Development of E-content Module and Measuring Effectiveness in the Topic Understanding ICT and its Application at B.Ed Level

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Abstract--- In today's education system, electronic content is gaining more attention, because it is effective for pupils and supportive of instructors working with individualized instruction systems. The main objective of the research was to measure the effectiveness of E-Content module intervention so an e-content module was developed, validated, and evaluated in the teaching of ICT and its Application to students of Bachelor of Education.A single group design was used for the pre-and post-tests. We selected a sample of 52 student- teachers from B.Ed College using a simple random sampling technique. Research tools such as E-Content Module and an achievement test were used to collect data. Effectiveness was measured by administering achievement test before and after the e-content module intervention.From the findings of the research, it emerged that E-Content in the teaching leads to higher achievement among B.Ed students so, teachers educators should use electronic content in order to develop interest to study among the prospective teachers.

Keywords--- E-Content Module, Effectiveness, B.Ed Students, Validation, Intervention.

I.   Introduction

An online content lesson is normally created to guide students through various information or to assist them in performing specific tasks as a result of the complicated modern, social, and economic conditions. And nowadays an Electronic–content module packages can be used as a teacher in the virtual classroom situation. The teaching process can be made more efficient by utilizing electronic content. Personalized instruction is made possible by e-content. Regarding to the intricate recent conditions such as social, economic and explosion of the population this type of content is generally developed and designed to channelize the students through the provision of information and help them to handle the specific task. In the virtual classroom an electronic content can be used by a teacher, and its usage can minimized the finance, time and burden of the teacher in educational process, it is also smoothened the progress of individualized instructional process. Images, text, animation, audio, video, graphics all are the elements of an e- content and content may contain either of these elements or a combination of these elements that can be displayed offline or on online web pages that can be easily transferable to one to another computer.The learning of the students can be enhanced and they become progressive by the use of e-content method in classroom teaching (Mishra et al, 2005). In other study on the development and validation of an e-content on the topic recombinant DNA technology in Biotechnology (Felix, 2007).) E-content is an effective tool for teaching and more effective than the traditional method (Farookue, 2008 Dilek 2010; Tekin and Polat, 2016). Mathematical thinking can be promoted by techniques that are suitable for mathematics teaching by giving them a suitable environment (Jaleel,2015). The effectiveness of an e-content package when teaching IUPAC nomenclature of organic chemistry to undergraduate students was measured. Applying the cognitive theory of multimedia learning properly at the same conditions, as applied in this study in the educational process will significantly reduce the cognitive overload associated with learning through e-content multimedia elements and improve student achievement (Hamdi &Hamtini, 2016).

The results demonstrated that there is a significant difference in mean scores between the control group and the experimental group (Devendrian, 2017). E-content module is an effective way of teaching of mathematics education among B.Ed. students (Albina, 2018).Development of e-content module for Chemistry Massive Open Online Course (MOOC) was better option to teach and findings of the study reflected that e content module had higher validity,

reliability and students perceived it as a superior and beneficial online resource for higher educational institutions (Hamid, Lee, et.al 2021). there were various issues involved in teaching and learning process that includes pedagogical issues, constraints of time and space, etc. and these challenges can be overthrown by introduction of electronic content in educational institutions(Nachimuthu, 2012). Research results disclosed that students having better browsing habits learnt better through the e-content intervention than those who had not any browsing habits (Kannanand Muthumanickam, 2010). This digital content includes text, audio, video, images, animation, and visual effects that are delivered over the internet, via satellite broadcast, or on mobile devices. E-content is student centered. Technologists and academics must collaborate in order to develop E-Content or Knowledge Packaging. Considering this, teachers must be skilled in developing e-content that helps to teach students while keeping in mind their individual differences and it must be able to work in a synchronous mode in case the teacher isn't available.E-content includes motion pictures, audio, animation, video graphics, text and that appeal effectively to the senses of students, making them more involved and motivated in the e-content learning experience. Student engagement is the key to e-content learning. Students' needs and interests are taken into account when designing materials and activities. The e-content is an interactive way to involves students in learning. E-content can take place anytime and anywhere. You can access e-content at any time and from anywhere. Students with special needs can also take advantage of the content. It also provides a consistent and effective training experience.There are many studies conducted on e-content like Felix (2007) Nivetha, V.(2008),Dilek(2010), Amutha(2016) and Albina (2018).From the review it was found that e-content proved to be an effective medium of instruction in teaching- learning process. Many studies were conducted in India and abroad but the literature that specifically focused on the development, validation and intervention of e-content was not sufficient and most of the research concentrated in southern region, in Jammu and Kashmir no such study was conducted earlier, so an investigators decided to conduct the study on electronic content in her region. The investigators decided to develop and validate the E-content in the understanding ICT and its application.In order to provide an effective method in teaching,the investigator decided to develop the E-content material that includes audio video and text to teach effectively at B.Edlevel further to analyze the effectiveness.

