IMPACT OF MULTIMEDIA BASED INSTRUCTIONAL DESIGN ON THE COLLEGE STUDENTS

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ABSTRACT

Preparing the technology proficient learners to meet the needs of 21st century has emerged as a critical challenge facing education in our country. The teacher has to prepare the young generation to fit in to the technology intensive society of the 21st century. Instructional design (ID) is the systematic process of planning events to facilitate learning. The ID process encompasses a set of interdependent phases including analysis of learners, contexts and goals; design of objectives, strategies and assessment tools; production of instructional materials; and evaluation of learner performance and overall instructional design effort (Gagne, Briggs, and Wager, 1992).The impact of learning solely depends on the efficiency of the teacher in delivering the message. But after the advent of multimedia technology the students have more wider opportunities through the multimedia namely computers, internet and A-V aids in equipping themselves with latest information and knowledge. A student in the higher learning is all set to be convinced by the teacher for transformation. This paper makes its attempt to develop a multimedia based instructional design in Botany at undergraduate level and to determine the effectiveness of it with undergraduate students of science. The results reveal that the Multimedia based instructional design is effective and it can enhance the knowledge and understanding of the students as it is developed with combinations of text, audio, animation, images, video and pedagogical applications which are blended to visualize the content.

Key words: Multimedia Technology, Instructional Design, Pedagogical Applications.

INTRODUCTION

Education is the most powerful instrument whose effective use requires the strength of will, dedicated work and sacrifice. As this instrument is in the hands of teachers in the present scenario, they must possess the skill of evolution of innovative strategies besides the strength of will, dedication and sacrifice. The quality of education of students depends upon the competence, dedication and quality of teachers. It is not brick and mortar of the classroom, but the dialogues rapport and interactions supported by deeds, between the learners and the teachers, all the time developing within its four walls can make or mar the destiny of the youngsters and in turn that of the nation. Being a teacher is to be a change agent transforming ideas into ideals and ideals into institutions which may spread the light of knowledge and wisdom into eternity. A real need and significant need is arising for researchers to examine models of professional development which will impact on the way in which teachers think about and reflect on science in the modern world (Grey & Bryce,2006). Pedagogy that is relevant for teachers to understand and be able to teach particular science concepts and /or employ strategies. Hence Instructional Design is an instrumental for understanding the pedagogy of the science content in particular which in turn helps a science teacher employ appropriate strategies.

The aim of instructional design is to make the instruction effective, efficient, appealing and cost-effective. The instructional designer uses a variety of interactive media to improve learning and address learning objectives. Traditional face-to-face teaching methods can be enhanced by, or even replaced by innovative e-learning methods. The instructional designer is the expert in finding the "right" technology to support "good" pedagogy.

The Information Age is making new demands on us all. Education must find ways to face these new challenges. A

teacher can no longer see learners as empty vessels that can be filled with information. The information now resides out there, distributed across a vast network and shared between all people. The challenge now is to help people use this information safely, wisely and productively as they adapt to a rapidly changing world. A teacher needs to prepare "students to learn, work and live successfully in a knowledge-based, global society" (Newhouse, 2002). The Instructional Designer is there to facilitate learning in this new epoch, the Knowledge Age.

The Kothari commission report (1960) states, "If science is poorly taught and badly learnt, it is little more than burdening the mind with dead information and it could degenerate even into new superstitions". Revised National Policy on Education (1996) envisaged launching of national mission for achieving universalisation of education and quality of education. It also emphasized the need for change in the teachers' outlook of teaching and dissemination of instruction. The advancement of science has to be effectively conveyed to the students without much time gap. Therefore Science Teaching Competence becomes a crucial factor for the fast development of science and for the induction of interest among students to learn the basic and the latest advancement in science. The recent advancement in teaching and learning principles have to be adopted by the science teachers in order to bring out better results of teaching and learning. It is in this backdrop the present study developed the multimedia based instructional design in Protein synthesis at under graduate level.

Rationale of the study

Humans can integrate information from different sensory modalities into one meaningful experience--such as when they associate the sound of thunder with the visual image of lightning in the sky. They can also integrate information from verbal and non-verbal information into a mental model-such as when they watch lightning in the sky and listen to an explanation of the event. Therefore, the instructional designer is faced with the need to choose between several combinations of modes and modalities to promote meaningful learning (Moreno & Mayer, 2000). According to Knowles (1987), there are five assumptions regarding college students (Conlan, Grabowski & Smith, 2003; Atherton, 2005). Multimedia is becoming an important tool for faculty in the biological sciences due to increasing conceptual and functional complexity that presents educational challenges that cannot be adequately addressed with traditional teaching methods (Buckley et al., 1999). Further, multimedia-based laboratory modules allow students to conduct experiments and experience interactive learning that would otherwise not be possible due to the complexity of the topic, laboratory hazards, cost, and/or ethical dilemmas; for example, at the undergraduate level, computer simulations have replaced some dissection laboratories (Watanabe, 2002). The college student:

- Has an independent self-concept and who can direct his or her own learning
- Has accumulated a reservoir of life experiences that is a rich resource for learning
- Has learning needs closely related to changing social roles
- Is problem-centered and interested in immediate application of knowledge is motivated to learn by internal rather than external factors

Fostering an understanding of the above assumptions, many of the learning modalities that are currently utilized by colleges and universities have yet to capitalize on the greatest benefits for the learning styles of the adult learner. With the current trends in post-secondary education and the advent of lifelong learning, colleges and universities that are able to provide flexible curriculum and teaching modalities will no doubt gain a strategic advantage. From this perspective, to the role of multimedia based instructional design takes on greater responsibility and therefore becomes a critical component of the integrative process of education as multimedia based instructional design is operated in this study as a process that applies technology-based learning of all kinds that is accessible to students at college level and help them learn independently through constructivism. In the knowledge society, era of knowledge packaging and constructivist revolution, students of higher learning have to be convinced of their taught for transformation. It is an urgent

need to take cognizance of independent and meaningful learning. While developing multimedia or e-learning, students must be able to understand the fundamental concept more effectively. They will be able to see the different stages and functions of learning object which they cannot normally see through naked eyes. Hence Potential multimedia development will also need to acquire or gain access to video and audio production equipment (cameras, recorders, microphones, editors), graphics production tools and utility systems (CD recorders, tape back-ups). Furthermore, issues such as file format compatibility and peripheral and network support make media development even more confusing. After selecting hardware and development tools, they must select following instructional design for the best reach of it to the students:

- How much interaction will take place in the instruction frames?
- What levels of remedial instruction will be used?
- When do digital audio and video support an instructional approach? When is it appropriate to use animation?
- Will there be close-ended or open-ended simulation?
- What features should the courseware contain?
- Should the organization consider summative or formative evaluations?
- What is the best way to handle testing and student tracking?

Therefore, to successfully meet the learning requirements of students of higher learning, teachers as instructional designers must be cognizant of today's increasingly heterogeneous students and their needs. Learning environments are increasingly transitioning from traditional classroom environments to the learner centered environments. During the design and development phase of any learning material, teachers must consider optimal satisfaction of students' requirements. Creating learning materials that provide a more stimulating learning lesson with less investment of a student is paramount to achieving the best learning mileage for a multimedia teacher.

Objectives of the study

The present study is committed to accomplish the following objectives:

- To design and develop the Multimedia based Instructional Design on Protein Synthesis in Botany at undergraduate level
- To find out whether the Multimedia based Instructional Design on Protein Synthesis in Botany is effective with undergraduate students.

Development of Multimedia based instructional design

The development of the e-content in the present study, include the following different steps:

- Designing of e-content
- Story board for video.
- Script writing for video.
- Video shooting
- Editing

Designing of e-content

In the present study, the investigator decided to develop the e-content in HTML format based on the instructions objectives. In this stage, the topic divided into sub copies and to present it each sub topic the investigator decided to collect appropriate images, animations, and videos.

Story Board for Video

The first step of the video shooting, the investigator prepared a story board, which is the working document of video in the multimedia. The story board gives a general outline of the material that intended to produce in video format. The investigator used three column formats for story board writing. In this format the first column contains content part, second column contains proposed visuals, and the third column contains visuals of multimedia.

Script writing for video

By the instruction of guide, the investigator transformed storyboard into a more detailed, step - by - step script. The investigators prepared these in two columns such as 'Audio' and 'visual' where both parts of the message were carefully planned and sketched out. The audio part of the script was what would be said and what sound effect would be recorded. The 'visual' part of the script shows every shot that

will be used in the final production.

Video shooting

A professional video graphics in the studio was arranged for shooting.

Editing

Editing was done by the investigators with the help of expert in the studio. The video programmer covers the topic 'Protein syntheses. The multimedia in HTML format, contains text, images, video and animations. The investigators prepared the video and animation to explain the concept according to the instructions objectives. After that all files and videos are carefully edited according to the original story board. The investigators used Adobe premiere software for video editing. Since it is a short reusable learning object the total duration is fixed as 10 minutes as per the guidelines of CEC-UGC for the same. After the editing process, the total video portion is presented as a complete multimedia module with other components like objectives Module summary etc., on the model of the multimedia given by the UGC- CEC which has the items such as Objectives, Modules, Assignment, References, Glossary, Summary, Quiz, Frequently Asked Questions (FAQs), Feedback, Case Study, Discussion. These items were prepared by the investigators and validated by the experts.

