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Message from the Editor-in-Chief

Hello from TOJDEL

TOJDEL welcomes you. TOJDEL looks for academic articles on the issues of distance education and e-learning and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should discuss the perspectives of students, teachers, school administrators and communities. TOJDEL contributes to the development of both theory and practice in the field of distance education and e-learning. TOJDEL accepts academically robust papers, topical articles and case studies that contribute to the area of research in distance education and e-learning.

The aim of TOJDEL is to help students, teachers, school administrators and communities better understand how to organize distance education for learning and teaching activities. The submitted articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJDEL. TOJDEL provides perspectives on topics relevant to the study, implementation and management of learning with technology.

I am always honored to be the editor in chief of TOJDEL. Many persons gave their valuable contributions for this issue.

TOJDEL, Governor State University and Sakarya University will organize the IDEC-2017 International Distance Education Conference (IDEC 2017) (www.id-ec.net) in July, 2017 in Berlin, Germany.

Call for Papers

TOJDEL invites article contributions. Submitted articles should be about all aspects of distance education and e-learning and may address assessment, attitudes, beliefs, curriculum, equity, research, translating research into practice, learning theory, alternative conceptions, socio-cultural issues, special populations, and integration of subjects. The articles should also discuss the perspectives of students, teachers, school administrators and communities.

The articles should be original, unpublished, and not in consideration for publication elsewhere at the time of submission to TOJDEL.

For any suggestions and comments on the international online journal TOJDEL, please send us mail to tojdel.editor@gmail.com

January, 01, 2017

Editors,
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A MULTI-ASPECT BASED OPINION MINING SYSTEM FOR OPEN AND DISTANCE EDUCATION USING ONLINE REVIEWS

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ABSTRACT
Open and Distance education is the form of education that delivers pedagogy, technology, and instructional designs to students who are not physically available at the same place in a traditional classroom or campus. Opinion mining (also called sentiment analysis) plays an important role in the field of social media. It computes people's polarities such as positive, negative, neutral, which were expressed in online social media contents at various levels, namely, document level, sentence level, and corpus level. In this research paper, a multi-aspect based opinion mining system is proposed by applying opinion mining techniques for Open and Distance Education social media contents. The purpose of this research is to measure the public satisfaction of open and distance at the title level, document level, sentence level, and aspect level. The proposed system was employed by the data collection process, preprocessing, feature extraction, opinion detection and polarity classification using the Naïve Bayles classifier. The detected opinions at various levels are also visualized. The performance of the system is evaluated using precision, recall, f-measure, and accuracy.
Keywords: Distance education, opinion mining, sentiment analysis, visualization, open education

INTRODUCTION

The first distance education course was started by Sir Isaac Pitman in the year 1840s in the way of sending and receiving shorthand texts to students on postcards. This success laid the foundation to start Phonographic correspondence society to offer formal courses. Then the first correspondence or distance learning degree was offered by the University of London. Later, the Open University was founded to create a respectable learning from the traditional form of education. According to Vasileios Kagklis et al. (2015), the distance education is a form of education in which there is a limited interaction between teachers and students. M.Banu Gündoğan and Gülsün Eby (2012) defined the distance education as a result of the struggle for permanence and progress. Safiullin Lenara et al. (2014) defined the distance learning is the independent form of education by using pedagogical technologies to design and implement remote courses. Distance education system is needed by various communities, namely, pupils in rural areas, small cities, managers, army officers, etc. Gao Guohong, Li Ning, Xiao Wenxian, and Wan Wenlong (2012) stated that the modern distance education is established using computer networks and its features, namely, multimedia teaching, interactive demonstration, classroom management, online examinations and so on. This form of education provides the learners to get more information using the internet. The modern distance education is implemented by both synchronous and asynchronous methods. Synchronous method is a face to face communication for sharing data and information between two or more computers. Examples, written texts, audio tools, and video, etc, (Tahir Tavukcu, øbrahim Arap, & Deniz Özcan, 2011). The asynchronous method delivers the course contents in one way like books, CD-ROMs, and videotapes. Most of the working professionals, housewives, Government officials, etc., like to pursue distance education to upgrade their knowledge or to get expertise in that particular course or to get promoted in the employment service. There are many Universities, centers, and private institutions offer distance education courses in each and every country. People might be asking opinions from friends, family members, and educators about the University, course details, course fee, and validity of the degree before getting admission. Nowadays, people are expressing their views, experiences, and opinions about the Universities through online social media contents. Opinion mining plays an important role in the field of social media to get people's positive or negative or neutral sentiment. E.g., great, amazing, very nice, wonderful, bad, and poor. These opinions can be expressed in online feedback forms, web emails and social networking websites such as Facebook, Twitter, LinkedIn, YouTube, MySpace, Blogs, and forums, etc., about the product sales, products service, quality, policy initiatives, Institutions, forecasting political opinions and news contents. Opinion mining

(also called sentiment analysis) computes these sentiments at the document level, sentence level, and corpus level. This computation helps the consumer and the public to ensure their opinions in social media.

In this paper, we analyzed open and distance education of Indira Gandhi National Open University (IGNOU) in India by using people's online reviews. IGNOU is the Public, Central University established in the year 1985. It is the largest university in the world with over 4 million students to impart open and distance education. The University offers higher education opportunities in India, particularly to the disadvantaged segments of society to strengthen the human resources. The Commonwealth of Learning (COL) designated that IGNOU is the first centre of Excellence in open and distance education in the world. In this context, we propose a multi-aspect based opinion mining system for Open and Distance Education to measure the satisfaction of IGNOU. In this research paper, first, the people's online reviews are obtained about IGNOU from social media websites. Second, the data pre-processing method is applied to clean the data. Third, features are extracted from the cleaned data. Fourth, opinions are detected for the extracted features. Fifth, the detected opinions are visualized. Finally, the Naïve Bayes classifier is employed to predict the accuracy of the actual and proposed system. The rest of the paper is organized as follows. Section 2, explained the related works in open and distance education and opinion mining. Section 3, explained the proposed opinion mining system for open and distance education. Section 4, described the experimental results and discussion. Finally, the conclusion and future works are presented in section 5.

