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Effects of E-content Strategy and its Interaction Among Students Belonging to Different Intelligence Groups

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The purpose of this study was to investigate the effect of E-Content treatment, intelligence, and their interaction on achievement in science by considering pre-achievement in science as covariate. The E-Content in the integrated form of text, graphics, animation, audio, video, and interactivity for class VI science was developed by the investigator. The independent variables were E-Content strategy and Conventional strategy of teaching science. The intervening variable was intelligence. The control variables were nature of school, grade level, and subject taught. The dependent variable was achievement in science. It was a Pre-test Post-test control group design. Data collected were analysed using t-test and ANCOVA. Results showed that the E-Content has improved science achievement significantly higher in comparison to conventional strategy when groups were matched on Pre-achievement in Science. Further, a significant effect of interaction between treatment and intelligence was found on achievement in Science when Pre-achievement in Science was taken as covariate. On the whole for both Above Average Intelligence as well as Below Average Intelligence students E-Content was the most suitable when groups were matched in respect of Pre-Achievement in Science. However, E-Content strategy was more beneficial to Below Average Intelligence students when Pre-Achievement in Science was taken as covariate.

Keywords: E-Content, Intelligence, E-Content Strategy, Conventional Strategy

INTRODUCTION

Teaching plays a vital role in formal education system. In spite of established sound theories of teaching, it still continues to be a challenging task. Teaching-centre and group oriented methods of instruction hardly provide for individual differences of the learners. The term like e-learning is often used to describe an educational program that uses technology such as computer or internet. This term is commonly used by the software industry. The term covers a wide set of applications and processes, such as web-based learning, computer-based learning, virtual classrooms, and, digital collaboration. It provide various benefits to the students as Increased preservation, reduced learning time, convenient training, self-pacing facility, interactivity, quick reference materials accessibility etc.. An important outcome of e-learning is E-content. E-learning is a process and E-content is a product. This approach of teaching has become an answer to the complicated modern, social, economic condition and an exploding population. E-content lesson is generally designed to guide students through information or to help them perform specific tasks. An E-content package can be used as teacher in the virtual classroom situation. Using E-content, the time and finance involved in the teaching process can be minimized. E-content is facilitating individualized instruction also.

Full potential of E-Content in assisting or managing instruction are yet to be exploited in India. Many factors have been identified as controlling factors to the effectiveness of E-Content use in schools. Among these are intelligence, learning style, self-confidence and gender. This study therefore investigated not only the effect of intelligence and its interaction on the achievement of students in science but also the relative effectiveness of E-Content strategy in comparison to conventional strategy.

OBJECTIVES OF THE STUDY

1. To compare mean scores of Science achievement at pre and post stages of the E-content Group.
2. To compare the adjusted mean scores on Science Achievement of the E-Content Group and Conventional Strategy Group by considering Pre Science Achievement as covariate.

3. To study the effect of Treatment, Intelligence and their interaction on Science Achievement by considering Pre Science Achievement as covariate.

HYPOTHESES

1. There is no significant difference between mean scores of Science achievement at pre and post stages of the developed E-Content Group.
2. There is no significant difference between adjusted mean scores of Science Achievement of the E-Content Group and Conventional Strategy Group by considering Pre Science Achievement as covariate.
3. There is no significant effect of Treatment, Intelligence and their interaction on Science Achievement by considering Pre Science Achievement as covariate.

EXPERIMENTAL PROCEDURE

The experimental procedure was executed. One experimental and one control group was formed. The E-content group as experimental group was taught Science with the supplement of E-content, the control group was taught Science through Conventional Strategy. The design had comprised three stages: the first stage has involved pre-testing of all the students of two groups on the Science Achievement Test. The second stage has involved treatment of six months. The experimental treatment was consisted of teaching Science to VI class with E-content to experimental and through Conventional Strategy to control group. During the third stage i.e. post-test stage, the students ware post-tested on achievement in Science just after the treatment so as to determine the effect of treatment. A detailed description of the design of the experiment has been given in the table.

