

Effectiveness of "Crystal Physics" E-Content on the Achievement of First Year Engineering Students

Dr. P. Gershom Jebaraj,

Assistant Professor. Dept. of Physics,
Ramco Institute of Technology,
Rajapalayam

Dr. K. Mohanasundaram,

Professor. Dept. of Education,
Periyar Maniyammai University,
Thanjavur

ABSTRACT

In this era of modernization, possibilities are emerging to provide Engineering education in an innovative way. Educational Technology has been widely used all over the world. The Engineers of today and tomorrow are expected to be far more creative and innovative. A study was undertaken to find out the Effectiveness of Crystal Physics E-Content on the Achievement of first year Engineering Students. A pre-test, post-test two group experimental design was adopted. Sample of 50 First Year Engineering students were exposed to different treatments such as E-Content method and conventional method of teaching. Their achievement scores were analyzed using different statistical techniques. It is found that the experimental group students who were taught with the help of E-Content material scored more than the control group in learning "Crystal Physics".

Keywords: Crystal Physics, E-Content, Engineering Education, Student Achievement, Digital Learning

INTRODUCTION

Engineering Education plays a vital role in building a nation. Its quality is the direct consequence and outcome of the quality of Engineers. Now a days, with tremendous developments in technology, possibilities are emerging to provide Engineering Education in an innovative way to meet the global standards. We can provide multidimensional and multi-disciplinary educational experiences to the learners with the help of new educational programmes. One such programme is e- Learning. An experimental study was conducted to find out the Effectiveness of "Crystal Physics" E-Content on the achievement of First Year Engineering Students. This study will help the teachers, educational technologists and

educationists of Engineering Education to promote and provide a newer, technology based educational delivery system.

OBJECTIVES

Following are the objectives of the present study

- ❖ To find out the Effectiveness of "Crystal Physics" E-Content on the achievement of First Year Engineering Students
- ❖ To find out the significant difference if any, on the achievement of First Year Engineering Students with respect to Gender (Male, Female), Quota of Seat Allotment (Government Quota/Management Quota), Type of Stay (Hosteller, Day Scholar) and Branch of Study at Higher Secondary Level (Computer, Non-Computer).

VARIABLES OF THE STUDY

Independent variable of this study is teaching Crystal Physics to First Year Engineering Students through e-content. The dependent variable of this study is academic achievement of First Year Engineering Students. These variables are studied with respect to Gender, Quota of Seat Allotment, Type of Stay and Branch of Study at Higher Secondary Level.

HYPOTHESES

Following hypotheses were formulated based on the objectives and variables of the study.

1. There is no significant difference in the achievement in Crystal Physics between control group and experimental group First Year Engineering Students.
2. There is no significant difference in the achievement in Crystal Physics between Male First Year Engineering Students of control group and experimental group.
3. There is no significant difference in the achievement in Crystal Physics between Female First Year Engineering Students of control group and experimental group.
4. There is no significant difference in the achievement in Crystal Physics between Government Quota First Year Engineering Students of control group and experimental group.
5. There is no significant difference in the achievement in Crystal Physics between Management Quota First Year Engineering Students of control group and experimental group.

6. There is no significant difference in the achievement in Crystal Physics between Hosteller First Year Engineering Students of control group and experimental group.
7. There is no significant difference in the achievement in Crystal Physics between Day Scholar. First Year Engineering Students of control group and experimental group.
8. There is no significant difference in the achievement in Crystal Physics between the First Year Engineering Students of control group and experimental group belongs to computer branch at Higher Secondary Level.
9. There is no significant difference in the achievement in Crystal Physics between the First Year Engineering Students of control group and experimental group belongs to non- computer branch at Higher Secondary Level.
10. The e-content is not effective in teaching Crystal Physics to First Year Engineering Students over the conventional lecture method.

EXPERIMENTAL PROCEDURE

Intelligence Test of 'g' culture fair scale-2 form A constructed by RB Cattell and AKS Cattell was administered to the First Year Engineering Students of Electronics and Communication Engineering Branch and Civil Engineering Branch of Ramco Institute of Technology, Rajapalayam. The control group and experimental group were formed by considering their average performance in the above intelligence test. The relevant pre-test was administered to the sample and the data were collected. Then the control group was taught through conventional Lecture method. Experimental group was taught through e-content. After the treatment, the post-test was administered to experimental group and control group and the data were collected.

