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"An Approach to Design a Topic Nature Based Courseware through the Criteria of E-learning"

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Abstract: *E-learning plays a great role in our learning environment especially in distance learning. It is an innovative approach for delivering electronically mediated, well designed, learner-centered and interactive learning environments for anyone, anywhere, anytime through internet and other telecommunication association digital technologies with instructional design principles. So far courseware we have seen online, are based on only course name and enriched with some video, audio, lecture or ppt. Among all courseware, which we have found, MIT courseware is one of the best than all other online courseware. But it is also not enriched with topic nature based course materials (TNBCM). Few coursewares have no faculty wise courses. Some courseware has courses but contents are insufficient in terms of area. Those courses are not easy understandable for students. Several courses with course materials have been surveyed in respect of different faculty such as science, arts, and business. As example animated video is absent to several courseware where it is most important for science related subject. Simulation software or information link is urgent for any engineering subject. This software link also is not available to most of the courseware. Self-assessment is also important for improving the level of confidence of student. An updated courseware is developed with online course materials based on the criteria of different courses. Hypertext Preprocessor (PHP) has been used to develop the software of courseware of higher education in undergraduate level. In the software database MySQL is also used to obtain the data of different courses based on online courseware. The development courseware system is important to enhance the quality of teacher and students through blended learning of an online education. The developed software has been verified according to the online education criteria of the universities of Bangladesh.*

Keywords - *TNBCM, CBT, E-learning, Animated video, Distance learning.*

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I. Introduction

The use of technology in the field of education is becoming indispensable worldwide. The Internet has become one of the vital ways to make available resources for research and learning for both teachers and students to share and acquire information [1].The e-learning refers to the use of internet technologies to deliver a broad array of solutions that improve knowledge and performance [2]. It is widely used in most of the developed countries to promote distant education (DE) and lifelong learning. Masie claims that the "e" in e-learning reflects the experience of the learner in the Internet era [3]. Through e-learning, learner and educator will confront new teaching and learning methods [4]. There are various applications like web-based learning, computer-based learning, virtual classrooms and digital collaboration where learner's manuals and guidelines are delivered via the internet, audio/video tape, satellite TV, CD or DVD ROM etc. [5]. It is not an internet portal but a comprehensive, fast, efficient, and effective training solution that combines excellent information management with the best technology. J. R. Galvão *et al.* [6] analyzed various courseware features that are available on the internet and propose a new model that is based on some of the technologies, such as computers and telecommunication. Oriol G. Bellmunt *et al.* [7] introduces a remote laboratory and an automated e-learning based course to be used in the course. Electrical workshop of automation through PLC programming language. Here, a survey is conducted to show a little bit difference in results between the remote group and local group. Lack of high-speed internet connection is the main problem. L.vcent conducted a survey on the effects of multimedia lecture and traditional lecture [8]. The courseware was designed for the teaching of History as one of the core subjects in National Curriculum that can stimulate students' thinking, increase their cognitive ability, and influence their attitudes [9]. The rapid and intensive use of ICTs in education in developed countries facilitated the establishment of 100% ICT based universities called "Virtual Universities" [10]. Information technology is capable of capturing students' attention through a visual representation of concepts, sounds, animation along with the use of other interactive tools. For example, a student may fell bored and fatigued on a part lesson on human digestive system. But if he can see visually how the digestive system works, through animations of the food moving across the body and listen to the relevant sounds can result in a better interaction.

Also, scientific argumentations, investigating the questions or the use of web-based technologies by the students support the development of students' higher-order thinking and problem-solving skills [11]. In addition, many world-leading conventional universities are now offering several distant courses through various ICTs and familiar established themselves as one of the "Dual mode Universities". The historic launching of 700 courses of 33 academic disciplines as "Open Course wares" through courseware sites unfolded a new horizon in e-learning. Massachusetts Institute of Technology (MIT), Open Yale, Open Michigan, Utah State, Open Learn, Harvard University, Caltech Today, University of Washington etc. are famous for hundreds of courseware sites. They offer a tremendous resource for faculties, students, and self –learners around the world.