RELATED WORKS

Open and Distance Education

The open and distance education is a system of learning and teaching. It disseminates the knowledge and quality higher education through open and distance learning mode. Ebru Melek Koc (13) studied the roles of mentors such as self-trainer, networker, social supporter, academic support and psychological supporter in a distance learning teacher education program. Yingqi Tang (2013) analyzed the librarian position announcement in the context of distance education librarianship in the United States. The authors identified the fundamental occupational skills, namely, technology skills, information science skills, and communication skills. Vasileios Vasileios Kagklis et al. (2015) studied the online discussion of postgraduate students at the Hellenic Open University by using text mining techniques and sentiment analysis. The authors provided valuable information to improve the educational process. Safiullin Lenara, Fatkhiev Arturb, Saipullaev Ullubic, and Bagautdinova Nailya (2014) proved the distance education is a new form of education by using the pedagogical technologies. Perihan Paksoy [16] studied the developments of Turkish airlines by using a global distance education program. Hieronymus J.M. Gijselaers et al. (2015) investigated the sedentary behavior and physical activity to predict study progress in distance education. The authors suggested that sedentary behavior contributes a significant predictive for learning performance in distance education. Fatma Kübra Çelena, Aygül Çelikb, and Süleyman Sadi Seferoğlu (2013) analyzed teachers approaches to distance education. The authors showed that the majority of participants want to participate in distance learning activities. They also reported that half of the participants don't trust distance education systems operated in Turkey in terms of content, materials used, evaluation methods, the validity of certificates and career opportunities. Filiz Kanteka (2014) presented the current status of distance education in nursing. This program attracts many nurses who are working in public and private institutions. Annelien van Rooyen (2015) studied the perception of accounting students in distance education through social media at the University of South Africa. The authors suggested that accounting modules need to increase success rates by using these social media apps to provide lectures. Bahar BERBEROĞLU (2015) evaluated the policy of open and distance education programs of Anadolu University by using linear models. This work was implemented by considering the relationship between time and number of programs. The authors reported that the numbers are increased for open and distance education in 1993 and in 2009 due to jumps in the graphics. Nurmukhametov N, Temirova A, and Bekzhanova T (2015) studied the organization and management of distance education in Kazakhstan by using Internet technologies. Galina Samigulina and Zarina Samigulina (2016) proposed distance education intelligent system based on the biological approach to Artificial Immune Systems (AIS) for the establishment of a multilateral exchange of information. The authors analyzed that AIS allows individual learning to gain necessary skills in real time based on modular training courses and accessing modern equipment.

Opinion Mining

Opinion mining is the effective method to measure public opinion about the open and distance education. Oksan Bayulgen and Ekim Arbatli (2013) investigated the Cold War rhetoric in the US – Russia relations by looking at the 2008 Russia – Georgia war based on content analysis and public opinions, links between media, public opinion, and foreign policy. Pawel Sobkowicz, Michael Kaschesky, and Guillaume Bouchard (2012) introduced an opinion formation framework based on content analysis of social media and socio-physical system modeling by automated topic, emotion and opinion detection in real-time, information flow modeling and agent-based

simulation and modeling of the opinion of networks. Magdalini Eirinaki, Shamita Pisal, and Japinder Singh (2012) presented an opinion search engine system with two novel opinion mining algorithms. First, the high adjective count algorithm was used for identifying and extracting features that are deemed as the most important and characteristic of each review. Second, the max opinion score algorithm was used to assign ranks to the features for deciding the final classification of reviews such as positive, neutral or negative. Daniel E. O' Leary (2011) captured opinion expressions in blogs and determined its opinions at different levels, namely, a word, sentence, and paragraph. The author used mood declaration approach to identify positive, negative or neutral opinions, and opinion word approach to identify specific words that suggest a particular opinion, and domain-specific approach to improving the quality of analysis. Andres Montoyo, Patricio Martinez-Barco, and Alexandra Balahur (2012) employed the tasks of subjectivity analysis and sentiment analysis to detect private states (opinions, emotions, sentiments, beliefs, speculations) on different topics. The authors grouped four categories, each with their corresponding challenges such as the creation of resources, classification text, opinion extraction and applications of sentiment analysis. Farhan Hassan, Saba Bashir, and Usman Qamar (2014) proposed a new algorithm for twitter opinion mining (TOM) to improve the accuracy of text classification and resolve the data sparsity issues. This algorithm was employed based on data acquisition, preprocessing, and polarity classification algorithm and evaluation procedure. Deanne K. Bird et al. (2014) conducted an online survey for Nuclear Power in Australia in 2010 and 2012. The study examined, comparatively analyzed and assessed public opinions (positive or negative or neither) by a set of questionnaires regarding climate change and the Fukushima disaster.

A. Moreo, M. Romero, J.L. Castro, and J.M. Zurita (2012) developed a lexicon-based system to analyze user comments on current news items in social media. The system identifies the discussion topics on which user expressed their opinions. The authors studied the system analytically with the preparation of knowledge (filtering stage, preprocessing stage), opinion focus detection module (interpretation context, disambiguation analysis, and frequency analysis), sentiment analysis module (labeling expression stage, tuples extraction stage, tuples clustering and filtering) and sentiment mining module. IT Vendors routinely use YouTube as one of the tools in social media to disseminate their IT product information to acquire customer opinions. In this scenario, the authors applied deep sentiment analysis for identifying and extracting value structure polarity (writer's opinion), attitude polarity (number of opinions about the source materials), the level of intensity (degree adverbs), and automated personality-sentiment-value analysis procedure for marketing strategies (Haeng-Jin Jang, Jaemoon Sim, Yonnim Lee, & Ohbyung Kwon, 2013). Xiao Wang (2013) examined the motivations and factors to predict one's intention to use social media while viewing mediated sports events by applying the integrative model of behavioral prediction and attitude functions. The author conducted a web-based survey in February 2012 among the limited number of students with a set of the questionnaire when they watch mediated sports events. In this model, structural equation modeling analysis and controlling were employed to predict intentions to use social media. Qiwei He et al. (2014) evaluated the relationship between posts and self-monitoring (SM) skills based on Snyder's SM Questionnaire (1974) collected via the internet. The authors introduced an Item Response Theory (IRT) model to check the validity of the Internet data for online assessments and predicted users SM skills by using both structured and unstructured textual analysis.

THE PROPOSED SYSTEM

An opinion mining system is the most effective way to measure the public opinions that are expressed in any form or language. The multi-aspect based opinion mining system applies various steps for analyzing online reviews. The system involved in the data collection process, data preprocessing, feature extraction, opinion detection at the title level, document level, sentence level, and aspect level, opinion visualization, opinion classification using a Naïve Bayes algorithm, and performance evaluation using precision, recall, f-measure, and f-measure. The general architecture of the proposed system is shown in Fig.1.

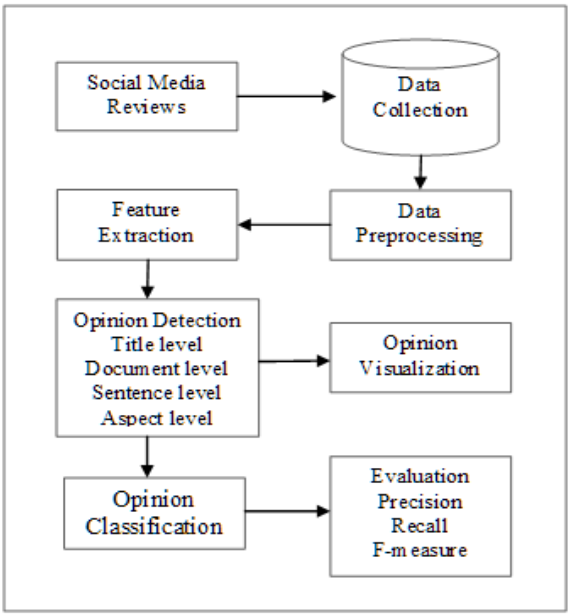

Figure 1. A multi-aspect based opinion mining system

Data collection

Data collection is the process of collecting information on the specified topic or targeted variables. The data can be a quantitative data or qualitative data. It is used to evaluate outcomes to answer relevant questions in terms of a research or decision-making process. There are many methods used to collect freely available information in online social media. Initially, the data are collected in the ways of surveys, personal interviews and focus groups. Later, the data are collected using various web analytics tools. These tools collect data in the form of structured, semi-structured and unstructured formats. The largest social media websites (Facebook, Twitter, Blogs, etc,.) are using APIs to collect accurate data. In this paper, the reviews are collected from mouthshut website about IGNOU using python programming. The data considered only from January 2016 to September 2016. It contains 102 online reviews from different people.