Objectives of the Study

a) To develop and validate an E-Content Module in the subject understanding ICT and its application.
b) To study the effectiveness of E-Content Moduleon the achievement ofB.Ed. students.
c) To study the educational implications of E-Content Module.

Hypothesis of the Study

a) There will be no significant difference in pre test and post test scores of achievement test of B.Ed. after e-content module intervention.

II. Material and Methods

Population: It consisted of B.Ed. students of Jammu Distt.

Sample: The sample consisted of 52 B.Ed. students.

As the research was experimental, many colleges not allowed an investigator to conduct study. So one B.Ed. College, that allowed for intervention I.E., Dogra College of Education, Bari Brahmna, affiliated to university of Jammu was selected for the study. The research was experimental in nature, in which the investigator employed a single group experimental research designs. Only one group was selected as the experimental group. The experimental group was presented with an e-content module. Single group pre–post experimental design was used. The content that investigator wanted to teach was already taught to students by their teacher through traditional method. Achievement test was given to the students for the pre experimental testing of the knowledge. After the previous knowledge testing in pre-test an electronic content module was confronted by the students and again an achievement test was given to B.Ed. students after the seven days of the module intervention.

Table 1:Depicting Brief Experimental Design

PRE TEST	E-CONTENT MODULE INTERVENTION	POST – TEST

Table 2: Showing Detailed Research Design

STAGES	DESCRIPTION
Identification stage	The first stage involved identification of subjects for the study and finally drawing out sample.

Pretesting stage	This phase involved administration of the criterion test.
Treatment stage	The second stage lasted for 8 days. In this stage the experimental group was given treatment that is e-content module by the investigator.
Post testing stage	After the treatment stage the criterion test was again administered to the experimental group for the post testing.

Development and Effectiveness of E-Content Module

*Sampling Technique Used***:** Simple random sampling technique was adopted for the selection of sample.

*Descriptive Statistics***:** Mean and standard deviation of the raw scores of the pre-test and post-test scores of the subjects were employed.

*Inferential Statistics***:**Pearson coefficient of correlation and CR was calculated in order to test the hypotheses of the study.

Research Instrument

There were basically two research instruments used in the stud that are E-contentdevelopment and objectives of E-content development.

Phases of Development of E-Content

- *Analysis Phase*
    - *Selection of a Unit***:** In order to develop an e-content module, the investigator selected a Microsoft office topic after consultation with teachers.
    - *Content Analysis***:** Content analysis helps the teacher in identifying all the concepts, definitions, information points, tools, examples, formula, diagram, illustrative graphics, etc., related to the content**.**
    - *Entry Behavior***:** Before developing any e-content, vocabulary, learning style, needs, conceptual level, and comprehension level of the learners should be taken into account.
    - *Specification of Objectives***:** After selecting a suitable topic, and analyzing it, the instructional objectives can be determined keeping in mind the earlier learnt capabilities of the learner group both in terms of their previous knowledge and other competencies
    - *Development of Evaluation Measures:* In order to evaluate the students' performance before the intervention of e-content module a pre-test is required so a criterion test was prepared by the investigator.
- *Designing Phase*

In developing a modular structure, the e-content module developer identify the title of each module, objectives and the combination of presentation methods most suitable.

- *DesigningFrames***:** There were three types of frames designed- Criterion, Teaching and Testing Frames. This is a test of the learner's knowledge. Therefore, a criterion test was given to the students in pre-tests.Teaching frames contain all the information related to the topics with audios and videos supporting with assessment tests after every session. A criterion test is given to the student after the completion of the e-content module.
- *Preparing Screens with Reference to Actual Programming***:** Various tools were used to prepare the e-content module. These were Text, Graphics and colors, Timing, Animation, Sound, and video.

III. Programming Phase

Once the final screen layout is ready E-content preparation is almost over. To execute the E-content one needs tools for execution. To execute the e-content presentation tool was used.