The initial objective of this article is to enhance educating and learning skills with internet support and is focused on a comparison of the characteristics of samples of courseware models, such as courseware or online courses. The authors also compare course features and propose potential directions for future developments, while concentrating on courseware that is focused on the student within a constructive context.

II. Concept of courseware

Advances in networking technologies, multimedia, and the internet can have a significant impact on teaching and learn in higher education [12]. Courseware is a term that combines the words 'course' with 'software'. It is educational material intend as kits for students, usually packaged for use with a computer. Instructional courseware can be defined as "software developed for the purpose of providing instruction [13]. The course is frequently used for delivering education about personal computer and its most popular business applications, such as word processing and spreadsheet programs [14].

A Courseware can contain the following elements:
(1). Materials for instructor-led classes (2). Material for self-directed computer-based training (CBT) (3) .Web sites that offer interactive tutorials (4). Material that is coordinated with distance learning, such as live classes conducted over the internet (5). Videos for use individually or as part of classes.
Specifically, the area of engineering known as courseware engineering serves as support material for students of this area in the process of learning. Courseware may be utilized as in a virtual class, lecture, self-learning, such as reference materials, and the accomplishment of tests to evaluate the performance of the student individually or in-group. The objects of the courseware may be altered if the context for which it was created is different to that where it is used.

III. Courseware study

"Massachusetts Institute of Technology" in abbreviated form MIT is the one of the famous courseware among all courseware. Its headline is "Unlocking Knowledge, Empowering Minds". It offers a tremendous field of various courses for its worldwide learners. It really helps a learner to learn any course very easily. We navigate department area and see that courses are designed in two portion – undergraduate and graduate. For science faculty-there is no animated video lecture and simulation software whereas software or any software link is important especially for computer science. Next one is the Utah State, it develops there courses by dividing various departments. But some department does not carry necessary course materials. For example-an animated video or picture is very important in biology but there is no such type of course material. In the Open learn, someone can search any subject by "Browse by Subject" options. Then comes the sub-subject. One sub-subject has many topics any every topic contains different types of course materials. But one of the big problems is that assigned course material does not contain that material always. One course assigned lecture video option but that option does not contain the proper video of the related sub-department, the subject then course material. But there is no video, audio, software for science. In the University of Harvard, for science, there is no software link, graph chart, flow chart and for arts, there is no image. Except these, there is a lot of course on online.

IV. Methodology

The whole courses in the world can be divided into four categories- science, arts, business and others. But students need not the same materials for all courses. First, we analyze the course materials of science. Under the Science category, there are so many departments like computer science, civil, electrical and electronic engineering, mechanical, medical science, biology, chemistry, microbiology, mathematics, artificial engineering and so on. Students need some special course materials for science related courses for full, perfectly and easy learning. A material enriched with the graph, pie chart, image, animated video, audio, special pdfs etc. are really essential for science courses. As for example, a medical student can understand the blood circulation through the heart just seeing a movable or animated image or video. Another example a student easily understands the photosynthetic system by animated video lecture. Image and animated video is very important in medical science. Because a medical student has to keep clear concept about various types human's bones, human brain, structure of various types blood cells and so on. The related images of human can make their learning more

easily. In chemistry structure view of various elements (liquid, gas, solid, metal) is very important. In computer science image, graphics, charts, video and sometimes recommended software was very important and so on. In arts the students need slight different course materials. Mathematical representation is important for multimedia business organization. For a student with a learning disability, auditory, visual, or tactile information can become jumbled at any point during transmission, receipt, processing, and/or retransmission. For example, it may take longer for some students who have learning disabilities to process written. No courseware is given effective material for the disabled student. Most of the courseware only for UG students, a few for PG students. No courseware available for primary students. In 1able 1 we show the present status of different courseware's course materials for three departments.