Table 1.1: Experimental Procedure

S.No.	Phase	Duration	Experimental Group	Control Group
1.	Pre-Test	1 Week	1.Science Achievement Test	1. Science Achievement Test
2.	Treatment	6 Months	Teaching Science with E-content	Teaching Science through Conventional Strategy
3.	Post-Test	1 Day	Science Achievement Test	Science Achievement Test

RESULTS

Objective 1: EFFECTIVENESS OF E-CONTENT ON THE BASIS OF ACHIEVEMENT IN SCIENCE

The first objective was to compare mean score of Achievement in Science of Pre and Post stages of E-Content Group. The data were analyzed with the help of correlated t-test. The results are given in Table 1.2

Table 1.2: Testing-wise M, SE, r and Correlated t- values of Achievement in Science

Testing	Mean	SE	r	Correlated t- value
Pre-test	46.63	1.76	0.98	31.10 **
Post-test	63.63	1.31		

** Significant at 0.01 level

From Table 1.2, it is evident that the correlated t-value is 31.10 which is significant at 0.01 level with df = 29. It reflects that the mean scores of Achievement in Science at Pre-test and Post-Test stages of E-Content Group differ significant. Thus, the null hypothesis, namely, there is no significant between mean scores of Achievement in Science at Pre-test and Post-Test stages of E-Content Group is rejected. Further, the mean score of Achievement in Science at Posttest stage is 63.63 which is significantly higher than the mean score of Achievement in Science at Pre-test stage which is 46.63. It may, therefore, be concluded that the E-Content was found to enhance Achievement in Science of students.

Objective 2: COMPARISON OF ADJUSTED MEAN SCORES OF ACHIEVEMENT IN SCIENCE OF E-CONTENT GROUP & CONVENTIONAL STRATEGY GROUP BY CONSIDERING PRE-ACHIEVEMENT IN SCIENCE AS COVARIATE

The second objective was to compare adjusted mean scores of Achievement in Science of E-Content Group and Conventional Strategy Group by considering Pre- Achievement in Science as covariate. The data were analyzed with the help of One Way ANCOVA. The results are given in Table 1.3.

Table 1.3: Summary of One Way ANCOVA of Achievement in Science by considering Pre-Achievement in Science as covariate

Source of Variance	Df	SSy.x	MSSy.x	Fy.x – Value
Treatment	1	2147.36	2147.36	372.38**
Error	57	328.70	5.77	
Total	59			

** Significant at 0.01 level

From Table 1.3, it is evident that the Adjusted F – Value is 372.38 which is significant at 0.01 level with df = 1 / 57. It shows that the adjusted mean score of Achievement in Science of students taught science through E-Content and those taught the same topics through Conventional Strategy differ significantly when groups were matched with respect to Pre – Achievement in Science. Thus, the null hypothesis that there is no significant difference in adjusted mean scores of Achievement in Science of E-Content Group and Conventional Group when pre –Achievement in Science is taken as covariate is rejected. Further, the adjusted mean score of Achievement in Science of E-Content Group is 62.35 which is significantly higher than those of Conventional Strategy Group whose adjusted mean score of Achievement in Science is 50.25. It may, therefore, be said that the E-Content was found to improve Achievement in Science significantly higher in comparison to Conventional Strategy when groups were matched on Pre- Achievement in Science.

Objective 3: EFFECT OF TREATMENT, INTELLIGENCE AND THEIR INTERACTION ON ACHIEVEMENT IN SCIENCE BY CONSIDERING PRE–ACHIEVEMENT IN SCIENCE AS COVARIATE

The third objective was to study the effect of Treatment, Intelligence and their interaction on Achievement in Science by considering Pre-Achievement in Science as covariate. There were two levels of Treatment, namely, E-Content and Conventional Strategy. The Above Average Intelligence & Below Average Intelligence were two levels of Intelligence. Thus, the data were analyzed with the help of 2×2 Factorial Design ANCOVA. The results are given in Table 4.7.

Table 4.3 Summary of One Way ANCOVA of Achievement in Science by considering Pre-Achievement in Science as covariate

Source of Variance	Df	SSy.x	MSSy.x	Fy.x – Value
Treatment	1	2132.74	2132.74	482.18**
Intelligence	1	0.17	0.17	0.04
Treatment × Intelligence	1	84.83	84.83	19.18**
Error	55	243.27	4.42	
Total	59			

** Significant at 0.01 level

4.3.1 Effect of Treatment on Achievement in Science

From Table 4.7, it is evident that the Adjusted F–Value is 482.18 which is significant at 0.01 level with df = 1 / 55. It shows that the adjusted mean score of Achievement in Science of students taught science through E-Content and those taught the same topics through Conventional Strategy differ significantly when groups were matched with respect to Pre-Achievement in Science. Thus, the null hypothesis that there is no significant effect of treatment on Achievement in Science of students when groups were matched with respect to Pre-Achievement in Science is rejected. It may, therefore, be said that the E-Content was found to improve Achievement in Science significantly higher in comparison to Conventional Strategy when groups were matched on Pre-Achievement in Science.