TOOLS

The following tools were employed in this present study:

1. **Intelligence Test-Test of "g": Culture Fair-Scale 2, (Form A)**, developed and validated by R.B. Cattell and A.K.S. Cattell.
2. **"E-Content on Crystal Physics"** developed and validated by the investigator to teach Crystal Physics to the First Year Engineering Students.
3. **Achievement Test in Crystal Physics** developed and validated by the investigator to assess the Academic Achievement of the First Year Engineering Students in Crystal Physics.

DATA ANALYSIS

The marks scored by the First Year Engineering Students in the Pre-Test and Post-Test were analyzed using "t" Test. It is shown in the Table I.

Table 1: Analysis of Pre-Test and Post-Test scores of Control Group and Experimental Group

Test	Variable	Group	N	M	S.D	"t"	Level of Significance
Pre-Test	Whole Group	Control	25	11.45	3.65	1.219	Not Significant
		Experimental	25	13.25	3.46		
Pre-Test	Whole Group	Control	25	24.72	2.59	12.453	Significant at 0.01 Level
		Experimental	25	46.12	1.8		
Pre-Test	Male	Control	13	23.37	3.5	15.55	Significant at 0.01 Level
		Experimental	12	43.76	2.1		
Pre-Test	Female	Control	12	25.15	2.7	18.92	Significant at 0.01 Level
		Experimental	13	48	1.25		
Pre-Test	Government Quota	Control	11	24.7	3.05	16.03	Significant at 0.01 Level
		Experimental	14	47.5	1.35		
Pre-Test	Management Quota	Control	14	25.27	2.95	18.42	Significant at 0.01 Level
		Experimental	11	44.76	1.95		
Pre-Test	Hosteller	Control	11	23.75	3.25	21.23	Significant at 0.01 Level
		Experimental	14	45.64	1.75		
Pre-Test	Day Scholar	Control	14	26.78	3.15	19.43	Significant at 0.01 Level
		Experimental	11	46.76	1.8		
Pre-Test	Computer Branch at Higher Secondary	Control	13	26.52	2.95	19.05	Significant at 0.01 Level
		Experimental	12	47.72	1.5		
Pre-Test	Non - Computer Branch at Higher Secondary	Control	12	23.62	3.85	15.3	Significant at 0.01 Level
		Experimental	13	43.52	2.25		

The mean Gain score and Gain percentage of the control group and experimental group are shown in Table 2.

Table 2: Mean gain score and gain percentage of the Pre-test and Post-test of control group and experimental group

Group	N	Pre-test M1	Pre-test M2	Mean Gain Score	Gain Percentage
Control	25	11.45	24.72	13.27	26.54
Experimental	25	13.25	46.12	32.87	65.74

Table 3 shows the Cohen's 'd' Value and Effect Size Analysis.

Table 3: Cohen's d Value and Effect Size Analysis

Group	Mean Score	SD	Cohen's d	Effect Size
Control	24.72	2.59	9.59	Large
Experimental	46.12	1.80		

The effect size analysis showed that, the Cohen's d value is 9.59. The effect size is large. It is concluded that, the effectiveness of e-content in teaching Crystal Physics to the First Year Engineering Students is large. This result is due to e-content which made teaching and learning process more interesting and helped the learners to achieve high.

FINDINGS

From Table 1, it is observed that

- ❖ The pre-test scores of the control group and experimental group is almost same with no significant difference between them before treatment. When the post-test scores are considered, both the groups had shown significant differences.
- ❖ There is significant difference in the Achievement in Crystal Physics between control group and experimental group First Year Engineering Students. The experimental group First Year Engineering Students who were taught through e-content achieved better in Crystal Physics than the control group students who were taught through conventional lecture method.
- ❖ There is significant difference in the Achievement in Crystal Physics between Male First Year Engineering Students of control group and experimental group. There is significant difference in the Achievement in Crystal Physics between Female First Year Engineering Students of control group and experimental group.