The course materials which we have got from different courseware and we propose some additional course materials, all are given below and the additional course material are given the italic form.
(1). Assessment (2). Graph/chart/ image (3). Animated video (4). Lecture notes/Pdf (5). Online text books (6). Pptx (7). Software links/other links (9). Student work (10). Video/audio lecture
Each of the items characterized has been classified as follows:
No Exist: No items exist /denoted as NE
Poor: An item exists in very poor level/ denoted as P
Average: An item exists in much summarized form/denoted as A
Well: There is a lot of information on the item /denoted as W
Very well: There is a lot of information that leads to other points of diversified information/ denoted as VW
Not applicable: If the faculties entirely not exist/denoted as NA

V. Calculation for the notation table

Here we have collected a lot number of courses of three departments of different courseware. Then from all courses we separate the science, arts and business courses. To find out the individual course materials we of a particular course use the following formula. Course material for an individual dept. = (number of courses that hold that material/total course (science or arts or business))*100.
For example, we consider the MIT courseware. Here MIT's total courses are 5990. In total courses 3270 courses are science related course. For find out the course Material rate e.g. ppt there is 3300 courses which holds the ppt as course material. Using the formula we get its percent rate. Ppt= (3270/3270)*100=100%.
Course material= (total number of single course material in total courses/ total course)*100.

Table 1: Present status of course materials of different courseware

Courseware Origin	*Fields*	*Assessment*	*Graph/ Image*	*Animated video*	*Lecture /pdf*	*Online text books*	*Pptx*	*Software links/other links*	*Student work*	*Video /audio lectures*
MIT	Science	A	W	P	VW	P	VW	W	W	VW
	Arts	P	P	P	W	P	P	P	P	W
	Business	A	P	P	W	P	VW	P	P	W
Utah State	Science	W	W	P	P	P	NE	A	P	P
	Arts	W	W	P	P	W	P	NE	P	P
	Business	A	P	P	P	P	W	P	P	P
Open Michigan	Science	VW	VW	P	VW	W	VW	P	VW	W
	Arts	VW	A	NE	W	A	VW	NE	VW	W
	Business	VW	VW	A	W	A	VW	P	VW	VW
Open learn	Science	A	A	P	W	W	W	W	VW	P
	Arts	A	P	NE	W	A	W	NE	P	P
	Business	A	P	P	W	W	W	P	VW	P
University of Harvard	Science	VW	VW	P	P	P	P	P	A	P
	Arts	W	W	P	P	A	P	NE	A	P
	Business	W	VW	P	P	P	P	P	A	P

We use the table 2 percentages for these notations. Here NE=0%, P=1-44%, A=45-55%, W=56-84% and VW= 85-100%. For example, in Utah State total course number is 81 in its two departments. It has only 2 ppt in its total courses. Then the percent rate of total ppt will be: ppt= (2/81)*100= 2.469%.

VI. Result and discussion

Maximum online coursewares are open for all universal and worldwide learners. So we can easily collect the data without restriction. Especially we consider those coursewares, which are available for all. However, some courseware, which we take in our survey, provides their own courses with course materials and these courses are only teaching in that university but for worldwide e-learners give legitimacy of their courses.

We first browse all of their courses and divide them in science, arts and business. Then we have analyzed their course materials which are available in one course. Count the total courses, along with science, arts and business courses respectively. After that we count down the different course materials provide by one course for learning. Many coursewares have one or more departments over science, arts and business related subjects.

Table 2: The percentage table of course materials of different courseware for three department