4.3.2 Effect of Intelligence on Achievement in Science

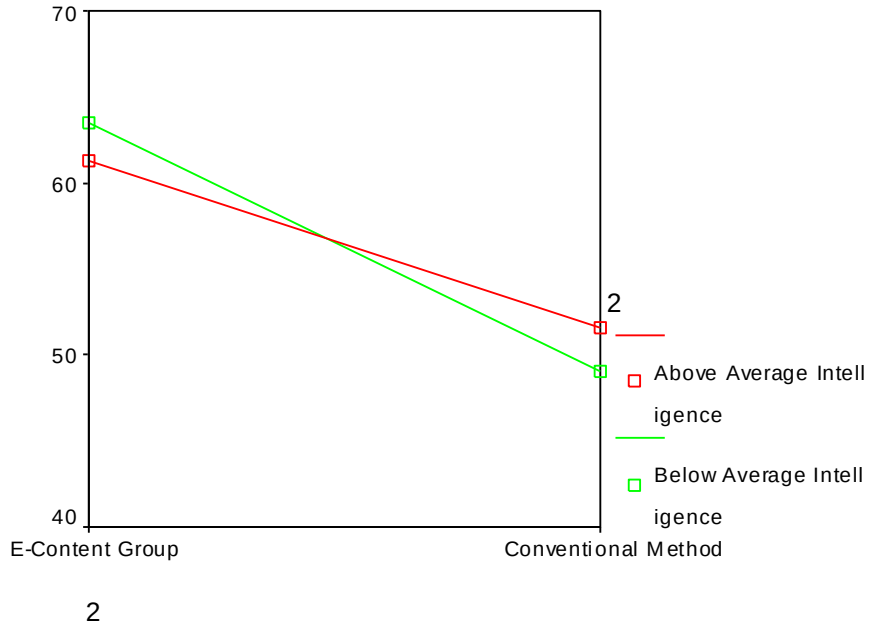
From Table 4.7, it is evident that the adjusted F–Value for Intelligence is 0.04 which is not significant. It shows that the adjusted mean score of Achievement in Science of students belonging to Above Average Intelligence Group and Below Average Intelligence Group did not differ significantly when Pre-Achievement in Science was considered as covariate. So there was no significant effect of Intelligence on Achievement in Science of students when groups were matched with respect to Pre-Achievement in Science. In this context, the null hypothesis that there is no significant effect of Intelligence on Achievement in Science of students when groups were matched with respect to Pre-Achievement in Science is not rejected. It may, therefore, be said that students belonging to Above Average Intelligence Group and Below Average

Intelligence Group were found to have Achievement in Science to the same extent when groups were matched in respect of Achievement in Science.

4.3.3 Effect of Interaction between Treatment and Intelligence on Achievement in Science

From Table 4.7, it is evident that the adjusted F-Value for Interaction between Treatment and Intelligence is 19.18 which is significant at 0.01 level with df = 1 / 55 when Pre-Achievement in Science was taken as covariate. It indicates that there was a significant effect of Interaction between Treatment and Intelligence on Achievement in Science when Pre-Achievement in Science was taken as covariate. Thus, the null hypothesis that there is no significant effect of interaction between Treatment and Intelligence on Achievement in Science when Pre-Achievement in Science was taken as covariate is rejected. In order to know the trend of effect of interaction between Treatment and Intelligence on Achievement in Science, the Graph 4.1 has been plotted.

Graph 4.1: Effect of Interaction between Treatment and Intelligence on Achievement in Science by considering Pre-Achievement in Science as covariate
Estimated Marginal Means of POSTSCAC



From Graph 4.1, it is evident that the students belonging to both Above Average Intelligence Group as well as Below Average Intelligence Group benefited significantly more through the E–Content than Conventional Strategy. In case of E–Content, students belonging to Below

Average Intelligence Group were found to benefit more than those belonging to Above Average Intelligence Group. Further, in case of Conventional Strategy, students belonging to Above Average Intelligence Group were found to benefit more than those belonging to Below Average Intelligence Group. It may, therefore, be said that E-Content Strategy is more beneficial to Below Average Intelligence students when Pre-Achievement in Science was taken as covariate. On the whole for both Above Average Intelligence as well as Below Average Intelligence students, E–Content was the most suitable when groups are matched in respect of Pre-Achievement in Science.

DISCUSSION OF THE RESULTS

The purpose of the study was to compare student learning of general science through two modes of instruction i.e. E-Content and Conventional Strategy of teaching. Two groups matched by their pre-achievement in science were randomly assigned to Experimental and Control groups to teach through E-Content Strategy and Conventional Strategy respectively. Student learning was measured in terms of scores on post achievement test. Findings of the experiment revealed that students of the E-Content group outperformed the matched students of the Conventional Strategy group. Students who taught through E-Content Strategy learned more than those who taught through Conventional Strategy of teaching.

