Impact study of e- content on teaching Learning of science

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Abstract:
Now days E-content is becoming very pleasant thanks to its flexibility of our time, place and pace of learning, E- contents include all reasonably contents created and delivered through various electronic media. Today the complete world is moving speedily towards digitization and that we are imagined to learn new things using new advance technologies. Through these technologies we will inculcate required knowledge, critical thinking, tolerance, commitment and values in both teachers additionally as in students which are more essential for surviving in present world which adversary tormented by pandemic covid-19. As modernization and techno creation of faculty education is on and also the students are switching from textbooks to digital course materials which the foremost needed in times. As big variety of digital materials which are available freed from cost or with minimum restriction s are often used, re-used and modified by teachers and students for his or her teaching and learning .these materials provide greater interactivity and social collaboration to both teachers and students. E- Contents (e-contents) which is additionally referred to as content refers to the content or information delivered over network based electronic devices or that's made available using electronic network like internet well developed e-content are often delivered over and over to different learners, individual course components .i.e. units, lessons, and media elements like graphics and animations may be re-used in numerous contexts.

The study reveals that e-contents are very effective and useful for teaching-learning of science. The sample of the study consisted of fifty in-service teachers who attended the training programme on the Promotion of ICT in teaching of science at secondary level organised by Regional institute of Education, Ajmer. The participants were invited from Northern region of the country who is working as science teachers in numerous schools located in tribal areas. Most of the sessions during the programme were delivered through different devices and using various modes of ICT. The programme was evaluated by conducting achievement (pre-post-test and post-test) test containing test items supported science contents at secondary level. The analysis of the Pre and post-test indicated that the programme was found useful and effective by most of the participants.

At the edge of the programme, feedback was also taken from the participants and it absolutely was found that ICT based approach for teaching of science is quiet and effective than the traditional method.

Key Words: Information and communication technologies, e-learning, multi-media, effective teaching, in service programme, Achievement test.

I. Introduction

Now days E-content is becoming very modern due to its flexibility of time, place and pace of learning, E- contents include all reasonably contents created and delivered through various electronic media. ICT innovations have opened new doors in every profession and section of society across the globe. The advent of electronic mail, personal computers (PCs), the Internet and their application to education has yielded amazing results. The health of every country's economy, whether existing or emerging, depends heavily on the amount and quality of education it offers to its workers[1]. Puentedura's (2014) SAMR model, redefinition refers to when technology allows for the creation of previously inconceivable tasks[2]. E-learning is a new method of teaching and learning. It gives guidance which is provided Electronic media, including Internet, Intranets, Extranets, Satellite Broadcasts, Audio / Video Tapes, Interactive TV, and CD-ROMs[3]. E-learning's effectiveness depends on how learning is done, that is, the underlying The real worth of e-learning and pedagogy lies in the ability to apply its attributes to Enable the right people to attain the best skills and experience at the right time. It is understood that e-learning has the power to transform performance, knowledge and landscaping skills[4]. e - Learning provides access to appropriate and valuable information for everyone, at any time wherever and when. The development and distribution of today the complete world is moving speedily towards digitization and that we are speculated to learn new things using new advance technologies. Technology can be a valuable method for learning transformation. It will help to improve and advance partnerships between educators and students, rethink our approaches to learning and collaboration, eliminate long-standing inequalities in equity and accessibility and adapt learning environments to fit all learners' needs[5]. Through these technologies we will

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inculcate required knowledge, critical thinking, tolerance, commitment and values in both teachers also as in students which are more essential for surviving in present world which adversary littered with pandemic covid-19. As modernization and techno creation of faculty education is on and therefore the students are switching from textbooks to digital course materials which the foremost needed in times as advanced and moderate method for classroom process. As big variety of digital materials which are available freed from cost or with minimum restriction s will be used, re-used and modified by teachers and students for his or her teaching and learning .these materials provide greater interactivity and social collaboration to both teachers and students. E-Contents (e-contents) which is additionally referred to as content refers to the content or information delivered over network based electronic devices or that's made available using network like internet well developed e-content are often delivered repeatedly to different learners, individual course components .i.e. units, lessons, and media elements like graphics and animations is re-used in numerous contexts. The ICT initiatives for School education in India within the framework of policy perspectives were explored the challenges of implementing these initiatives at ground level[6]. The aim of e-contents development is to form vibrant and digitally sound rich society. Everyone in society is empowered to form, receive, share and utilize information for his or her progress. Viewing all the parameters The MHRD NCERT initiates the task to develop e-content in science at secondary stage and assigned it to Regional institute of Education, Ajmer.

