EFFECTIVENESS OF E-CONTENT PACKAGE ON TEACHING IUPAC NOMENCLATURE OF ORGANIC CHEMISTRY AT UNDERGRADUATE LEVEL

By

G. DEVENDIRAN * M. VAKKIL **

* Research Scholar, Department of Education, Periyar University, Salem, Tamil Nadu, India.
** Assistant Professor, Department of Education, Periyar University, Salem, Tamil Nadu, India.

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ABSTRACT

This study attempts to discover the effectiveness of an e-content package when teaching IUPAC nomenclature of organic chemistry at the undergraduate level. The study consisted of a Pre-test-Post-test Non Equivalent Groups Design, and the sample of 71(n=71) students were drawn from two colleges. The overall study was divided into two groups, an experimental group and a control group; and it consisted of (n=36) students in the experimental group, and (n=35) in the control group. The experimental group students were taught through an e-content package, whereas the control group students were taught via existing conventional methods of teaching. The initial results of the study revealed that the students in the experimental group achieved more in learning organic chemistry than the students in the control group. The final results of the calculated t–values from the study indicated a higher level of significance. And the research hypothesis, which was based on pre-test and post-test scores of the control group and experimental group in teaching IUPAC nomenclature of organic chemistry was accepted. Our findings showed a significant difference in mean scores between the control group and experimental group in teaching IUPAC nomenclature of organic chemistry.

Keywords: e-Content Package, IUPAC Nomenclature, Organic Chemistry, Undergraduate Level

INTRODUCTION

Technology refers to techniques as well as technical contrivances. It is the science of techniques and methods of creating or achieving results. And it relates to any arts, science, or particular profession (Kumar, 2008). In the latest and more modern classrooms, the cutting-edge development of computer and networking systems are changing the education scenario and transforming the teaching and learning process from the traditional to a more modern digital environment. It is through this form of technology that we use to teach a specific subject directly to a student, guiding the learner through a sequence of steps involving the presentation of information (Muthukumari and Ramakrishnan, 2017). Technology, thus results in new designs and devices as also new ideas and processes (Singh and Sharma, 2008). The use of technology in education results show increased effectiveness of the educational process. Thus, the use of technology in training show results with an increased productivity through enhanced human capability.

In the fifties, individualized learning became the focus of much research, and also became coupled with Skinner's behavioral psychology theories. This led to the development of individual learning packages. Skinner, in his many books; 'The Technology of Teaching,' (1968), and 'The Possibility of a Science of Human Behavior', (1953) and in his theory of Operant Conditioning, proposed that learning takes place through a cycle of stimulus, response and reinforcement (Mangal, 2007), which resulted in linear and branched programmed learning.

Through the use of computers in education, modern research has revealed that individual learning can take place with the advent of computers in education. These self-instructional methods encourage student involvement,

with emphasis on discussion sessions led by students or instructors. Informality, frankness, and student interaction characterize the sessions. Since students are encouraged to work toward self-expression and self-determination, formal assignments are seldom evident. Students are evaluated or evaluate themselves on the basis of participation, self-expression, affective development, and personal satisfaction. E-content is a very powerful tool of education. It is the latest method of instruction that has attracted attention of learners and teachers of all instruction systems (Mishra, Patel, and Doshi, 2017).

It is also a valuable resource for the development of an information rich society where everyone, irrespective of cast, religion, race, region, and gender bias are empowered to create, receive, share, and utilize information and knowledge for their economic, social, cultural and political upliftment and development. E-content has many advantages such as providing an authentic learning environment, skills are easily integrated, allows for self-paced learning (Sabna and Hameed, 2016). Technology incorporated teaching is more effective, especially when the student is more involved, and has enthusiasm and motivation. There are many exceptional methods and varieties of teaching aimed at developing the understanding of this learning skill.

Chemistry is the science of substances, their composition, structure, properties, and interactions. Chemistry helps us explain the physical world and its workings, and plays an important role in our lives. As a science, organic chemistry lies at the interface of the physical and biological sciences. We can use the study of organic chemistry to develop and apply basic skills in problem solving and to learn a subject of immerse practical value. Organic compounds have numerous nomenclature patterns for naming. Long before organic chemistry became an organized branch of chemical science, common names were in vogue. Now we follow IUPAC (International Union of Pure and Applied Chemistry) nomenclature for naming millions of Organic compounds. The IUPAC derives rules for naming such compounds in different ways. For students, who major in chemistry at the bachelor level, these concepts appear difficult to understand. Thus, this research paper attempts to show a study of these specific areas through an e-content package, and evaluate how the learning and teaching processes can be more effective.