The present study showed that the E-Content improve Achievement in Science significantly higher in comparison to Conventional strategy when groups were matched on Pre-Achievement in Science. This study's finding is supported by the findings of previous studies in which students learned academic material (subjects) using Multimedia Program performed significantly better than those taught using the Conventional Strategy, Nimavathi, V. and Gnanadevan, R. (2008) found that a Multimedia Program was effective in improving students' understanding of academic material. Also, Jyothi, K.B.S. (2007) claimed that Computer Based Learning had a significantly better effect than Traditional Instruction on learning. In addition, these findings are consistent with Jayaraman, S. (2006), who found that the computer based Multimedia Learning Packages were effective on performance and behavioral outcomes of students of different age groups, Sharma, A. and Sansanwal, D.N. (2002) who found that Video-based Instructional Strategies for Teaching Science were effective on achievement in science of class IX students, Panda, S.C and Chaudhury, J. (2000) who found that Computer Assisted Learning (CAL) was

very effective in Achieving Higher Cognitive Skills among students. Researcher gives the fact that the E-Content Strategy has promoted learning because it encourages students to take an active role in the learning process and have better control over their education. However, the overall value of E-Content in schools depends on: level of education; cost; availability of support, maintenance, and software; suitability and availability of curriculum; and national E-Content Strategy and commitment.

In the present study a significant effect of Interaction between Treatment and Intelligence was found on Achievement in Science when Pre-Achievement in Science was taken as covariate. The research by Khirwadkar, A. (1999) "Developing computer software for learning chemistry at Standard IX.", and, Rose, A. and Stella, V. (1992) "Effectiveness of Computer Assisted Instruction with Special Reference to Underachievers" also shows the similar results regarding the interaction between Treatment and Intelligence. The researcher confirms that students have different levels of learning and retention abilities. E-Content makes learning more effective, involving more senses in a multimedia content and more connections in hypermedia content. The E-content encourages learning at one's own pace. A number of self-assessment exercises allow the students to assess himself without an exam phobia. A lot of pictures, video, animations, and graphics all in full colour are used to make learning easier and pleasurable for below average students also. The E-Content Strategy offers many coloured, animated, and fully voiced and interactive sequences that a teacher can use to explain to student's concept that are difficult to explain through Conventional Strategy on blackboard. That is why the researcher has obtained that the students belonging to both Above Average Intelligence Group as well as Below Average Intelligence Group benefited significantly more through the E-Content than Conventional Strategy. Further, in case of E–Content, students belonging to Below Average Intelligence Group were benefitted more than those belonging to Above Average Intelligence Group.

CONCLUSIONS AND SUGGESTIONS

The study showed that the E-Content strategy has enhanced the achievement of students in science of E-Content group. Further E-Content Strategy has been more beneficial to Below Average Intelligence students when Pre-Achievement in Science was taken as covariate, on the whole for both Above Average Intelligence as well as Below Average Intelligence students, E–

Content was the most suitable when groups are matched in respect of Pre-Achievement in Science.

In India, the use of E-Content in education has remained almost completely unexplored. Very few numbers of studies have been conducted in this direction. Based on the findings of the current study, some of the suggestions in the area of E-Content are identified as follows:

1. Potential of E-Content should be utilized to enhance quality of education at school level.
2. Government should also establish E-Content portal in various organisations such as Institutes of Education and Research, Curriculum Wing, Test Book Boards, Curriculum Research and development Centers, and Education University. These departments may conduct research studies and make efforts to develop E-Content software.
3. Private organizations can step forward to educational software development if copyright act prevails and a system to check the software piracy is established.
4. Government should offer incentives for teachers who increase their proficiency in computer studies and contribute to enhance E-Content.
5. Teachers should be aware of preparation of ICT, motivate themselves to use ICT, should have faith in recent innovations in ICT and should actively participate in training related to ICT.
6. Personal with expertise in pedagogy and computer programming are needed to benefit from E-Content. Hence teacher education institutions are required to introduce courses to prepare teachers equipped with pedagogy and computer programming skills.
7. In-service teachers should be given computer literacy training through refresher courses. It is necessary to develop a culture for better utilization of computer in teaching learning process.
8. Institutions should have appropriate ICT and good physical facilities for using ICT.
9. Students should be allowed to use computers with Internet facility and information technology course should be a part of curriculum.

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