Data preprocessing

Data preprocessing is an important step in the field of opinion mining and sentiment analysis. The real world data are incomplete, noisy, and inconsistent. It doesn't make any sense to analyze those data. The quality of data is the most important factor in analyzing data. If there is much incomplete, noisy and inconsistent data, Then the feature extraction or knowledge discovery is more difficult. In this step, URLs, profile images, profile links, send message labels, title values, data time contents, data time links, review detail links, font values, and font links are removed to obtain profile names, genders, review titles, and review summaries.

Feature extraction

Feature extraction is the process of transforming arbitrary data into numerical or string features for machine learning. Features are also inherent properties of the data. These features are an initial set of measured data, which are used for dimensionality reduction. If there is too much of information, then it reduces the effectiveness of the knowledge discovery or data mining. In this approach, the collected review contains more information, namely URLs, profile images, profile links, profile names, send message labels, gender details, title values, data time contents, data time links, review titles, review detail links, font values, font links, and review summaries. If this information is used for opinion mining and sentiment analysis, then the performance of the system will be not effective. In this context, only the titles, text reviews, sentences, and aspects are considered as the feature set for the opinion mining system. The cleaned data are processed and extracted theses feature sets using python programming. For instance, the review, "<title>Best faculty</title> *Indira Gandhi national open university(IGNOU) is a best one university in India for the dropper, for privateness. And one quality more of this university is that this gave the opportunity to every student to complete his/her study with no burden. Because many universities are said to his/her students to get rid of the university in case you couldn't qualify your class in 2-3 years but in this case, IGNOU is the best university and much more other great qualities makes it great.* " is segmented into titles and review texts. Further, the review texts are segmented into sentences. These sentences are processed to extract aspects.

Opinion detection

Opinion mining is the process of computing people's opinion on posts, reviews, comments, news, etc., which are expressed in Blogs, Forums, Facebook, Twitter, YouTube, etc, In this model, MeaningCloud is used to detect opinions for the extracted feature set. The MeaningCloud performs various operations, namely, text classification, sentiment analysis, Language identification, topic extraction, and text clustering using an Application Programming Interface (API) Key. The sentiment analysis operation measures the polarity of each feature set as positive, negative and neutral. The proposed approach detects sentiment at the title level, document level, sentence level, and aspect level. Mathematically, $(T, R) = \{(t_1, r_1), (t_2, r_2), (t_3, r_3), \ldots, (t_n, r_n)\}$ where T and R represents the association between title and review respectively. $t_1, t_2, t_3 \ldots t_n$ represents titles associated with reviews. $r_1, r_2, r_3 \ldots r_n$ represents reviews associated with titles. Further, $(R, S) = \{(r_1, (s_1, s_2, s_3 \ldots s_n)), (r_2, (s_1, s_2, s_3 \ldots s_n)), \ldots, (r_n, (s_1, s_2, s_3 \ldots s_n))\}$. Where, R and S represent reviews and sentences of the reviews respectively. r_1 represents first review and $s_1, s_2, s_3 \ldots s_n$ represents sentences of the first review, and so on.

Title level opinion detection

A title is the first impression of a review. Normally, people look at the title first instead of going through the entire review. Reviews are written based on titles. The titles are very important to understand the interest and disinterest of people. Therefore, opinions are detected as positive, negative, and neutral at the title level.

Document level opinion detection

The opinions expressing at the document-level is not a single opinion. It is based on multiple opinions. The document level opinion mining aims to classify reviews as positive, negative, and neutral. For instance, "*Indira Gandhi National Open University based in Delhi is a very good option for those who are doing their job or preparing for something and at the same time want to complete their education. The best thing is that you can go for the exam in any month with your convenience. The syllabus is normal and it provides books or you can also get it online. The fee is normal in our range. The reputation of this university is quite good. You can learn from anywhere, at any age with your convenience. All types of 10+ 2 courses, degree courses, etc. are available. If you are planning to study with your job, then it is the best option available, just go for it.*" All sentences in this review expressed as positive except the sentence "*The fee is normal in our range*". Therefore, the above-mentioned review expresses an overall opinion as positive. Similarly, opinions are detected for all reviews at the document level.

Sentence level opinion detection

The sentence level opinion detection determines each sentence as positive, negative, and neutral. This level of opinion detection is closely related to subjectivity sentiment classification, which expresses subjective views and opinions of the opinion holder (Bing Liu, 2012). The opinions are detected for simple and compound sentences. The overall score is calculated by adding the maximum polarity and minimum polarity. For instance, the sentence "*during the admission, it was in my mind that it will be good to do a distance course or it will be a setback for my future but on being a part of IGNOU*" express both positive and negative opinions. For "admission" the sentence is positive, but for "future", the sentence is negative. The overall polarity of the sentence is detected as neutral. Similarly, sentiment polarity for each sentence is detected.

Aspect level opinion detection

The opinions expressed at the title level, document level, and sentence level do not express individuals likes and dislikes on opinion targets, The opinion targets are entities and its aspects (or attributes). This target expresses individuals and groups opinions exactly. At this level of analysis, the named entities and abstract concepts are identified. Then, a polarity value (positive, negative, neutral) is assigned to those entities and aspects. For instance, the sentence "*IGNOU is a very good university for those who don't want to go college or for those who are unable to go college*" is processed and extracted the entity "IGNOU" and aspect "University". The polarity of both entity and aspect are identified as positive opinion.

Visualization of opinions

Visualization is one of the best methods to communicate a message or knowledge information by creating images, diagrams, and animations. This makes an effective way to explore abstract ideas. Visualization techniques are used in many applications, namely, science, engineering, education, medicine, multimedia, etc. In this research, the extracted opinions at the title level, sentence level, document level and aspect level are visualized using Nodexl as shown in Fig. 2 - 5. In the visualization, first, the opinions, namely, P+, P, NEU, N, N+, and NONE are highlighted by blue color with a primary label (degree of the vertex) and secondary label (name of the vertex) in title level opinion detection. Second, the green, maroon, purple, fuchsia and blue colors are highlighted in document level opinion detection except for the opinion N+. Third, the yellow, green, red,

blue, olive, and violet colors are highlighted in sentence level opinion detection as well as aspect level opinion detection.