1. Need of the Study

The need for the study came about through a disturbing trend on the standards of teaching and learning. And it's important that effective methods are used and tried to raise the standards of teaching and learning. Such as through the use of technological devices like e-learning resources, multimedia, computer assisted instruction, e-content packages and so on. This study was proposed in order to develop an e-content package toward a nomenclature of organic chemistry at the undergraduate level. Using a syllabus designed by Periyar University, the syllabus was reviewed in order to find out the effectiveness of the e-content package through experimentation and understanding of the nomenclature system among undergraduate students, with a major in chemistry.

2. Review of Literature

Karahoca et al., (2010) conducted a study on an interactive e-content development for vocational and technical education. Nevertheless, interactive and web-based content of simulation education may be a solution, especially when faced with a shortage of professional tools and space, or a shortage of teaching staff, and through the use of electronic content and the use of interactive training software education and traditional vocational technical education it may have a positive effect on students' success.

Johnson (2012) investigated an empowerment of science teaching competence of M.Ed., trainees through e-content with a Meta cognitive instructional design. The research revealed that e-content in science was effective in enhancing competency of science teaching. Through the use of a control group, plus an experimental group I and experimental group II – the study showed a significant difference in their science teaching competence.

Muppudathi and Pazhanivelu (2012) investigated the effect of e-content on teaching biology at secondary level. Their study was based on an experiment, and their results revealed that students performed better using an e-content method than conventional methods of teaching.

Shanmugaraja, Karthikeyan, and Jayaraman (2012) studied the effectiveness of e-content on teaching zoology at higher secondary level. Their result revealed that the performance of teaching through an e-content method is better than the Lecturer method in achievement.

Subramaniam, Nordin, and Krishnan (2013) explored a study of e-content development in engineering courses and showed that most of the students have the skills and internet facilities, either notes or printed module only, they also have a high level of willingness to learn through online methods, and they needed materials which are more motivating.

3. Objectives of the Study

Objectives of the present study are;

- To develop and validate an e-content package on teaching IUPAC nomenclature of organic chemistry at undergraduate level.
- To find out if there is any significant difference between the score of the pre and post-tests of the control group.
- To find out if there is any significant difference between the score of the pre and post-tests of the experimental group.
- To study the effectiveness of teaching IUPAC nomenclature of organic chemistry for undergraduate students through e-content over conventional method.
- To study the significant difference in the performance of retention tests in the control and experimental groups.

4. Hypotheses of the Study

Hypotheses of the present study are:

- There exists significant difference between the scores of pre and post tests in the control group.
- There exists significant difference between the scores of pre and post tests in the experimental group.
- There exists significant difference between the scores of post-test in the control and experimental groups.
- There exists significant difference in the performance of retention tests in the control and experimental groups.

5. Methodology

The present study comes under the purview of an experimental study and was conducted by employing a Quasi Experimental Design (Siddhu, 2000). The design used in the present study was based on the Pre-test-Post-test Non Equivalent Group Design.

5.1 Participants

For the present study a sample of 71(n=71) students were drawn from an undergraduate level. A sample of the study included 36 students in the experimental group and 35 students in the control group. Within the experimental group, students were taught through the newly developed e-Content package, whereas control group students were taught through an existing method of teaching used for IUPAC nomenclature of organic chemistry.

5.2 Instruments

For the present experimental study, an achievement test developed by the investigator and used as both a Pretest and Post-test respectively in the Experimental and Control groups. An e-content package, which was based upon the chapter "Nomenclature of organic compounds" (Morrison and Boyd, 2005; Murry, 2011) was utilized for treatment in the Experimental group. The total duration of the e-content package was thirty seven minutes.

6. Results and Interpretations

Data and results of the t-test done for the comparison of pre, post, and retention test scores of control and experimental group in respect of teaching IUPAC Nomenclature of Organic Chemistry are presented in the following.

From Table 1, it can be inferred that the calculated 't'–value 13.35 is higher than the tabulated value 2.021 at 5% level of significance. So the research hypothesis based on pre and post tests of the control group in teaching IUPAC nomenclature of organic chemistry is accepted.

Variable		Sample	Mean	Standard Deviation	t-Value	Level of Significance
Control Group	Pre test	35	16.08	5.79	13.35	*Significant
	Post test	35	35.91	6.6		

* Significant at 5% level

Table 1. Comparison of the Pre and Post Test Scores of the Control Group in Teaching IUPAC Nomenclature of Organic Chemistry

Consequently it was concluded that there is a significant difference between pre and post tests of the control group when teaching IUPAC nomenclature of organic chemistry. Therefore achievement in pre and post tests of control group are considerably increased when teaching through a conventional method.

From Table 2, it can be inferred that the calculated 't'–value 22.41 is higher than the tabulated value 2.021 at 5% level of significance. The research hypothesis based on the pre and post test scores of experimental group in teaching IUPAC nomenclature of organic chemistry is accepted. Consequently, the authors concluded that there is significant difference between pre and post test scores of experimental group in teaching IUPAC nomenclature of organic chemistry. Therefore, achievement in pre and post-tests of experimental group are considerably increased when teaching through e-content package as compared to the conventional method.