Courseware	*Fields*	*Assessment*	*Graphs / image*	*Animated video*	*Lecture / PDF*	*Online text books*	*Pptx*	*Software/links*	*Student work*	*Video/audio lectures*
MIT	Science	53.85%	68.19%	32.6%	87.46%	46.57%	100%	70.06%	68.50%	86.54%
	Arts	37.44%	14.56%	19.4%	83.30%	37.56%	29.44%	0.0%	18.74%	70%
	Business	52.11%	20.42%	21.5%	81.18%	16.46%	100%	16.71%	20.89%	60%
Utah State	Science	65%	75%	26.7%	29.09%	241.81%	76%	46.64%	10.91%	41.82%
	Arts	71%	56%	11.9%	47.69%	56%	7.69%	0.0%	14.6%	23.08%
	Business	55%	45%	13.6%	31.98%	7.69%	55.8%	7.69%	26.92%	23%
Open Michigan	Science	89%	97.8%	21.8%	89%	56.93%	100%	27.59%	100%	81%
	Arts	93%	52.84%	0.0%	70%	53.88%	100%	0.0%	89.98%	89.53%
	Business	87%	91.8%	12.6%	74%	49.76%	100%	64.59%	87%	69%
Open Learn	Science	25.64%	51.28%	19.5%	78%	84.99%	94.02%	37%	93%	40.26%
	Arts	13.33%	26.67%	0.0%	73%	46.99%	66.67%	0.0%	43%	3.39%
	Business	12.5%	31.25%	12.36%	81.25%	78.67%	62.5%	35%	89.6%	25%
University of Harvard	Science	90%	90%	21.78%	39.39%	44.55%	2.42%	18.18%	46.78%	43.03%
	Arts	84%	82.4%	8.9%	44%	48%	7.81%	0.0%	47.90%	18.8%
	Business	76%	95.29%	11.4%	23.53%	30%	2.94%	25.88%	53.56%	17.65%

However, we consider them for their excellent courses and relevant course materials. Here we study only science, arts and business departments because these three departments are strong enough then all other sectors. Especially the undergraduate and graduate levels are associated with these three departments and most of the learners in the world are belong to these departments. Science, arts and business department also have their sub-departments and we consider all the courses under their departments and sub-departments. Because our consideration was coursed with relevant course materials to learn that course easily.

We have done survey and find out the status of previous deliver course materials, which we have given to the table 1. Hence, we have shown the important course material status by different charts. We represent the courseware in the X-axis and in Y-axis we present the rate of the course materials. We use the Table II data to draw these charts for the present situations of the course materials which conditions is too much bad but they are very important. Animated video shown in fig.1 is essential course material. Because learners can easily understand any example through it. Animated video with example can make that example prefect to learn. Especially in science field, its important is too much. However, from the chart we can see the status of animated video is too worried in various coursewares. As chart status shows that MIT, Utah State, Open Michigan, Open Learn, University of Harvard courseware contain very little animated video for their courses.