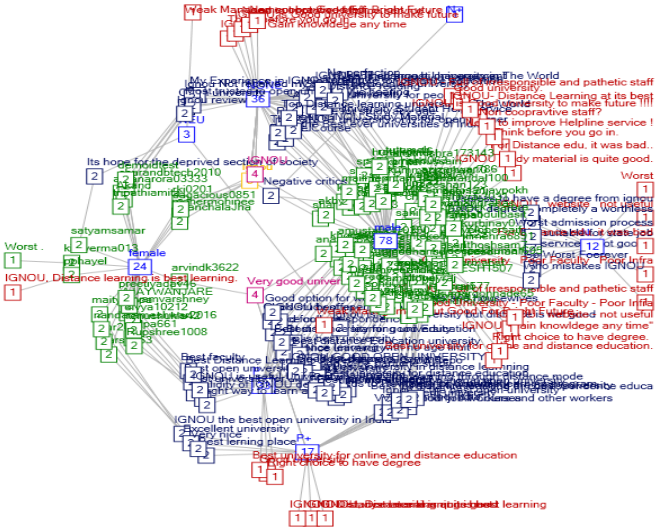

Figure 2. Visualization of title level opinion detection

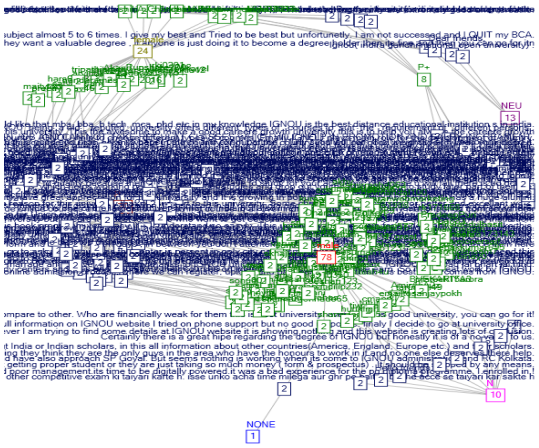

Figure 3. Visualization of document level opinion detection

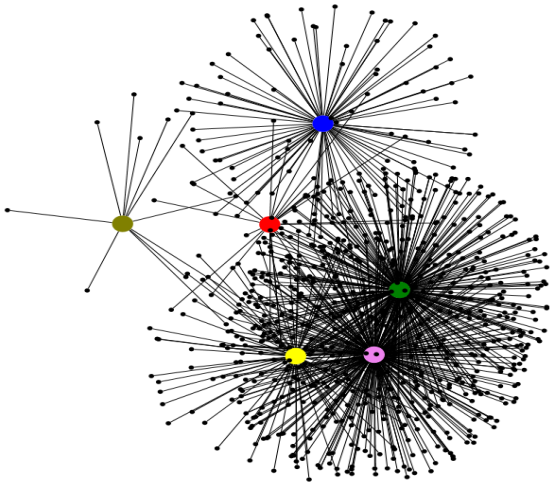

Figure 4. Visualization of sentence level opinion detection

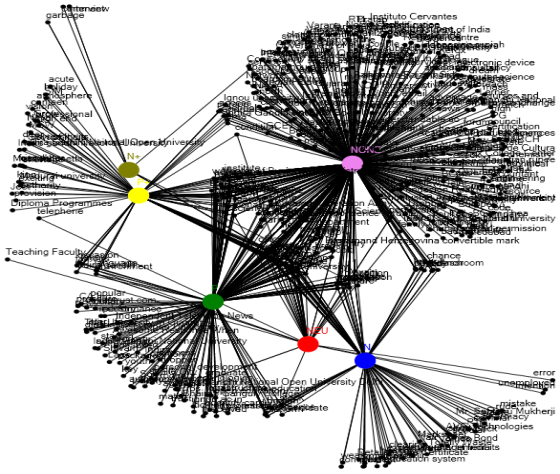

Figure 5. Visualization of aspect level opinion detection

Naïve Bayes Classifier:

In machine learning, Naive Bayes classifier is a probabilistic model based on Bayes' rule (Eq. 1) and a set of conditional independence assumptions. This classifier is used to assign the most likely class for each level, and it performs well for sentiment classification problems. The Naïve Bayes algorithm is fast and space efficient. It is also described as an independent feature model.

$$P(c_j|d) = \frac{P(c_j)P(d/c_j)}{P(d)} \quad (1)$$

Where $P(c_j|d)$ refers the probability of an event d in class c_j, $P(d|c_j)$ refers the probability of generating events d d in class c_j, $P(c_j)$ refers the probability of occurrence of class c_j, and $P(d)$ refers the probability of event d occurring.

The documents are generated as a multinomial event model by considering word frequency information. A document is represented as a bag-of-words model. The classifier checks the presence of a positive or negative or neutral opinion in each feature set. If the polarity word appears in the document, then the score is updated as one The probability of an event is obtained in a document based on equation (2).

$$P(d_i|c_j) = P(|d_i|)|d_i|!\prod_{t=1}^{|V|}\frac{P(w_t|c_j)^{N_{it}}}{N_{it}!} \quad (2)$$

Where $P(d_i|c_j)$ is represented as the probability of i^{th} document belong to the j^{th} class. $P(|d_i|)$ represents the probability of i^{th} document. $P(w_i|c_j)$ represents the probability of occurrence of i^{th} word in j^{th} class. N_{it} is the total occurrence of a polarity word t in the document d_i. The classification process is optimal for selecting the highest probable class with dependent features.

EXPERIMENTAL EVALUATION AND DISCUSSION

The open and distance education dataset was collected from online social media using the data collection process. This dataset is used to carry out the experiments at four levels, namely, title level, document level, sentence level, and aspect level. The features were extracted from the dataset as 102 titles, 102 documents, 783 sentences and 1683 aspects. Then, the opinions were detected by processing all these features using a MeaningCloud tool (http://www.meaningcloud.com). At each level, the opinions were detected as highly positive (P+), positive (P), neutral (NEU), negative (N), highly negative (N+), and objectives (NONE) as shown in Table 1. The objective statements have not expressed any opinions or meaningful statements. For experimental purposes, the highly positive and positive opinions are considered as a single positive class. Similarly, the highly negative and negative opinions are considered as a single negative class (Table 2). The neutral class has been used as it is detected. The objective statements are not considered for the experiment. Naïve Bayes classifier has been used to perform the classification task using the Weka data mining tool (Mark Hall, Eibe Frank, Geoffrey Holmes, Bernhard Pfahringer, Peter Reutemann, Ian H. Witten, 2009) at 10 cross fold cross-validation. First, the classification was performed at each level as shown in Table 4. Second, the classification was performed by combining all the feature sets, and performance of the system is predicted by

detailed accuracy in each class as shown in Table 5. The proposed system is evaluated using confusion matrices, precision, recall, f-measure, and accuracy.

Table 1. Opinion detection

Features	P+	P	NEU	N	N+	NONE	Total
Title level	17	33	3	12	1	36	102
Document level	8	70	13	10	0	1	102
Sentence level	77	288	22	87	11	298	783
Aspect level	145	417	43	107	11	960	1683

Table 2. Combining opinions as a single class

Features	P	NEU	N	Total
Title level	50	3	13	66
Document level	78	13	10	101
Sentence level	365	22	98	485
Aspect level	562	43	118	723
Combined Method	1055	81	239	1375

A three class confusion matrix is defined as shown in Table 3. The confusion matrix is also called as contingency table or an error matrix. It contains the classification result about actual and predicted classifications. The acutal class is represented in rows and predicted class is represented in columns. In the confusion matrix, A, B, and C are represented as a class, namely positive (P), negative (N), and neutral (NEU) respectively. The diagonal entires tpA, tpB, and tpC represent the number of correctly classified data for each class as positive, negative, and neutral. The remaining entries represent incorrectly classified data for each class. Precision is the fraction of predicted positive cases that were correct. The recall is the fraction of positive cases that were correctly identified (Howard J. Hamilton, 2012). Precision, Recall, F-measure, and accuracy are defined as follows. If there is high precision, then the system returns more relevant results. If there is a high recall, then the system returns most of the relevant results. The f-measure returns the weighted average of the precision and recall.