From Table 3, it can be inferred that the calculated t–value 7.7 is higher than the tabulated value 2.021 at 5% level of significance. So the research hypothesis, based on post test scores of the control group and experimental group in teaching IUPAC nomenclature of organic chemistry is accepted. Consequently, it was concluded that there is a significant difference in mean scores of the post test scores of the control group and experimental group in teaching IUPAC nomenclature of organic chemistry.

From Table 4, it can be inferred that the calculated t– value

Variable		Sample	Mean	Standard Deviation	t-Value	Level of Significance
Experimental Group	Pre test	36	19.66	5.85	22.41	*Significant
	Post test	36	45.51	2.8		

* Significant at 5% level

Table 2. Comparison of the Pre and Post Test Scores of the Experimental Group in Teaching IUPAC Nomenclature of Organic Chemistry

Variable		Sample	Mean	Standard Deviation	t-Value	Level of Significance
Post Test	Control	35	35.97	6.5	7.7	*Significant
	Experimental	36	45.51	2.8		

* Significant at 5% level

Table 3. Comparison of the Post Test Scores of the Control Group and Experimental Group in Teaching IUPAC Nomenclature of Organic Chemistry

Variable		Sample	Mean	Standard Deviation	t-Value	Level of Significance
Retention Test	Control	35	30.44	8.19	8.08	*Significant
	Experimental	36	43.08	4.07		

* Significant at 5% level

Table 4. Comparison of the Retention Test Scores of the Control Group and Experimental Group in Teaching IUPAC Nomenclature of Organic Chemistry

8.08 is higher than the tabulated value 2.021 at 5% level of significance. So the research hypothesis, based on retention test scores of the control group and experimental group in teaching IUPAC nomenclature of organic chemistry is accepted. Consequently, it can be concluded that there is a significant difference in mean scores of the retention test scores of the control group and experimental group in teaching IUPAC nomenclature of organic chemistry.

7. Findings of the Study

Major findings derived from the study are,

- There exists a significant difference between pre and post-tests of control group in control group in teaching IUPAC nomenclature of organic chemistry.
- There exists a significant difference between pre and post-tests of control group in experimental group in teaching IUPAC nomenclature of organic chemistry.
- Teaching IUPAC nomenclature of organic chemistry through e-content is better than teaching through conventional method based on the post test scores of control and experimental group.
- Retention level of undergraduate students in teaching IUPAC nomenclature of organic chemistry through e-content is significantly better than control group.

8. Discussion

The investigator prepared on e-content package on teaching IUPAC nomenclature of organic chemistry. E-content provides some new approaches to the aspects of intrinsically motivating learning. The present study found a more significant effectiveness of e-content on teaching IUPAC nomenclature. It enhanced the learner knowledge level which can to lead to creative thinking. The ultimate aim of e-content is to abolish disparity among the learners through effective education. This e-content method is a

variation from the traditional method and introduced new technological features such as images, audio, video, etc. Teaching through e-content is student centric. Post tests scores of control and experimental groups show that the e-content facilitated teaching is more effective than the conventional method. The retention test scores indicate students had a better long term memory in the experimental group rather than conventional method of teaching. Finally, the results of the present study shows e-content act as a good supportive material for teaching various critical units. And also teaching and learning process was more effective through technology centric instruction rather than conventional teaching methods.

Conclusion

The development of e-learning technologies i.e. e-content, multimedia, and so on, offer new ways in which learning can take place in the school and / or home environments. Adoption of technological tools for teaching learning in a regular classroom increase students' active involvement and learning. A technology rich learning environment can assist students as they develop understanding, cooperation, interest, self-directed learning, and curiosity. Technology enhances the teacher as well as students ability in terms of teaching and learning. It could be surmised from the study that the experimental group performed at a more significant level when compared to the control group.

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ABOUT THE AUTHORS

Devendiran G. is a Research Scholar in the Department of Education in Periyar University, Salem, Tamil Nadu, India. He got Educational qualification such M.Sc. (Chem), M.Ed., M.Phil. (Edu.), NET (Edu.). He got Rajiv Gandhi National Fellowship. His area of research is Educational Technology and Cognitive Psychology.

Dr. M. Vakkil is Assistant Professor in the Department of Education, Periyar University, Salem Dt, Tamil Nadu, India. He got educational qualifications such as M.Sc. M.Ed., M.Phil. (Edu), Ph.D. (Edu). He got rich teaching experience of 15 years and research experience of 9 years. He has published 3 books and 20 articles of National and International Journal. He organized 4 National and International Conferences. He attended and presented papers in 30 national conferences 8 international conferences and acted resource person for 10 educational workshop/conferences. His research area of interest is Special Education. He completed Two UGC Major Projects. He is the editor of Two journals.