

In modern world, knowledge is growing day by day resulting in like expansion, but in this expansion is so large to that the world knowledge explosion is move appropriate. We cannot assume that each and every student coming in the school as a blank paper. Student coming in the school is hungry for knowledge and increasing demand of education have created many questions. And in such a condition there is a need to increase use and efficiency of self study and enlighten the education process as per the individual capacity. We have to improve the current education system. By using techniques systems like Seminar, Workshop, Team Teaching, Quiz, Panel Discussion, E – Learning, Programmed Learning, Project Work, Practical Work etc.

Students' take more interest in a technique like E – Learning and Programmed Learning because they are new and different techniques than current educational techniques and that's why students gain knowledge easily and education work fetches good result.

2. Rationale of the study

Rationales of the following study to develop Science and Technology are as follows

- To arouse interest of students in Science and Technology.
- To motivate students towards Science and Technology.
- To increase their achievement level in Science and Technology.

3. Statement of the Problem

The title of the proposed study is:

Improving Quality of School Science and Technology Education

4. Objectives of The Study

There are the objectives prepared for this study.

- To construct computer-based E-Learning and Programmed Learning programme from the unit 'Musculo – Skeleton System' of the subject 'Science and Technology' of standard VII.

- To compare the effect of Programmed Learning method and E-Learning method on the students' achievement.
- To compare students' achievement through both methods in the context of their sex.
- To check the effect of educational method, intelligent achievement and sex as well as interaction on the student achievement.

5. Hypotheses of the study

There are the hypotheses prepared for this study.

Ho₁: There will be no difference between Average score of Educational Achievement of the students' having high Achievement and low Achievement.

Ho₂: There will be no difference between Average score of Educational Achievement of the students' having high intelligence and low intelligence.

Ho₃: There will be no significant effect on students' educational scores by their educational method and intelligence interaction.

6. Type of Research

This research is an Applied Research.

7. Limitations of The Study

➤ The comparative study of E-Learning and Programmed Learning has been done on the Gujarati medium school. So, their results are limited to the students of that school and consequences limited for only student of one school.

➤ This research only limited for E-Learning and Programmed Learning.

➤ At the end of this research replication has not been done.

8. Research Methodology

The researcher has used two equal group Pre-Test – Post Test of True Experimental Design.

9. Variables

In this research Educational Methods and Sex are independent variables. Educational Achievement on Post Test is dependent variable and Intelligence and First Annual exam are controlled variables.

10. Population

Seven schools governed by Visnagar city.

11. Sample

Thirty boys and Thirty girls of std VII of Shri N. M. Nootan Sarva Vidyalaya, Visnagar governed by Visnagar city trust selected by randomized sampling from 215 students.

Table 1 Construction of Groups

Sex	Experimental Group – I	Experimental Group – II	Total
	E-Learning Method	Programmed Learning Method	
Boys	30	30	60
Girls	30	30	60
Total	60	60	120

12. Tools

- Researcher has used self made programmed on the students of std VII of Shri N. M. Nootan Sarva Vidyalaya, Visnagar. The unit 'Musculo – Skeleton System' was selected in subject Science and Technology of std. VII.

- Researcher has taken into consideration the educational psychological principles, while construction of self – learning E-Learning programmed on unit ‘Musculo – Skeleton System’ in subject Science and Technology of std. VII.
- Researcher has used the Verbal – Non-Verbal group intelligence test prepared by Dr. K. G. Desai for finalization of Intelligence level of students.
- Researcher has taken in to consideration the total score of the students in first annual exam.
- To measure the effectiveness of the learning works on the students, researcher has prepared the achievement test of unit based on ‘Musculo – Skeleton System’ in subject Science and Technology of std. VII.

13. Data Collection

- First Researcher have taken permission from the principal of a school for an experiment.
- Then Researcher took permission from principal of Nootan B.C.A., P.G.D.C.A. College, Visnagar in a same campus that college have facility of a Learning programmed in a server it started working in the all computers.
- Researcher has done this experiment in two different groups.
- For deciding groups researcher have use first annual exam scores of Std. IX and to decide I.Q. by Dr. K.G.Desai’s Verbal – Non-Verbal group intelligence test. From the score of intelligence test is I.Q. was decided and as per the I.Q., Intelligence level was fixed and from that two equal were created. After some training/learning they were given Achievement test made by the teacher at the end of unit educational work.

Thus, this Information was collected from four different classes of school.

14. Data Analysis

As per the intension of educational objectives and as per the Achievement tests of unit ‘Musculo – Skeleton System’ in the subject Science and Technology of the Std. VII. Pre test, Intelligence tests scores, the following analysis was made.

- To decide significant value of two equal groups t-test, mean standard deviation was calculated.
- To decide main effect of Intelligence, Achievement and Sex and effect of interaction on the students’ educational achievement Analysis of Variance was used.
- To decide students educational Achievement only from experimental efficiency or not ANCOVA was used.

In this research paper information of only those variables was given who have significant interaction.

Table 2 - 2x2x2x2 Factorial Design for Analysis of Variance

Source	Sum of Square (SS)	Degree of Freedom (df)	Mean of Square (MS)	F Value	Significant Level
Corrected Model	2312.0374	15	154.136	3.191	*0.01
Intercept	88877.833	1	88877.833	1840.2	
Achievement	248.044	1	248.044	5.136	0.05
Intelligence	460.698	1	460.698	9.539	0.01
Achievement x Intelligence	256.423	1	256.423	5.309	0.05
Intelligence x Sex	271.575	1	271.575	5.623	0.01
Method x Sex x Intelligence	358.332	1	358.332	7.419	0.01
Method x Sex x Intelligence	18.199	1	18.199	0.377	NS

Achievement				
Error	5022.888	104	48.297	
Total	116961.000	120		
Corrected Total	7334.925	119		

15. Hypotheses Testing

Description of hypothesis testing was given below.

