Research Article

Effect of E-content in Biology Teaching

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ABSTRACT

A digital text and images are designed for display on web pages which are suitable for particular audience are called as "e-content." E-learning is a process and e-content is a product. For the e-content development aspect, each one is used to develop the phases', namely, analysis, design, development, implementation, and evaluation. Types of contents are based on three bases, namely, according to uniqueness; format and interactivity. The main aim of the study is to prepare e-content development and validate and to find out the effectiveness of e-content in biology subject. 348 Bachelor of Education samples were used. The author concluded that teaching through e-content was an effective manner and the application of e-content in teaching-learning process had a significant impact in biology.

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INTRODUCTION

E-content is the latest method of instruction that has attracted more attention to gather with the concept of models. The demand of e-content is likely to grow in future. In a classroom, technology stimulates the learner and gets the learner involved in the learning. Books are an extension of brain; video is an extension of eye; audio is the extension of an ear; audio conferencing is the extension of mind and vocal cord; computer is an extension of fusion on mind, hands, and eyes; satellite technology is an extension of human reach; and computer network is an extension of human cooperation.

E-content is digital information delivered over network-based electronic devices or prepared by the subject experts, i.e., symbols that can be utilized and interpreted by human actors during communication processes, which allow them to share visions and influence each other's knowledge, attitudes, or behavior. It allows for user involvement and may change dynamically according to the user's behavior.

TYPES OF CONTENT

Based on the desired outcome of education and the level of uniqueness of the content utilized by the organization, the researchers classify the type of content used during the teaching-learning process. All the contents are classified into three types, namely, according to uniqueness, according to format, and according to interactivity. Under each of these classifications come several factors.

According to uniqueness

The content become indicates an institution or organization specific the more customization it may require. Accordingly, such content falls into two different categories (a) off-the-shelf content and (b) customized content.

Off-the-shelf content

Such content works like magic in a box. Meaning that this content is pulled off the shelf to serve a purpose previously served by similar content. Usually, such content contains basic introductions to generic knowledge that applies similarly to different organizations. The cost of reusing such content is very low and requires minimum efforts.

Customized content

When off-the-shelf content is used but with minor modifications that help optimize the content to fit a specific organization it is classified as customized content. Such modifications are usually applied to the fine tunings of the content not the core content. This could be due to difference in languages, different cultures, differences in learner characteristics, etc.

According to format

After classifying the content as per the level of uniqueness, it is necessary to address the format of the content during delivery and specify whether the content will be designed

into textual content, audio content, video content, graphical content, animated content, and simulated content. (a) Textual content: This form of content is a traditional form of content that delivers educational knowledge in the form of text. (b) Graphical content: It is often a very smart way to deliver a message by having some sort of visual aid that matches what the text says. Graphical content is usually made of static images and graphs that communicate certain information to the learner. This method can have great impact in the retention of information by the learner.[1] (c) Audio/video content: Learning material can very much be communicated using methods of audio or video, by converting educational messages into such forms. Audio and video can be used in various ways to demonstrate material to learners that are best communicated through moving pictures. Sometimes, the best way to have a piece of information reside in the mind of its receiver is to let the learner see it happen in the form of visuals.[2] (d) Animated content: When educational materials are converted into an animation that depicts certain movements and actions to deliver capsule messages to the learners. Animations also allow user interaction to give the learner a better more realistic feel of the content and its secret key of difference lies in the word "interactivity" and (e) simulation content: The simulation of educational material varies greatly from simple simulations that require straightforward one action interaction versus complex situations that are put into simulation and require a complex of actions. Usually, simulations as a form of learning are used to help the learner acquire, enhance, or develop their skills and abilities.

According to interactivity

The interactivity of content must be assessed according to the level of interaction and the complexity. When two elements mutually influence one another than an interaction takes place. In the learning process, interaction is a vital factor for retaining more of the material acquired. Interactive content is designed to create a learning experience for the learner that changes their behavior to achieve an educational goal.

Such content is divided into two forms according to the level and complexity of interactivity; (a) low-level interaction: Instructional content with low level of interactivity may not achieve high level of education. However, such type of content is a desirable way to deliver learning material relative to plain textual content and (b) high-level interaction: With greater levels of interaction, the learner may interfere with the learning process by answering questions, interacting with an animation or going through a simulation, and it is bound to create higher levels of educational output.

IMPORTANCE OF E-CONTENT DEVELOPMENT

Several e-content development programs are introduced under the Ministry of HRD, Government of India, namely, National Programme on Technology Education Learning (NPTEL) by offering free online video lectures in engineering, science, and humanity courses. NPTEL is an open courseware initiative collaboratively started by seven Indian Institutes of Technology and Indian Institute of Science in 2016.