Table 3. Confusion Matrix

		Predicted		
		A	B	C
Actual	A	tpA	eAB	eAC
	B	eBA	tpB	eBC
	C	eCA	eCB	tpC

$$\text{Precision A} = \frac{\text{tpA}}{\text{tpA} + \text{eBA} + \text{eCA}}$$

Where tpA is the number of true positive predictions for the class A and eBA, eCA are false positives.

$$\text{Recall A} = \frac{\text{tpA}}{\text{tpA} + \text{eAB} + \text{eAC}}$$

Where tpA is the number of true positive predictions for the class A, and eAB, eAC are false negatives.

$$\text{F-measure} = 2 \times \frac{(\text{Precision} \times \text{Recall})}{\text{Precision} + \text{Recall}}$$

$$\text{Accuracy}=\frac{2\,x\,(\text{TruePositive}+\text{TrueNegative}+\text{TrueNeutrals})}{\text{TruePositive}+\text{FalsePositive}+\text{TrueNegative}+\text{FalseNegative}+\text{TrueNeutrals}+\text{FalseNeutrals}}$$

Table 4. Classification result using confusion matrices

Feature level		P	N	NEU	Precision (%)	Recall (%)	F-measure (%)	Accuracy
Title level	P	50	0	0	75.75	100	86.20	75.76
	N	13	0	0	0	0	0	
	NEU	3	0	0	0	0	0	
Document level	P	78	0	0	77.22	100	87.15	77.23
	N	10	0	0	0	0	0	
	NEU	13	0	0	0	0	0	
Sentence level	P	365	0	0	75.25	100	85.88	75.26
	N	98	0	0	0	0	0	
	NEU	22	0	0	0	0	0	
Aspect level	P	562	0	0	77.73	100	87.47	77.73
	N	118	0	0	0	0	0	
	NEU	43	0	0	0	0	0	

Table 5. Proposed classification result using confusion matrices

Feature level		P	N	NEU	Precision (%)	Recall (%)	F-measure (%)	Accuracy
Title level	P	50	0	0	89.29	100	94.34	90.91
	N	3	10	0	100	76.92	86.95	
	NEU	3	0	0	0	0	0	
Document level	P	78	0	0	91.76	100	95.71	90.10
	N	0	10	0	76.92	100	86.96	
	NEU	7	3	3	100	23.08	37.50	
Sentence level	P	365	0	0	99.46	100	99.73	94.85
	N	0	95	3	82.61	96.94	89.20	
	NEU	2	20	0	0	0	0	
Aspect level	P	562	0	0	93.20	100	96.48	94.05
	N	0	118	0	98.33	100	99.16	
	NEU	41	2	0	0	0	0	

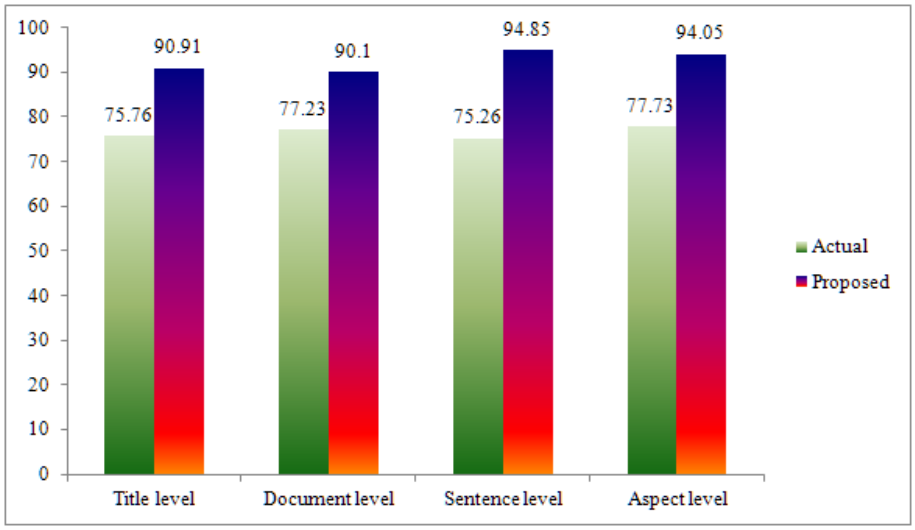

Figure 6. Comparison of accuracy between actual and proposed

In this system, the accuracy was obtained for the title level, document level, sentence level, and aspect level is 75.76%, 77.23%, 75.26%, and 77.73% respectively. The average accuracy of the actual system is 76.50%. The proposed system achieves the accuracy of 90.91%, 90.10%, 94.85%, and 94.05% for each class. The average accuracy of the proposed system is 92.48% with 69% precision and 66% recall.

CONCLUSION

Online social media contents are steadily growing day by day about the open and distance education. It's become more useful to the public for decision-making purpose, improving the quality of education, quality of service, creating policy, etc. In this research paper, a multi-aspect based opinion mining system is proposed for open and distance education to measure the satisfaction of the public . The proposed system is too general, it could be used in any fields like education, medical, engineering, science, etc. The system was implemented by applying various steps, namely, data collection process, data preprocessing, feature extraction, opinion detections, opinion visualization, classification, and evaluation. A highlight of this research is measuring the public opinion about IGNOU using online reviews, and by applying the Naïve Bayes sentiment Classification algorithm at the title level, document level, sentence level, and aspect level. The experimental results reveal that the proposed system achieved 92.48% accuracy than the actual system. In future research, the performance of the proposed system could be compared with Sentiment140, SentiStrength, and SentiWordNet, and also ranks the open and distance Universities based on aspects.

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ASSESSING LEARNER READINESS ON THE USAGE OF LETURE PODCASTS

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ABSTRACT
This study focused mainly on the learners' perspective and experiences with regard to the usage of lecture podcasts as opposed to the researcher's perspective. To obtain the learners' perspective, hypotheses were formulated to guide the study. Quantitative methods were employed to collect data and perform statistical analysis. Four hypotheses were fully supported whilst only one hypothesis was rejected. The outcome of the study attested that generally, learners are very receptive to podcasting technology and that lecture podcasts helped to enhance learning and accommodate different learners. This practice led to improved test grades. However, learners also indicated that lecture podcast should complement the traditional lecture.
Keywords: learners' perspective, quantitative methods, hypotheses

INTRODUCTION

Previous studies (Fernandes 2009; Lau 2010; Walls 2010; Evans 2008; Zhu 2010; Lazzari 2008; Hew 2009; and Maharaj 2010) reported positive effects regarding the use of podcasting in higher education although a small proportion of researchers (Dupagne, 2009 and Bensalem, 2011) reported relatively negative effects in their study findings. It is therefore pertinent and significant that the learners' perspective be taken into account in an attempt to ensure that optimism is conserved and any negative elements that may hamper academic success rate are discovered and resolved scientifically. To this end, the study was undertaken to investigate the learners' perspective with regard to the usage of lecture podcast. The following hypotheses were formulated in that regard to obtain the learners experiences and perspective on the usage of lecture podcasts;

HYPOTHESES FORMULATION

- H1 - If lecture podcasts are used, learning will be enhanced.
- H2 - If lecture podcasts are used, different (bright and slow) learners will be accommodated.
- H3 - If lecture podcasts are used, learners will revise the work using podcasts instead of textbooks.
- H4 - If lecture podcasts are used, the learners' academic performance will be improved.
- H5 – Age, gender or ethnicity has no influence on the usage of lecture podcasts.