IV. Validation of E-Content Module

Based on the subject experts, educationists, and experienced teachers' suggestions, the topics were selected from B.Ed. syllabus. The topic Microsoft was selected by the investigator.

Expert Validation: For the validation process, the investigator had consulted subject experts, educationists, and experienced senior teachers for the development of E-Content.

Individual Try Out: After the validation from the experts, the E-content was given to the target group students. It was tested on twenty individuals separately. This could be achieved by identifying and removing the words and concepts that were problematic.

Pilot Testing: In pilot testing E-content module was tested with a group of students. The investigator did pilot testing on 30 students.

Development of Script for E-Content Module

The investigator drafted a script for the e-content module after consulting with experts. The script served as the basis for the development of an e-content module for the subject unit. Scripts were provided to teachers so that they could verify the accuracy of the content.

V. Construction of Criterion Test

Criteria tests are used to assess the level of competence of the individual. Academic tests can be used to determine an individual's level of competence. In this study, we will examine the effectiveness of E-Content. Based on Bloom's Taxonomy, the investigator constructed a test tool to assess the effectiveness of developed E-Content.

VI. Validation of the Criterion Test

Validation is a very important phase in the construction of the test. As the investigator developed an achievement test, therefore to validate it the content validity was used.

Phase 1: Preparing Rough Draft

Criterion test was prepared by the investigator. The content of the test was Microsoft office that includes MS power point, MS excel and MS word.

Phase 2: Expert Validation

After the criterion test was constructed the investigator established the face validity and the content validity of the tool. For this the draft of the criterion test is circulated among the subject expert, teachers and language experts for acquiring their suggestions. Experts suggested a number of changes in the criterion test and on the basis of their suggestions some questions were modified, some were deleted and some new items were incorporated in the criterion test.

Phase 3: Try Out

After incorporating necessary changes the investigator approached some B.Ed. student-teachers and criterion test was distributed for trial on those students. The questions that were not clear, the investigator modified them clear.

Phase 4: Pilot Testing

When the investigator constructed the tool she applied the pilot testing on the 30 B.Ed. students and they respond positively to the criterion test.

Phase 5: Finalisation of the Criterion Test

After the expert validation and pilot testing the criterion test was finalised. And ready for administration on the students.

Measuring the Effectiveness of theE-Content Module

To measure the effectiveness of the e-content module 52 B.Ed. students were selected. Pre-test post –test experimental design was applied to students.

Phase I: This phase began with the permission of the B.Ed. Principal and taking pre-test of the students.

Phase II: After the conduction of the pretest the investigator involved the student to the E-Content module intervention.

Phase III: After the completion of the instructional treatment I.E., E-Content module of eight sessions, the subjects were administered the post test (criterion test).

Table 3: Depicting the Mean Scores and Level of Significance of the Experimental Group

Experimental	*Situation*	*Mean*	*S.D*	*R*	*T value*	*Result*
Group	Pretest	25.4	6.14	**r =0.0996**	**10.27****	**Hypothesis is rejected**

	Posttest	42.5	3.29			

VII. Results and Discussion

Based on the pre and post test scores of experimental group in subject, it was evident that the t value was 10.27 at the 0.01 level of significance. This is more than the table value, I.E., 2.98 at 0.01 level of significance. Thus, at a 0.01 level of confidence, the difference between the maximum scores of the experimental and control groups on the achievement tests is significant. Therefore hypothesis was rejected. The findings of the study were in agreement with the Tekin, A., Polat, E. (2016), Nivetha, V. (2008) and KannanandMuthumanickam (2010) Prabakaran &Saravanakumar (2020) where it was found that electronic content boost an achievement of learners. where as it is in disagreement with the Hareton K.N. Leung (2003) Smith, S. B, et al., (2000) and Schnitman, I. (2007).From the table it comes to know that mean value of post test score is 41.5 which more than the mean value of the pretest which is 26.4. It means that there is a positive effect of e -content module intervention on the achievement of B.Ed students. Because these systems are online, students can study any course or subject at any time, from anywhere around the globe. Using this system may allow both the teachers and students to save time, money, paper, etc. and increase accessibility for faculty and students alike. E-learning has become more important as a result of recent changes in technology and lack of time. The course contents can be digitized and made available on the web by using a Content Management System (CMS) so they can be used anywhere, at any time, by the researchers, instructors, and students participating in the course (Sinha and Sahay, 2017). In an e-content system, students are at the center. Student needs and interests are considered when designing materials and activities. Electronic content is interactive. The student may access online resources at any time. The content can also make colleges more engaging for students who have special needs. Additionally, it provides uniform and effective training.Students are encouraged to actively participate in the teaching and learning process while using e-content, which is a self-instructional learning method. Learning from e-content differs significantly from learning through lecture-based methods, and learning through e-content is perceived to be more beneficial and efficient than traditional lecture-based methods (Khan, 2019). E content can be alternative of chalk and talk method some of the instructor found that it saves time for discussion, questioning, and problem solving approach. It is an effective method for content delivery. As intraditional classroom some students are shy they cannot put questions to students (Joshi, 2017).E content is boon for them as they can ask question in discussion forums in e-content course. Research concluded that students who used digital learning had higher levels of motivation for learning than those who used traditional teaching methods. Moreover, it significantly improved learning outcomes compared to traditional instruction. Moreover, it significantly improved the learning outcomes(Lin, E.T AL., 2017).Interactive and web based simulation is the main factor for increase in achievement scores of students (Dilek, 2010).