E-content and multimedia materials typically refer to the presentation of material in different forms.[3] The strategies have included powerpoint (Mayer, 2012), educational games(Nachimuthu, 2012),[4] and computer-assisted video learning(Vijayakumari, 2010)[1] in a variety of content areas, in addition to auditory and video media. Numerous studies in specific areas such as teacher education have produced significant results favoring electronic gadgets.[5] If we observe the students, they can utilize the following electronic gadgets; (1) listening to music; (2) playing PC and video games; (3) talking on iPhone; (4) sending text and picture messages; (5) watching videos and/or television; (6) using facebook, twitter, and LinkedIn; and (7) utilizing videos from YouTube, Skype, Yahoo, and Google messengers.[6]

OBJECTIVES AND HYPOTHESES OF THE STUDY

The objectives of the study are (1) to prepare e-content development and validate for biological science topic in teaching method of science at Bachelor of Education (B. Ed) level and (2) to find out the effectiveness of e-content in the science learning process. The hypotheses of the study are; there is no significant difference between the pre-test and post-test scores of control and experimental group in relation to their biology achievements.

SAMPLE FOR THE STUDY

Simple random sampling method was adopted in the experimental study. Moreover, the size of 348 B. Ed trainees with science background was selected among 4000 populations of 40 different B. Ed colleges in both the Namakkal and Salem District of Tamil Nadu State of Indian Country. In this study, the 1st year Bachelor of Education students were selected. Among the 348 samples, 174 B. Ed trainees have been selected for experimental group and remaining 174 for control group. The time was noted down as per the questions involved in the validated e-content and that scoring was taken as their achievement.

METHODOLOGY OF THE STUDY

In the experimental method, the data collected was put into appropriate statistical analysis of mean, standard deviation, and *t*-test. For this research, an e-content package for biological science-based content of "AIDS education" was prepared in Adobe software file in January 2016. The e-content document was validated by biology professors of Periyar University, Salem, in Tamil Nadu State of India, keeping in mind for the following criteria: (a) Technologically friendly; (b) learner friendly; (c) learner centric; (d) teacher friendly; (e) employing learner-centric pedagogy; (f) self-evaluative; and (g) object-based learning and teaching.

According to Dick and Carey, 2014,[7] classifies the e-content development models are as follows: (i) An instructional design model by Kemp, 1977; (ii) systematic approach model by Vernon and Donald, 1980; (iii) a Systematic Design of Instructional model by Dick and Carey, 1990; [7](iv) systems reusable information object strategy model by CISCO, 1999;

(v) ADDIE process model by DeSimone, Werner, Harris, 2002; and (vi) content-based model by Cernea, 2005. In this study, the ADDIE model was followed.

e-content duration has been estimated on the basis of the number of hours that are required to transact the content in the classroom. For example, a course in the classroom requires one credit and a credit is equivalent to 15 h classroom teaching. The content of a course will be taken as 15 h. On an average, undergraduate students have to take 6–8 papers in an academic year. Therefore, during the study period of 3 years, a student may take 18–24 papers. A paper shall comprise 40 modules each module of 1 h duration and to include production in "four levels."

That content generation levels are four areas, namely, (a) e-content, (b) e-tutorial, (c) web resources, and (d) self-assessment.

a. E-content: It includes textual document, PDF/E-Books/illustration, video demonstrations/documents, and interactive simulations wherever required;
b. E-tutorial: It includes video and audio content in an organized form, animation, simulations, and virtual laboratories;
c. Web resources: It includes related links, wikipedia development of course, open content on internet, case studies, anecdotal information, historical development of the subject, articles; and
d. Self-assessment: It includes MCQ, problems, quizzes, assignments and solutions, online feedback through discussion forums and setting up the FAQ, and clarification on general misconceptions.

ANALYSIS OF THE STUDY

The researcher prepared an achievement questionnaire related to the "Aids Education" unit part and that was found out with face validity and reliability (0.79). It consists of 50 questions with "yes" or "no" type. The researcher prepared three volumes of e-contents and stored in a single file as "aids education." The collected data were analyzed and interpreted with mean, standard deviation, and t-test. The statistical treatment was given to test the hypothesis and to find out that there is no significant mean difference in achievement of biology between the group taught through technological e-content method of teaching and the group taught through traditional method of teaching.