METHODOLOGY

The study employed a quantitative research approach. Quantitative research approach explains the phenomena by collecting numerical data that is analyzed using mathematically or statistically based methods. In this study, the learners' views or opinions were obtained through an electronic questionnaire that was based on the research hypotheses. The research strategy used in the study was a survey in which a five likert scale questionnaire was distributed to a stratified random sample of 75 learners who are enrolled for a diploma in Management Sciences at Tshwane University of Technology. The electronic questionnaire was distributed through the university's learning management system (LMS) called MyTUTOR (Blackboard). Apart from the questionnaire data, published literature on podcasting as indicated in the introduction section was reviewed. Online databases (e.g. Science direct, ProQuest, Emarald, Ebschost, and google scholar) were the main sources of data that was used in the study.

DATA ANALYSIS

Statistical data analysis was performed using Stata V12 Statistical Software. The five likert scale electronic questionnaire used the scale Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A) and Strongly Agree (SA). The codes (A1 to E3) that have been used in the frequency tables below represent the following variables which were used in the questionnaire in the quest to test the hypotheses enumerated above:

H1
A1: Using lecture podcasts has positively changed my learning approach
A2: Using lecture podcasts made learning easier for me
A3: Learning content delivered in the form of a lecture podcast is more understandable than studying from the textbook or notes
H2
B1: I have listened to a lecture podcast on a specific topic once only

B2: I have listened to a lecture podcast on a specific topic multiple times
B3: I prefer to use a lecture podcast to revise a lecture in a private setting (e.g. home)
B4: I prefer to use a lecture podcast to revise a lecture anywhere at any time (e.g. library, in transport, on the move)
B5: I listen to the entire lecture podcast every time

H3
C1: I study effectively when I use a textbook and notes only
C2: I study effectively when I use a lecture podcast only
C3: I study effectively when I complement textbook with a lecture podcast
H4
D1: Using lecture podcasts helped me improve my test scores
H5
E1: Indicate your ethnic group
E2: Indicate your age group (in years)
E3: Indicate your gender

FREQUENCY TABLES DERIVED FROM STATA V12

H1:

A1	Freq.	Percent	Cum.
A	19	26.76	26.76
N	2	2.82	29.58
SA	50	70.42	100.00
Total	71	100.00	

DESCRIPTION – TBL A1:
Table A1 depicts that 70% of the respondents strongly agree that using podcasts has improved their learning aspirations and attitudes whereas 27% just agreed. The remaining 3% selected the neutral response. None of the learners opted for disagree or strongly disagree options. This showed that a large proportion of learners (n=69) or 97% of learners support and appreciate the usage of the lecture podcasting in the classroom as a method of enhancing/improving learning.

A2	Freq.	Percent	Cum.
A	21	29.58	29.58
N	2	2.82	32.39
SA	48	67.61	100.00
Total	71	100.00	

DESCRIPTION – TBL A2:
Table A2 illustrates that 68% of the learners strongly agreed that using lecture podcasts has made learning easier for them whereas 29% just agreed. 3% of the learners selected the neutral option. Most of the respondents (n=69) are convinced that using lecture podcasts simplified learning for them. Only a small number of the respondents felt undecided about whether lecture podcasts assisted in simplifying their learning experiences or not. There were no “strongly disagree” or “disagree” options chosen on this variable.

A3	Freq.	Percent	Cum.
A	23	32.39	32.39
D	1	1.41	33.80
N	35	49.30	83.10
SA	12	16.90	100.00
Total	71	100.00	

DESCRIPTION – TBL A3:
Table A3 shows that only 17% of the learners indicated that they understand and prefer a lecture that is delivered in the form of a podcast as opposed to a textbook lecture. 33% of the learners just agreed whereas a large percentage of the learners (49%) selected a neutral option. Only a small percentage of learners (1%) disagreed.

On this variable, 50% of the learners indicated that they can relate to and understand a lecture podcast better than studying from a textbook whilst 49% of the learners are undecided. Only 1% of the learners disagreed.

H2:

B1 |	Freq.	Percent	Cum.
A |	16	22.54	22.54
D |	23	32.39	54.93
SA |	17	23.94	78.87
SD |	15	21.13	100.00
Total |	71	100.00	

DESCRIPTION – TBL B1:
In Table B1, it can be observed that 24% of the learners strongly agreed that they listened to the lecture podcast on a specific topic only once whereas 21% strongly disagree. 23% agreed and 32% disagreed that they listened only once to a lecture podcast.

B2 |	Freq.	Percent	Cum.
A |	18	25.35	25.35
D |	8	11.27	36.62
N |	7	9.86	46.48
SA |	19	26.76	73.24
SD |	19	26.76	100.00
Total |	71	100.00	

DESCRIPTION TBL – B2:
Presented in Table B2, it is viewed that an equal number of learners strongly agreed (27%) and 27% strongly disagreed to listening to a lecture podcast on a specific topic multiple times. The table indicates that 52% of the learners were provided an opportunity to attend (listen to a lecture podcast) multiple times or repeatedly to enforce understanding of the subject. 38% of the learners did not need revision on a specific topic and as a result they had a prerogative of deciding not to listen to the lecture podcast over and over again.

B3 |	Freq.	Percent	Cum.
A |	12	16.90	16.90
D |	24	33.80	50.70
N |	4	5.63	56.34
SA |	4	5.63	61.97
SD |	27	38.03	100.00
Total |	71	100.00	

DESCRIPTION TBL – B3:
Vied in table B3 is that 38% of the learners strongly disagreed that they listened to a lecture podcast in a private setting. 34% disagreed. Only 6% strongly agreed whilst 17% agreed. The remaining percentage (5%) opted neutral. The table shows that 72% of the learners used a mobile device to listen to a lecture podcast on the move "go" since they disagreed to have listened to a lecture podcast in a private setting like home. It can be further elaborated that 72% of the learners have utilized their time constructively because normally they would not have studied on the "go" using a textbook. Only 23% of the learners preferred to listen to a lecture podcast in a library or home.

B4 |	Freq.	Percent	Cum.
A |	30	42.25	42.25
D |	7	9.86	52.11
SA |	31	43.66	95.77
SD |	3	4.23	100.00

Total	71	100.00

DESCRIPTION TBL – B4:

Table B4 shows that 44% strongly agreed and 42% agreed that they listened to a lecture podcast in a public setting or "on the move" whereas only a small percentage of 4% strongly disagreed and 10% disagreed. Similar to the preceding table, the current table depicts that a large proportion of the respondents (n=61)or 86% of the learners have listened to lecture podcasts every time they got an opportunity regardless of the location they found themselves in. Only a small proportion of learners (n=10) or 14% of the respondents preferred to study in a private space.

B5	Freq.	Percent	Cum.
A	3	4.23	4.23
D	30	42.25	46.48
SA	3	4.23	50.70
SD	35	49.30	100.00
Total	71	100.00	

DESCRIPTION TBL – B5:

List in table B5, 49% of the learners strongly disagreed that they listened to an entire lecture podcast whereas only 4% strongly agreed. 43% disagreed and only 4% agreed. Most of the respondents (n=65) or 92% indicated that they have not listened to the entire lecture podcast (all the podcast episodes). This implies that 92% of the learners had freedom to choose what they had to or wanted to listen to or study. The remaining percentage of the respondents,(8%) have listened to all the podcast episodes. This shows that 8% of the respondents really needed to study all the podcast episodes and for this reason again the opportunity was provided.