- ❖ There is significant difference in the Achievement in Crystal Physics between Government Quota First Year Engineering Students of control group and experimental group. There is significant difference in the Achievement in Crystal Physics between Management Quota First Year Engineering Students of control group and experimental group.
- ❖ There is significant difference in the Achievement in Crystal Physics between Hosteller First Year Engineering Students of control group and experimental group. There is significant difference in the Achievement in Crystal Physics between Day Scholar First Year Engineering Students of control group and experimental group.
- ❖ There is significant difference in the Achievement in Crystal Physics between control group and experimental group First Year Engineering Students who belongs to Computer branch at Higher Secondary level.
- ❖ There is significant difference in the Achievement in Crystal Physics between control group and experimental group First Year Engineering Students who belongs to non-computer branch at Higher Secondary level.
- ❖ From the Table 2, significant statistical difference is noted between the mean scores of pre-test and post-test of both the experimental and control groups. Hence, it is concluded that the First Year First Year Engineering Students in the experimental group who learned "Crystal Physics" through the developed e-Content are at the higher level in their academic achievement than the students of the control group who learned "Crystal Physics" through conventional method. So the developed e-Content is more effective in teaching "Crystal Physics" to the First Year First Year Engineering Students than the conventional method.
- From Table 3 it is noted that, the Cohen's d value is 9.59. The effect size is large. It is concluded that, the effectiveness of e-content in teaching Crystal Physics to the First Year Engineering Students is large.

RECOMMENDATIONS OF THE PRESENT STUDY

1. The e-Content for teaching Crystal Physics is found to be effective. Hence, the same approach can be given for teaching other subjects like Languages, Chemistry, Mathematics and other Engineering Subjects.

2. Teaching Engineering Subjects through conventional methods should be reduced. Newer instructional technologies like e-Content shall be introduced in Engineering Colleges for all subjects.
3. The Assistant Professors, Associate Professors and Professors of the Engineering Colleges shall be trained to develop e-Content in their own field.
4. In-service training and orientation programmes shall be conducted for them in regular intervals regarding the development and implementation of e-Content.

De - Limitations

1. The study was conducted only for First Year Engineering Students.
2. The medium of instruction is English.
3. This study was not extended to the students of Arts & Science Colleges and Education Colleges.

CONCLUSION

The results from this study reveal that, e-content is more effective in teaching Crystal Physics to First Year Engineering Students than the conventional lecture method. If e-content is used to teach the Students of Engineering Colleges, it will bring a substantial change in the method of spreading knowledge to improve quality in Engineering Education. The learners will find more and more avenues of learning, they can get the knowledge that will be more relevant in this age of digital revolution. Hence the Quality of Engineering Education will be improved and ultimately the potential human resource will be developed for the progress of our Nation.

REFERENCES

- ♣ Guidelines for e-content Development, (2012).University Grants Commission, New Delhi
- ♣ Jeya Shanmugaraja et.al (2012). A study of Effectiveness of e-content on Teaching Zoology at Higher Secondary Level, International Journal of Current Research, Volume (4), Issue (09), pp 205-206, ISSN: 0975-833X.
- ♣ Gershom Jebaraj, P (2013). A Text Book of Engineering Crystal Physics-I. S C M Publishers. Erode.

- ♣ Lizeron Eremias, R & Subash (2013).E-Content Development: A Milestone in the dynamic progress of e-Learning. International Journal of Teacher Educational Research (IJTER), Volume(2), No. (1),January2013,pp43-49, ISSN: 2319-4642.
- ♣ Muppudathi, G(2013). A Study on Experts' Validation of E-Content. Indian Journal of Applied Research, Volume (3), Issue (11), Nov 2013,pp1 50-151, JSSN-2249-555X
- ♣ Nachimuthu, K(2012). Need of e-Content Development in Education. Education Today, An International Journal of Education & Humanities, APH Publishers, New Delhi, Volume(03)No. (02)Ju(v-Dec2012,pp72-80, ISSN: 2229-5755 .
- ♣ Pio Albina, A & Edward William Benjamin,A (2013). Effectiveness of e-Content in teaching Mathematics for XI Students. Indian Journal of Applied Research, Volume (3). [']sue (9), Sept 2013, andppl83-184, ISSN: 2249-555X.
- ♣ Ravi P Bhatia (2011).Features and Effectiveness of E-learning Tools. Global Journal of Business Management and Information Technology, Volume I, Number 1 (2011),pp. 1-7.
- ♣ Rekha, N & Muthuchamy, I (2013).Development and Validation of e-Content on DNA Replication in Botany at Higher Secondary Level. International Journal of Scientific and Research Publications, Volume (3), Issue (6). June 2013,pp1-3, ISSN: 2250-3153.