The Table 1 summarizes the comparison of pre-test scores of control and experimental group. The calculated "t" value 0.67 is less than the critical value of 1.96 corresponding to the 0.05 level of significance. Hence, the null hypothesis is accepted. This implies that the control group and experimental group do not differ significantly in their achievement in the pretest.

The Table 2 summarizes the comparison of post-test scores of control group and experimental group. The calculated "t" value 7.57 is greater than the critical value of 1.96 corresponding to the 0.05 level of significance. Hence, the null hypothesis is rejected. This implies that the control group and experimental group highly significant difference in their achievement in the post-test scores.

The Table 3 summarizes the comparison of pre-test scores and post-test scores in control group. The calculated t-value 1.31 is lesser than the critical value of 1.96 corresponding to the 0.05 level of significance. Hence, the null hypothesis is accepted. This implies that the pre-test and post-test scores of control group do not differ significantly in their achievement.

The Table 4 summarizes the comparison of pre-test scores and post-test scores in experimental group. The calculated "t"-value 8.29 is greater than the critical value 1.96 corresponding to the 0.05 level of significance. Hence, the null hypothesis is rejected in this pretest and posttest. This concludes that the experimental group differs significantly in their achievement in the pre-test and post-test scores

FINDINGS OF THE STUDY

Advantages of e-content development are to be meaningful and must be able to make a difference, i.e. from being unknown to known, from being known to being better understood, from being understood to providing enlightenment, and from being just stored knowledge something that is shared and made available to others. There are two forms of e-content, namely, short learning objects (SLOs) and modules. SLOs are a new

Table 1: Comparison of control group and experimental group in pretest

Gender	n	Mean±S.D	t-value	Significance
Control group (pre)	174	73.26±9.46	0.6662	0.05 level
Experimental group (pre)	174	73.94±9.58		

SD: Standard deviation

Table 2: Comparison of control group and experimental group in posttest

Gender	N	Mean±S.D	't' value	Significance
Control group (post)	174	74.62±09.84	7.5686	0.05 level
Experimental group (post)	174	82.86±10.46		

SD: Standard deviation

Table 3: Comparison of pre-test and post-test scores of control group

Gender	N	Mean±S.D	't' value	Significance
Control group (pre)	174	73.26±9.46	1.3143	0.05 level
Control group (post)	174	74.62±9.84		

SD: Standard deviation

Table 4: Comparison of pre-test and post-test scores of experimental group

Gender	N	Mean±S.D	't' value	Significance
Experimental group (pre)	174	73.94±9.58	8.2954	0.05 level
Experimental group (post)	174	82.86±10.46		

SD: Standard deviation

way of thinking about learning content. They are much smaller units of learning, typically ranging from 2 to 3 min. It may be a description about an item, equipment, a concept, a process, or an activity. Modules are larger independent structural experiences, containing objectives, learning activities, and assessment. In other words, it is a comprehensive package containing a lesson. It contains lecture modules with inbuilt visuals, text, quiz, FAQs, assignments, glossary, case studies, references, discussion, and download. The output is deployable on the web or compact disks.

The findings of the study are as follows: (a) Teaching through e-content is effective; (b) while administering the e-content to the B. Ed trainees, it is found that e-content promotes active participation; (c) the e-content is found to have a beneficial effect on the learner achievement as a result of the unique combination of tutorial interactive and visual capabilities; and (d) educational e-content materials were created more achievements in B. Ed level because of self-learning strategy, particularly in science classrooms. The e-content package makes and stimulates each student's individual or self-paced with enjoyable learning process in their subjects. E-content package encourages cooperation and active learning and promotes students' own pace of learning. In e-content method, they will exchange their knowledge with each other so that at the end of the learning process, the students will get the complete information about the unit.

CONCLUSION

Any content product available in a digital form and it typically refers to music, information, and images that are available for distribution on electronic media is called as e-content.[8] For the e-content development aspect, each one is used to develop the following phases of ADDIE model, namely, analysis, design, development, implementation, and evaluation. A digital text and images designed for display on web pages which are suitable for particular audience are called as "e-content." E-learning is a process and e-content is a product. This approach of teaching has become an answer to the complicated problems and unidentified areas.

We are in need to innovative our work in preparation of e-content material as a form of digital literacy in educational settings, particularly to investigate the implications of new forms of social networking, knowledge sharing, and knowledge building. The application of e-content in teaching-learning process will have significant impact. E-content is generally designed to guide students through lot of information in a specific task. The quality of learning depends not only on the form of how the process is carried out but also on what content is taught and how the content is presented. As the technology becomes user friendly the creation of e-content by teaching community will be much easier. Hence, in future, teachers can get adequate practice in this field and to develop more e-content for teaching-learning process.

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