There is a growing importance of ICT based teaching learning resources within the varsity curriculum. As ICT based resources not only supports teaching and learning within other curriculum subjects, but it's also a theme in its own as a separate discipline and learning takes place in better ways[7]. The utilization of ICT based resources provides opportunities for pupils to figure both collaboratively and independently. As such, the role of ICT within the curriculum isn't only to reinforce the educational experiences of pupils but also to assist they develop the abilities essential to participate effectively within the world of affairs. It generates avenues for working in groups developing solidarity, cohesion, and social values. ICT based resources as a crucial tool will be potentially utilized for creating teaching-learning effective. Research studies on the effectiveness of ICT resources / e-contents in classroom teaching-learning show that it's a positive impact on students' academic achievement[8]. National curriculum framework (NCF) -2005 emphasizes that the greater the range of pedagogical approaches employed, the broader are the range of learners' reached. One among the themes for brand spanking new National Policy on Education is promotion of knowledge and communication technology systems at school[9]. Hence there's must enhance the employment of ICT and its resources in teaching-learning of Science at secondary level. National curriculum framework (NCF) 2005 the new concepts of teaching learning have suggested that student should lean freedom and opportunity to be told consistent with their capacity, interest and pace. Teacher should act as a facilitator only or as a guide not as a coach or lecturer[10, 11]. The new role of teacher is:

- To provide sort of learning situations to learners
- Ensuring active engagement of every child in learning
- To engage learners to match, debate, share and learn from one another, and to supply help only if learners provoke it.

NCF-2005 gives the standards for Ideal science curriculum for various stages viz. primary, upper primary and secondary, and better secondary.

(i)   Primary Level

At this level the fundamental objective of science and social science teaching is nurturing the curiosity and exploring the globe around them by using cognitive and psychomotor skill through observation, classification, and inference. At this stage science and scientific discipline have integrated as environmental studies.

(ii)   Upper Primary Level

NCF 2005 suggests that child at this stage should be engaged in learning science as a composite discipline and systematic experimentation as a tool to discover/verify theoretical principles. There are some instances should be developed for classroom process to be organised with hand on experiences.

(iii)Secondary Level

At this stage students should engaged in learning principle of science through familiar experiences and dealing with hands to style simple technological units and modules.

(iii)   Senior Secondary Level

At this stage science should be introduced as a separate discipline with emphasis on experiments/technology and problem solving. The learner should be also be given free choice to choose the

topic of their own interest. Core topics of a discipline should be carefully identified and treated with appropriate rigor and depth. To incorporate and enrich the capacity of in-service teachers a step with ICT based teaching approach have considered best, Capacity building programme for Science key resource persons (KRPs), and invited from northern states of country. The programme was designed in way to in keeping in sight the advice and guidelines of NCF 2005, and to strengthen in-service teachers via capacity building programme under the jurisdiction of RIE, Ajmer.

(iv) Challenges in ICT /e-contents based teaching learning:

There are some challenges which make the barrier in adopting ICT based teaching learning as given bellow as:

(a)School concerned:
- Most of faculty don't have the desired ICT infrastructure
- More emphasis is laid down on completing the syllabus instead of on making teaching learning more practical by using activity based/ICT based.
- Most of faculty feels that the traditional method is more comfortable for students
- There may be a lack of access to ICT at their respective institution
- Most of faculty don't have enough digital teaching learning resources.
- There is lack of professionally developed teacher within the field of ICT.

(b).Teachers concerned:
- Lack of ICT enables skills
- Lack of to incorporate technological pedagogical skills in teaching learning practices
- Lack of stage specific e-content knowledge and related pedagogical skill
- They are unable to spot proper ICT tool for content delivering at school room
- They do don't have interest and awareness with relation to new innovations in teaching learning process.

(c).Student concerned:
- Students don't use the essential skills of ICT
- They don't have access to need ICT related tools outside the college campus
- They don't have awareness about ICT related tools

II. Methodology

Objectives of Study:
- To sensitize KRPs and In-service teachers regarding ICT/e-contents and its application
- To orient them in using and creating ICT/e-contents resources
- To study the impact of ICT/e-contents in their teaching-learning process

(ii) Objectives of programme:
- To identify the concepts/ topics to form a set of educational resources.
- To identify and build useful e- resources for the identified concepts.
- To develop e- content in science for sophistication X.
- To identify gap (if any) with relevancy e- content in mapping.
- To select appropriate media for the event of e- content wherever required.
- To upload the content untidy with CIET.