Findings of the Research

On the basis of interpretation of the results drawn in the present study, the investigator lay down the following findings:

1. There was a significant difference in pre-test and post-test scores of achievement test of B.Ed. students after E-Content Module intervention. It means there is a difference in the pre-post test scores of achievement test of student teachers.
2. The intervention of E-Content Module made achievement scores higher in post-test than that in pre-test scores.

Educational Implications of the Study

1. The findings of the investigation revealed that there is a significant effect of e-content module on the achievement of the B.Ed. students. Developing digitalized content suitable for the B.Ed. curriculum is the need of the hour.
2. The outcomes of the study revealed that a very powerful tool in education is electronic-content. Students as well as teachers benefit from e-content, regardless of the system they use for instruction. The use of more computer simulation programmes such as animation, flash movies, sound effects, text, and videos, creates an interest in the learner. When the interest develops students take an interest in them and effective learning takes place.
3. Education institutions may distribute developed e-content to students and teachers as a means of enhancing and enhancing the teaching and learning process.

4. E-content is really beneficial to learning. We may use this facility at any time and at any location. E-content learning promotes critical and active learning. With e-content materials, the learner and teacher will recognize that they are transitioning from fact providers to facilitators of learning environments.

5. The usage of E-content is altering teaching in a variety of ways. Teachers can build their own content using E-content.

6. E-content can significantly aid the scientific investigation process, and innovative use of such technologies can assist student-teachers in grasping the different options available in science education teaching. E-content and its use should be encouraged in order to make scientific knowledge learning more fascinating.

7. Using e-content will manage an increase the strength of the classroom, lessen the weight of the syllabus, and eliminate harsh competition.

VIII. Conclusion

E content is undoubtedly head and heart of teaching learning process. but development of e content is not an easy process, it require heavy expertise in subject area,selection of the content, patience while creating content, creativity in integration of interactive elements in content, sequencing of the content,analysis of the material to be presented to the students.As we know that people retain only 20 percent what they hear and 50 percent of what they hear and see.And 100 percent what they hear, see and do. E-content consist of interactive elements like videos, audios, animations, textual material, students can choose any one of the elements that is more appealing and interested to the students or they canuse all theelements of the module for better and long lasting learning.

Recommendations

Investigator conducted only single pre- test, post-test experimental designother researcher can take two groups control and experimental group.Same study can be conducted on college and university students and may be taken up with reference to developing E-content in different school subjects. Effectiveness of module can be tested with teacher support and without teacher support method. Attitude of Teachers and students towards teaching and learning through E-content may be studied. A study may be undertaken to find out the effectiveness of E-content through synchronous and asynchronous mode.

Acknowledgement

Without the exceptional support of my supervisor, Dr. Kiran, the research foe this paper would not have been possible. I was indebted to her enthusiasm, knowledge, and careful attention from the beginning of this research. This study would not have been possible without the time and valuable input of the participants.

Contribution

Ms. ReechaJrall: writing, conceptualization, review, experimentation (data collection), analysis.

Dr. Kiran: Drafted the highlights of the research along with providing the literature and relevant guidance. Conceptualization, reviewing, writing and editing, both authors have read and agreed to publish the version of the manuscript.

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