Table 3 TESTING OF HYPOTHESIS

No.	Hypothesis	Mean of Square	F-Value	Significant Value		Relation	Hypothesis Accepted or Not Accepted	Interpretation	Relation	Conclusion
				0.05	0.01					
1	There will be no difference between Average score of Educational Achievement of the students' having high Achievement and low Achievement.	248.044	5.136	Sig.	NS	$F_{cal} > F_{tab}$	Not Accepted	We can see significant difference between average scores of educational Achievement of the students' having high Achievement and low Achievement.	$M_{high.ach.} = 31.98 > M_{low.ach.} = 28.47$	Students' having High Achievement having High Educational Achievement than students having low Achievement.
2	There will be no difference between Average score of Educational Achievement of the students' having high intelligence and low intelligence.	460.696	9.539	NS	Sig.	$F_{cal} > F_{tab}$	Not Accepted	We can see significant difference between average scores of educational Achievement of the students' having high Intelligence and low Intelligence.	$M_{high.IQ.} = 32.68 > M_{low.IQ.} = 27.77$	Students' having High Intelligence having High Educational Achievement than students' having Low Intelligence.
3	There will be no significant effect on students' educational scores by their educational method and intelligence interaction.	256.423	5.309	Sig.	NS	$F_{cal} > F_{tab}$	Not Accepted	We can see significant effect on students educational scores by their educational method and intelligence interaction.	--	We can see the effect of E-Learning, Programmed Learning, High Intelligence and Low Intelligence interaction on the students' educational Achievement scores.

Sig. = Significant NS = Non Significant

In which there are significant value of F-Test and which have significant value of t- Test was given below.

Table 4 t – value of significant F – Value

No.	Significant Interaction Relation	Mean of including variables		t-value	Significant value		Interpretation	Relation	Conclusion
		MA ₂	MD ₂		0.05	0.01			
1	A ₂ X D ₂	MA ₂ = 31.5	MD ₂ = 27.77	2.683	Sig.	Sig.	There is significant difference between the score of taught students of low intelligence students by Programmed Learning students.	MA ₂ > MD ₂	Taught students' average scores were more than the low intelligence student score by Programmed learning.
2	D ₁ X D ₂	MD ₁ = 30.15	MD ₂ = 27.77	3.593	Sig.	Sig.	There are be significant difference between average scores of high intelligence and low intelligence students.	MD ₁ > MD ₂	High intelligence students are superior than low intelligence students.
3	B ₁ X D ₂	MB ₁ = 31.47	MD ₁ = 27.77	2.626	Sig.	Sig.	0.01 level significant differences are between boys and lower intelligence students' average scores of post test.	MB ₁ > MD ₂	Boys are superior than students of lower intelligence.
4	B ₂ X D ₁	MB ₂ = 28.98	MD ₂ = 32.68	2.683	Sig.	Sig.	0.01 level significant differences are between girls and higher intelligence students' average scores of post test.	MB ₁ < MD ₁	Higher intelligence students are superior than girls.
5	D ₁ X D ₂	MD ₁ = 32.68	MD ₂ = 27.77	3.593	Sig.	Sig.	0.01 level significant differences are between lower intelligence and higher intelligence students' average scores of post test.	MD ₁ > MD ₂	Higher intelligence students are superior than lower intelligence students.

A₁ = Learning Method, A₂ = Programmed Learning Method, B₁ = Boys, B₂ = Girls,

C₁ = High Achievement, C₂ = Low Achievement, D₁ = High Intelligence, D₂ = Intelligence

Table 5 - 2x2x2x2 Factorial Design for Analysis of Variance

Source	Sum of	Degree of	Mean of	F	Significant
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	Square (SS)	Freedom (df)	Square (MS)	Value	Level
Corrected Model	2348.5304	17	138.149	2.826	0.01
Intercept	196.470	1	196.470	4.019	0.05
Method x Intelligence	235.036	1	235.036	4.808	0.05
Sex x Intelligence	269.714	1	269.714	5.722	0.05
Method x Sex x Intelligence	335.410	1	335.410	6.861	0.01
Error	4986.395	102	48.886		
Total	116961.000	120			
Corrected Total	7334.925	119			

16. Conclusion of ANCOVA

- Effect of E – Learning, Programmed Learning Method, Higher Intelligence and Lower Intelligence on the Post test scores can be observed.
- If we control the effect of students’ educational system and First annual exam score we can see the Sex and Intelligence of students’ affects the Post Test scores.
- If we control the scores of first annual exam, we can see the effects of Educational system that are taught to students their Sex and Intelligence on the scores of Post Test.

17. Educational Implication

- We can keep Programmed Learning and E-Learning as a part of education curriculum of a teacher trainee as per the students’ Sex and Intelligence , so that we can create efficiency in future teachers. They can drive students’ towards self study.
- We have to give Personal Guidance to the students’ who are having low scores and we have to arrange extra educational classes.
- For the students’ having high scores and for that we have to give Vocational Guidance and Knowledge about modern streams of education to teacher’s trainee.
- Teacher’s trainee should plan educational facility as per sex, intelligence and work efficiency and the introduction of educational psychological principle.
- Teacher’s trainee should use Internet and visit different types of Institutes.
- In B.Ed. College, we must introduce computer and other teaching techniques in such a way that students can take part easily. For such a system, we have to arrange innovative lesson plan and in that we have to give importance to activity.

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