(iii). Development of e-contents:

Keeping in sight the event of e-content material collectively of the priority areas of NCERT and providing e-content to confirm active, interactive, and participatory interesting and effective teaching learning resources for college kids, teacher and teacher educators the programme was planned. The scripts for all the chapters of science NCERT text book at secondary class were developed in workshop mode for e-contents.

(A)Development of scripts in workshop mode:

Five days workshop for development and review of scripts on identified concepts of science text book of secondary level was conducted during September 11-15, 2017. In the said workshop the scripts were written, discussed and edited for finalisation. In the said workshop the experts were invited from University, college and schools to participate significantly and contribute in the process of development of e-content.

(b).Recording of e-contents:

Based on developed scripts the recording of e- contents was completed with the help of subject experts identified as presenter with the furtherance of studio technical team in around five months (January 2018 to April 2018). A tentative schedule was prepared for recording of e- contents based on availability of presenter and resources. We have also involved the scholars of institute studying in different programmes during

recording process. Once the recording has completed the editing was done with the supervisory of subject experts and incorporate the suggestion in vetting workshop.

(c). Future plans and dissemination of e-contents:

The developed e- content sent to Central Institute of Educational Technology - NCERT for further reference and share among public domain for tryout and facilitation. Finally the recommended programmes were uploaded on institute channel. These developed materials we've been used during training programme of in-service and pre-service teachers and teacher educators at RIE, Ajmer

(iv). identified the content and after discussion with KRPs an intervention was made by the investigator/ different resource persons through ICT /e-contents and its devices on various topics of secondary level like chemical reactions, acid, base and salts, periodic properties, animal and plant cells, nutrition in animals and plants, animals and plants physiology, environment, electricity, reflection and refraction of lights, magnets and energy sources etc.

(v). Sampling: The present study was administered during the capacity building programme in science teaching through ICT/ e-contents which was organized at RIE, Ajmer for in-service teachers and Key resource persons (KRPs). In numerous academic sessions, tools were administered on around 50 KRPs of various states including Rajasthan, Uttrakhand, Uttar Pradesh, Punjab, Haryana, Himachal Pradesh, Jammu and Kashmir, Chandigarh and Delhi. The Tool which used for data collection is self-designed questionnaire which was covered three types' questions like outlook about ICT /e-contents, knowledge about ICT/e-contents, use of ICT/e-contents. Purposive sampling technique used for data collection and the character of study is experimental. The study is single group pre-test and post-test based design. The results were calculated on the premise response given by in-service teachers and these percentages are wont to compare the results of pre-test and post-test. The Key resource persons who participated in the capacity building programme were involved in the teaching learning process and faculties. So that they are expected to be vast in subject content approach and constructivist class was held with them. The participants of every training programme were divided in group of six KRPs each. They were explained the various topic concerned with science text book at secondary level by using different mode of ICT/ e-contents like small video clip that we've got recorded within the studio itself et al like videos, CD, DVD, films, open resources available free on internet. We have tried to produce opportunity to KRPs to use ICT integrated resource materials for teaching of science in school room situation and also try and make them enable that how to develop e-content/ICT based materials of Science at local level by minimum available resources. During the programme the developed e-content of science contents (Class IX and X) at secondary level were also prepared with the collaboration of subject expert involving participants/in-service teacher, pre-service teachers and students of the institute within the audio –video studio of institute and at end of programme the entire training materials in soft copy form was given to participants for his or her future use at school room situation and reference.

III. Results And Discussion

From the post test and written feedback taken from the participants (KRPs) it should be concluded that ICT based approaches very helpful in effective and useful learning of science in Indian contexts. It's clear from the feedback received from key resource persons or teacher about different session within the different programme that by using ICT based teaching and learning we will easily understand and explain the misconceptions of science. Some concepts of science which don't seem to be hard but there are lot of difficulty in their understanding. Such form of misconceptions are easily learnt and explained by ICT based teaching learning. Thus we should always emphasis more on ICT based teaching-learning of science especially at secondary level in order that it's going to improve the standard of education in our country. Hence, it's concluded that ICT based approach of teaching science is significantly effective than the lecture method and other conventional methods.

Applications of ICT/e-Contents:

- In delivering biology contents: Computers help students visualize objects that are difficult or impossible to look at for instance, computers are often wont to display human anatomy, internal structure of human and animal cells. Law is already implemented in some a part of the globe against killing animal for experimental purpose instead models and computer animation can be utilized by students for experiment in natural science. Many plants in botany, animals in zoology and insects in entomology can never be found here in India, yet must be learnt by students; with ICT/e-contents of these are made available to students as if they're in real forms.