H3:

C1	Freq.	Percent	Cum.
A	9	12.68	12.68
D	15	21.13	33.80
N	4	5.63	39.44
SA	4	5.63	45.07
SD	39	54.93	100.00
Total	71	100.00	

DESCRIPTION TBL – C1:

Presented in table C1, 55% of learners strongly disagreed that they study effectively when using only traditional learning mechanisms (textbooks and notes). 6% strongly agreed. 21% disagreed as opposed to 13% who agreed. 5% of the learners opted neutral. 76% of the learners have indicated that they don't study effectively when they are confined to using traditional mechanisms only. 19% of the respondents indicated that they still believe that traditional mechanisms are effective tools of learning whilst 5% of the learners is undecided (neutral).

C2	Freq.	Percent	Cum.
A	15	21.13	21.13
D	6	8.45	29.58
N	31	43.66	73.24
SA	14	19.72	92.96
SD	5	7.04	100.00
Total	71	100.00	

DESCRIPTION TBL – C2:

Highlighted in table C2, 20% of learners strongly agreed that they study effectively using lecture podcasts only, whereas only 7% strongly disagreed. 21% agreed as opposed to 8% that disagreed. 44% opted neutral. From this scenario, it is deduced that a large percentage (41%) of the learners are in favour of studying with lecture podcasts although 15% of the learners disagree. Although almost an equal number of students are in favour of lecture podcasts, 44% of the learners are not sure whether they prefer traditional learning mechanisms or lecture

podcasts.

C3	Freq.	Percent	Cum.
A	15	21.13	21.13
D	6	8.45	29.58
N	2	2.82	32.39
SA	45	63.38	95.77
SD	3	4.23	100.00
Total	71	100.00	

DESCRIPTION TBL – C3:
Outlined in table C3, a large percentage of learners (63%) strongly agreed that they study effectively when they complement traditional learning mechanisms (textbooks and notes) with technology (lecture podcasts) as opposed to only 4% that strongly disagreed. 21% agreed and only 9% disagreed. 3% opted neutral. The table indicates that 84% of the learners preferred to use both traditional learning mechanisms and lecture podcasts to study. 13% of the learners preferred to use either textbooks or lecture podcasts.

H4:

D1	Freq.	Percent	Cum.
A	27	38.03	38.03
D	2	2.82	40.85
SA	42	59.15	100.00
Total	71	100.00	

DESCRIPTION TBL – D1:
Presented in Table D1, a large proportion of learners i.e. 59% strongly agreed that the use of lecture podcasts helped them improve their academic performance (test scores). 38% also agreed whereas only 3% disagreed. This table depicts explicitly that the introduction and use of podcasting technology in the classroom has assisted learners to improve their academic performance as exhibited by 97% of the learners who agreed that their test scores have improved after studying with the aid of lecture podcasts. A very small percentage of the learners (3%) disagree that lecture podcasts assisted them to improve their test scores.

H5:

E1	Freq.	Percent	Cum.
African	33	46.48	46.48
Coloured	16	22.54	69.01
Indian	9	12.68	81.69
White	13	18.31	100.00
Total	71	100.00	

DESCRIPTION TBL – E1:
The sample ethnic distribution was as follows as seen in table E1, Africans (46%, n=33), Coloured (23%, n=16), Indians (13%, n=9) and White (18%, n=13).

E2	Freq.	Percent	Cum.
15 to 20	38	53.52	53.52
20 to 25	17	23.94	77.46
25 to 30	11	15.49	92.96
30 to 35	5	7.04	100.00
Total	71	100.00	

DESCRIPTION TBL – E2:
The age groups presented in table E2 is that of 15 – 20 years (54%, n=38), 20 – 25 years (24%, n=17), 25 – 30 years (15%, n=11) and 30 – 35 years (7%, n=5).

E3	Freq.	Percent	Cum.
Male	43	60.56	93.52
Female	28	39.43	39.46
Total	71	100.00	

DESCRIPTION TBL – E3:
In conclusion, in table E3, the gender distribution of the respondents ise presented. There were 43 male learners (61%) and 28 female learners (39%).

FINDINGS

H1 has been completely supported by 97% of the learners and only 3% opted neutral. Therefore H1 confirmed that the use of lecture podcasts had a positive impact and enhanced learning.
H2 was fully supported. Just over half of the learners (53%) indicated that they listened to podcasts on specific topics multiple times whilst others (47%) have listened only once. Learners (72%) also used their time constructively while they were "on the go" to study whilst others (28%) preferred to study in a private place like home. This shows that the lecture podcast accommodated different learners and catered for different learning needs because it allowed learners the autonomy to choose topics they needed to study from the index. Learners could also decide to lesson to specific sections of the topic or listen to the whole topic presentation.
H3 was rejected. 84% of the learners indicated that they prefer to complement lecture podcasts with textbooks and/or notes. Only 16% of the learners indicated that they prefer to use only lecture podcasts to study.
H4 is supported. 97% of the learners agreed that the usage of lecture podcasts assisted them to improve their test marks. Only 3% of the learners disagreed.
H5 is supported. All the age groups that were represented (97%) agreed that the usage of lecture podcasts in the classroom helped them to understand the content and improve their test grades. Only 3% of the learners did not agree. The ethnic groups have all responded positively about the use of the lecture podcasts and believe that it is a method that will assist them to perform well academically.

CONCLUSION

The study attested that learners are very receptive to podcasting technology regardless of age, gender or ethnicity. Through the use of lecture podcasts, learning attitudes are positively changed and learning is enhanced. This study has also affirmed that all learners (average, above and below average) have been accommodated by using podcasting technology in that learners could choose episodes to listen to from the indexes, choose a section from within an episode, rewind or fast forward the episode. Below average learners had an opportunity to listen to the same lecture multiple times as they wished whereas average learners indicated that they listened to a section of an episode once only. It is transparent that podcasting technology accommodated different types of learners. Learners reported that the use of lecture podcasts assisted them in improving the test grades. However, the study also reported that lecture podcasts alone are not sufficient to equip learners with the necessary information and knowledge. The traditional methods remain vital. Majority of the learners reported that they prefer to complement the lecture podcast with notes or textbook. Therefore, a lecture podcast should not substitute the traditional lecture but rather complement it.

Based on the findings and conclusions of this study, the researcher recommends that podcasting should be incorporated into blended teaching and learning environments in the quest to provide constant learner support anytime, anywhere and increase lecturer-learner contact time and accommodate diverse learners with various learning needs, consequently improving the learners' academic performance (learning outcomes).

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DISTANCE EDUCATION : INNOVATIVE AND EFFECTIVE PEDAGOGY

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ABSTRACT

Open and distance learning today has gained its momentum both in popularity and effectiveness amongst those who have not got the opportunity to join formal mode of education due to various reasons like inadequate time or financial hardship. Despite this, it is felt that the system of open and distance learning can be made more effective and result-oriented particularly in the Indian context. Some new innovative strategies can be developed to be included in this system, which is being analyzed and highlighted through this paper. The role of Information & Communication Technology (ICT) in education is very crucial in today's pedagogy for an improved system of knowledge sharing. The present paper tries to suggest some strategies by which the ICT will be used as a tool for effective teaching-learning. The Government has notified that the qualification earned through open & distance learning mode is at par with that of the formal mode of education. This has complimented in attracting more and more working people towards this system of education through which such people can fulfill their desires of strengthening their academic career while in service.

The recent trends of open & distance learning have also created some negative impressions in the academic fraternity mainly owing to the unfair and illegal means through which degrees are improperly awarded by some institutions offering such programmes. While dealing with such illegal practices, the authorities have even closed down a number of institutions offering courses in the open and distance mode. This paper endeavours to find out the best ways to obtain assured quality education and steps to improve the existing system of open and distance learning for a country like India.