Method and Procedure

Experimental research method with single group design was adopted in the study since any other approach other than multimedia based instructional design could be thought of affecting the sensitivity - inputs. For the purpose of the present study, the investigator selected 20 UG final year Botany students at randomly from Holy Cross college, Tiruchirappalli, and 20 U.G. final year students from botany were selected at randomly from E.V.R. college. Tiruchirappalli. The multimedia based instructional design was validated by the experts in Educational Technology and Botany. The achievement test was developed by the investigators based on the guidelines of Bloom(1970) and it was validated by the experts. The pre-test was conducted for 20 students each from Holy cross college and E.V.R. college. The Multimedia was demonstrated to the 20 students each from both the colleges. Every student was given computer in which the multimedia based instructional design was loaded so that they were allowed to learn the concept protein synthesis at their own pace. The investigators attempted their queries if any in the experimentation phase. Learners were made to feel at home. Soon after the experimentation the posttest was conducted for all the 40 students.

Result and Discussion

Table 1 shows that the calculated 't' value is greater than that of the table value at 0.01 level of significance for both the colleges. Hence their post-test mean scores outnumber the pre test scores. This clearly shows that the multimedia based instructional design delivered its goods for the better performance of all the 40 students from two different colleges in protein synthesis. It is also inferred fro the above table that the students of Holy cross College outperformed the students of E.V.R. college in the post test and S.D of Holy Cross college is less than that of E.V.R college. Hence, the multimedia based instructional design is better reach of Holy cross college than that of the other one. This study is beyond the scope of reason out the same. Thus, Multimedia based instructional design is effective and it can enhance the knowledge and understanding of the students as it is developed with combinations of text, audio, animation, images, video and pedagogical applications which are blended to visualize the content.

Table 2 shows the gain score of students of Holy Cross and E.V.R. colleges as the gain score is calculated from the difference of scores between the post-test and the pre-test.

Name of the Institution	No. of Sample	Pre-test		Post-test		t-value
		Mean	S.D	Mean	S.D	
Holy Cross College	20	8.7	1.26	16.45	1.74	16.15*
E.V.R. College	20	7.4	2.15	12.6	2.42	7.22*

Table1. Mean Difference of College Students in their Achievement in the Pretest and the Post-test

Category	No. of Sample	Holy Cross College		No. of Sample	E.V.R. College		t-value
		Mean	S.D		Mean	S.D	
Above 70% of Marks	4	3.8	1.03	2	2.7	1.00	1.26
Between 60% and 70% of marks	12	5.7	1.34	7	4.3	1.22	2.33
Below 60% of marks	4	8.4	0.75	11	6.8	1.35	2.89

Table2. Gain Score Difference Among the College Students in their Achievement

Three categories of students were taken based on their achievement in the third semester major paper to analyse the gain score out of their learning through Multimedia based Instructional design. They are students who secured 70% and above, between 60% and 70% and 60% and below. It can be inferred from the table that Holy Cross and E.V.R college students who secured 70% and above, between 60% and 70% and 60% and below do not differ significantly in their gain score. However the mean gain score of Holy Cross students in all the categories is greater than that of the E.V.R. college. The author observed that the gain score of students who secured below 60% of marks in their major paper in both the colleges is greater than the other categories students. Hence, this shows that the multimedia based instructional design could reach its maxim and draw attention of average learners.

Recommendations

The following recommendations are given based on the findings and conclusions

- Develop a partnership between educational institutions and the IT industry for the continuous development of new content and methodology taking into account contemporary technology.
- Distribution of the multimedia to teachers and students from formal and non-formal educational modes, for supplementing and complementing the process of teaching and learning in higher education.
- Laboratory demonstration like dissection of plants and animals can also be taught through multimedia so that no animal or plant has to sacrifice its life.

Conclusion

In this age of Globalization, Technology has become a powerful pedagogical tool in Education. Computer and Internet based technologies hold great promise both for increasing access to knowledge and as a means of promoting learning. In order to thrive in a digital economy, students will need digital age proficiencies. It is important for the educational system to make parallel changes in order to fulfill its objectives, namely the preparation of students for the world beyond the classroom therefore the educational system must embrace the 21st century skills within the context of rigorous academic standards. As realizing the importance of technology in 21st century one has to go through a major paradigm shift in instructional methods to face the challenges present in today's society. Educational Practice is changing from the teacher on the stage to the guide on the side. "A traditional learning structure does not guarantee the delivery of a consistent message where as consistency is assured in e- learning" (Albert Lewis 2005). In student centric classrooms, the role of the teacher changes to that of a facilitator and as a resource person. With the use of technology, the teacher can extend his /her role beyond the classroom. Various technologies deliver different kinds of content and serve different purposes in the classroom. Each technology is likely to play a different role in students' learning. The pervasive use of technology in all spheres of life, the knowledge economy and the paradigm shift together, generate demands the teacher and the learner to adopt ways that help to inculcate 21st century skills among students. Right now in India, educational Institutions are gearing up to provide the information networks to give students access to the digital resources. In fact technology results in new designs and devices as well as new ideas and processes. Thus, the multimedia is to provide a credible reality and a challenge to our existing mental processes, to provide us appropriate level of cognitive conflict and motivated us to continue the process of knowing. Hence multimedia based instructional design should be positively taken cognizance of it as a supplement by the teachers of higher learning institutions to open up possibilities for the student visualize the content and concretize it.

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