- In delivering Chemistry contents: Chemistry deals chemically and their reactions most of which are very dangerous to life if not handle with caution. Reactions of those chemicals in most cases don't seem to be easy to grasp by students without seeing them in real term; teachers usually explain these reactions abstractly and thru molecular diagram. CAI (Computer assistant instruction) has been of tremendous help in solving this problem; software is accessible where students could watch this reaction on computer as in reality. Animations and videos of complex molecular structures in chemistry are available for classroom teaching for

all categories of scholars in chemistry. for instance students will find it difficult to understand the chemistry of atom if not supported using ICT; other area of chemistry that might be difficult to show and learn if not supported by ICT are scientific theory, chemical change , ionization, electrochemistry and plenty of more.

- In delivering Physics contents:
    Educational software may be accustomed teach difficult concepts or observe difficult skills in physics. for instance teaching of electrical generator in physics will be facilitated with the help of educational software. The rotation of the coil within the flux is extremely clear when student see it demonstrated through this software.
    Many topics of physics like reflection, refraction and dispersion of sunshine is explained effectively in a straightforward way by depicting rays of sunshine and its path in several media with the assistance of CAI (Computer Assisted Instruction).In other subject also ICT/ e-contents made easier to grasp the difficult concepts such waste management, pollution controls and environmental issues etc[12]. The findings of pre-test and post-test are summarized given below:

TABLE .01

The percentage of pre-test and post –test of in-service teachers concerned their outlook about the ICT/ e-Contents.

	Strongly agree (SA)	Agree (A)	Neutral (N)	Disagree (D)	Strongly Disagree (SD)
Pre-test	39.05	31.40	09.50	15.70	4.35
Post-test	59.04	35.02	2.05	3.40	0.49

As we can see and analyse the data of both pre-test and post-test and it is clear from the table that the percentage of strongly agreed and agreed are increased as 19.99 and 3.62 respectively. The percentage of neutral, disagree and strongly disagree are decreased as7.45, 12.3 and 3.86 respectively. The finding indicated that   there is positive improvement in the view of in –service teacher towards the ICT.

TABLE .02

The percentage of pre-test and post –test of in-service teacher about the knowledge of ICT/e-contents.

	Proficient	Adequate knowledge	Little knowledge	Not known to me
Pre-test	25.03	35.01	33.03	6.93
Post-test	44.02	51.04	4.39	-0.55

It is clear from table -02 that the percentage of proficiency and adequate knowledge are enhanced in post –test as 18.99 and 16.03 respectively and the percentage of little knowledge and not known are lowered in post –test as 28.64 and 8.84 respectively that indicates that after training programme there is positive improvement in the use of ICT/e-contents skills of participants.

TABALE .03

The percentage of pre-test and post –test of in –service teacher regarding use of ICT in their professional life.

	Always (A)	Mostly (M)	Sometime (S)	Rarely (R)	Never (N)
Pre-test	15.05	35.03	25.03	15.02	9.87
Post-test	25.03	38.05	27.04	8.4	1.48

Table .03 shows that before training programme 15.05 % in-service teacher was always using the ICT , 35.03%mostely,25.03 % sometime, 15.02 % rarely, 9.87 had never used ICT/e-contents in their day to day life . After training there is positive improvement in the results of post –test as 25.03% have said always, 38.05 % mostly, 27.04 % sometimes, 8.4 % rarely   and only 1.48 have said never. So it is clearly evident from the results that the percentage of the use of ICT has increased after the training programme

IV. Conclusion

From the above results, it might be concluded that training in ICT use or e-content development would be only for professional development of teachers and as result, use of ICT training/e-contents development programme positively affected the view of teacher about ICT. The results clearly show that teachers must have the skill, knowledge and attitude necessary to inculcate ICT in to the curriculum .without maintaining the standard of teachers no innovation should be expected. The suitable use of ICT can act as catalyst and can bring paradigm shift in both content and pedagogy that's the guts of education reforms within

the 21st century. Thus, ICT can play an prominent role in term of capacity building of teachers to equip them to face the emerging challenges, the recent development in ICT require that teachers should be ICT literate and will be ready to integrate use of ICT in classroom teaching learning activities. ICT in education won't function on their own .it is that the teacher who is required to use ICT to boost students learning therefore the foremost task is the development of ICT trained teachers. The NCTE, NCERT and other government bodies should introduce more qualitative parameter to the in –service teacher training, ICT training programme. Teacher mustn't be only an information provider, but also an example to be followed, an advisor and supporter in build up the student's capacities and mobilizing them to amass knowledge and wisdom

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