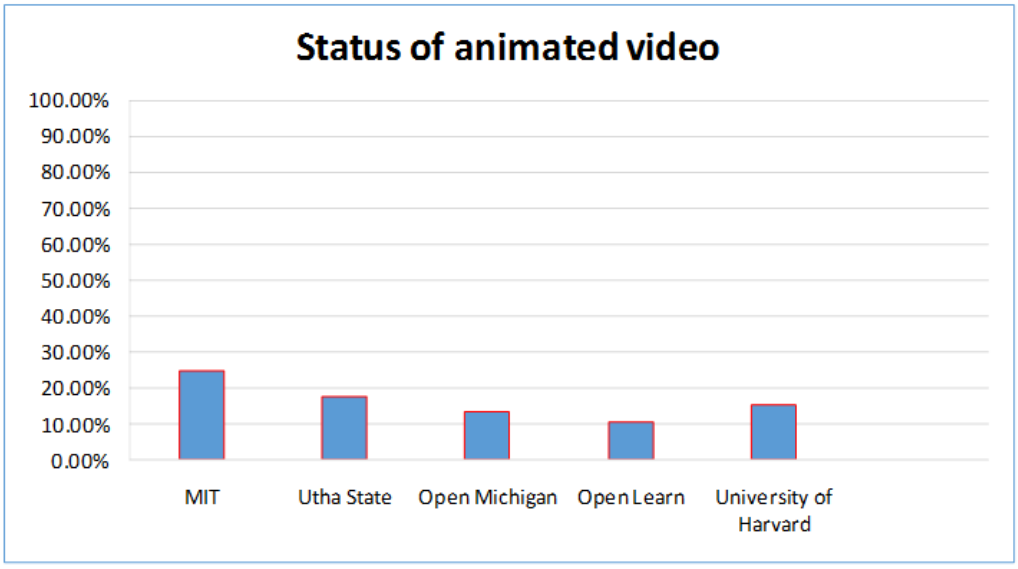

Fig. 1: Average status of animated video

VII. Our development plan

Our main focus is to develop a topic nature-based courseware. Because, a topic nature-based courseware present any difficult course to a learner quite easily. We have designed our proposed courseware in the following format. For example, database is an important subject in engineering course. In Database, one of the most important topics is file and database. From this topic we would learn- what is file? what is database? difference between file and database, etc.. For perfect understanding we should design this topic with that type of material those can help to understand this topic without problems. For selecting the best course material for this topic, we first analysis it, takes experts suggestions. After that, we have found that 'File and Database' need three course materials shown in fig. 2.

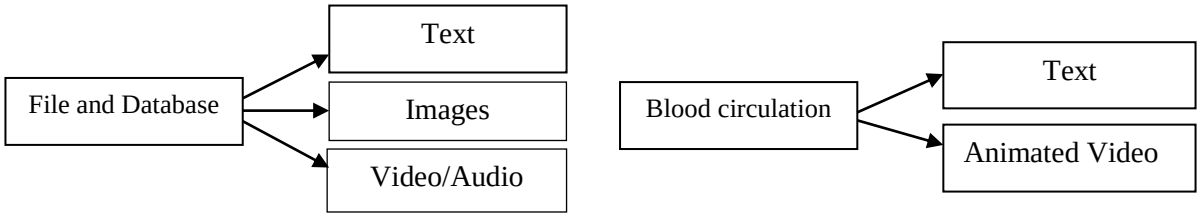

Fig. 2: Topic nature-based course material

If we consider one of the topics of medical science, as for example –blood circulation. For better understanding a video or animated video lecture is enough. Various body parts as like as different bones of human body could be easily understandable through an image. But the entire end one question left behind. We find many course materials of different courses in online so why the courseware? Because now online provides a vast amount of tutorials, audio and video lectures, ppt, pdfs, images etc. So, what's the difference between online and courseware? The differences are courseware is an innovative part of E-learning, for understanding a specific topic it provides those related course materials those can easily present the topic to the learners. We have found all course materials of a related in one place so it saves our time of searching.

We want to develop an ideal model of courseware, which will contain courses of science, arts and business departments with topic nature-based course materials and want to recover the present limitations of different courseware which are available in online. For this respect, we make students and teachers survey and collect their opinions, suggestions and useful guidelines to develop a better courseware.

VIII. Conclusion

E-learning includes numerous types of media that deliver text, audio, images, animation, and streaming video, and includes technology applications and processes such as audio or video tape, satellite TV, CD-ROM, and computer-based learning, as well as local intranet/extranet and web-based learning. It is commonly thought that new technologies make a big difference in education. Many proponents of e-learning believe that everyone must be equipped with basic knowledge of technology, as well as use it as a vehicle for reaching educational goals. Education institutions today understand the necessity of the above tools and have already started to use them in various aspects of their day-to-day activities. Now education is enriched with various types of course materials as well as home works, assessment, result delivery, Internet is being embedded into the core of the education system. Because most of coursewares are not developed according to the nature of the topic. We identified the lacks in different course materials and therefore, propose a topic nature-based courseware along with their uses in different universities and institution with charts. The course materials are definitely element to gather knowledge on any discipline over the internet but their absence in the form can make a courseware difficult to understand for the students. Our work is in progress and tries to develop an effective courseware with the relevant course materials according to the nature of topics, which will be more logical, worthwhile and easy to understand for all. Hypertext Preprocessor (PHP) has been used to develop the software of courseware of higher education in undergraduate level. In the software database MySQL is also used to obtain the data of different courses based on online courseware. The development courseware system is important to enhance the quality of teacher and students through blended learning of an online education.

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