Keywords : Open & distance learning, formal education, innovative strategies, ICT, pedagogy, tool.

1.1 Introduction:

Open and Distance Learning (ODL) is a system wherein teachers and learners need not necessarily be present for the exchange of knowledge, which is barrier-free and flexible in terms of age, time, place, eligibility criteria for admission, etc. ODL system is usually owned by IGNOU, some state open universities, and some institutions as well as universities with dual mode (*both traditional & ODL*) of education. This system has been more significant for continuing education to those who were not so fortunate to have formal education in their lives, both from advantageous and disadvantageous locations, and to the working personnel who can take help of the system for enhancing their skills. The regulatory powers on ODL are now vested on the Distance Education Bureau, UGC.

The system of ODL in India has been running since 1982, but the popularity has gained its momentum since just a few years ago. As much as the academic world has become more and more large, the world has become more competitive and it has been difficult enough to get admitted in renowned institutions for which the learners have started taking shelter of ODL system. The number of learners through the ODL system has been growing every year, which resulted in an increase in the number of ODL institutions/Universities. This growth of the ODL system has been able to engage a good number of unemployed youths, and at the same time, the mode and the standard of this type of education has come under scrutiny. There are many private institutes/Universities that have started adopting unfair means for earning easy money by giving degrees/diplomas without any rigorous interventions. These types of illegal practices have also made some institutes/universities compelled to closure. There is a growing demand by a section of the society to invalidate the degrees/diplomas earned through ODL system for progression to higher studies and employment because of these unfair practices by a few institutions. However, this demand is very unfortunate and a big slap to those learners who have honestly and sincerely completed their education through the ODL system and earned reasonable degree/diplomas even carrying very good marks. At this point of time, the question of standard or quality of the education through ODL system arises. Here, the significance of some innovative pedagogy comes up that are to be introduced in the system, which will not only be effective but also will ensure the quality of education in the system. This paper tries to forward some suggestive measures by which, innovative and effective pedagogy can be executed and implemented in the ODL system.

Here are some definitions of the ODL system of education that were presented by many academic intellects years ago:

"Distance education implies that the majority of educational communication between (among) teacher and student(s) occurs non-contiguously (at different times and at separate places – separating the instructor-tutor from the learner). It must involve two-way communication between (among) teacher and student(s) for the purpose of facilitating and supporting the educational process. It uses technology to mediate the necessary two-way communication" (Garrison & Shale, 1987, p. 11).

Some authors have defined DE from the perspective of dominant technologies:

"Telecommunications-based distance education approaches are an extension beyond the limits of correspondence study. The teaching-learning experience for both instructor and student(s) occurs simultaneously – it is contiguous (same time) in time. When an audio and/or video communication link is employed, the opportunity for live teacher-student exchanges in real time is possible, thereby permitting immediate response to student inquiries and comments. Much like a traditional classroom setting, students can seek on–the-spot clarification from the speaker" (Barker et al, 1989, p. 25).

Elsewhere, in a book on ICTs in distance education, the authors say the term distance education refers to:

"*... teaching and learning situations in which the instructor and the learner or learners are geographically separated, and therefore, rely on electronic devices and print materials for instructional delivery. Distance education includes distance teaching – the instructor's role in the process – and distance learning – the student's role in the process*" (Portway & Lane, 1994, p. 195).

SOME OF THE TOP ODL SYSTEMS IN INDIA:

2.1 Indira Gandhi National Open University (IGNOU) :

IGNOU is the largest distance education university in the world which came into existence in 1985. It merely started with two programmes of study with 4528 students and today, it has grown up to 228 programmes, 4 million students around the world, 810 faculty members, 574 Academic Staff and 33,212 Academic Counselors. Observing the above figures, one can easily understand the size of the network of this University. This University has been providing education in the ODL mode since its inception and producing a huge number of graduates every year. Apart from having all the traditional facilities of teaching learning tools, IGNOU owns different modern ICT enabled infrastructure for delivering education through ODL mode. It also has an e-Library, comprising of 48000 numbers of e-books and 21 lakh full text academic articles which are freely accessible by the learners or anybody who wants other than learners of IGNOU also, and these can be used for the purpose of learning and research. The University has created an archive of the audio-video catalogue, which is going to be accessible soon. For facilitating the learners, many helpline numbers are made available 24x7 for various academic and administrative purposes. It is mention worthy that this University has kept the provisions for online admissions also to enable learners to get admitted within a few clicks of the mouse which saves both time and money to a large extent. In 2004, IGNOU started ***Edusat*** bringing a revolution in the ODL system, which is purely devoted to two-way of pedagogy through video conferencing, and facilitates a classroom-atmosphere (virtual classroom). Learners can now easily clear their doubts through face to face virtual interaction with the subject experts or faculties of IGNOU. To encourage the learners, IGNOU has facilitated railway concessions also for its students for face to face interactions. All these have made the university a global leader, and helped in achieving awards of excellence on many occasions. It has today 21 schools and a network of 67 regional centres, 2667 study centres, and 29 overseas centres in 15 countries.

2.2 State Open Universities (SOUs) :

There are 13 state open universities that provide education only in distance mode in this country. We can see also many universities in India which provide dual mode of education, viz. *traditional classroom teaching* and *Open and Distance Learning*. These Universities cater to people who are unable to pursue the regular courses due to various reasons. They also play crucial role in shaping the career growth of the learners who are already employed.

S.No.	Name of the SOU	Address
1.	Dr. B.R. Ambedkar Open University (BRAOU), Hyderabad, A.P. - (1982)	Prof. G. Ram Reddy Marg Road No.46, Jubilee Hills, Hyderabad - 500033
2.	Vardhman Mahaveer Open University (VMOU), Kota, Rajasthan - (1987)	Rawatbhata Road, Akhelgarh, Kota-324010, Rajasthan
3.	Nalanda Open University (NOU). Patna, Bihar - (1987)	IIIrd Floor, Biscomaun Bhawan, West Gandhi Maidan, Patna - 800001, Bihar
4.	Yashwantrao Chavan Maharashtra Open University (YCMOU), Nashik, Maharashtra - (1989)	Dnyanagangotri, Near Gangapur Dam, Nashik-422222, Maharashtra

S.No.	Name of the SOU	Address
5.	Madhya Pradesh Bhoj Open University (MPBOU), Bhopal, M.P. - (1991)	I.T.I (Gas Rahat), Building Govindpura, Bhopal – 462 023
6.	Dr. Babasaheb Ambedkar Open University (BAOU), Ahmedabad, Gujarat - (1994)	Govt. Bungalow No.9, Dafnala, Shahi Baug, Ahmedabad-380003, Gujarat
7.	Karnataka State Open University (KSOU), Mysore, Karnataka – (1996)	Manasagangotri, Mysore - 570006, Karnataka
8.	Netaji Subhas Open University (NSOU), Kolkata, W.B. - (1997)	1, Woodburn Park, Kolkata -700020, West Bengal
9.	U.P. Rajarshi Tandon Open University (UPRTOU), Allahabad, U.P. - (1998)	17, Maharshi Dayanand Marg (Thornhill Road), Allahabad, Uttar Pradesh
10.	Tamil Nadu Open University (TNOU), Chennai, Tamil Nadu - (2002)	Directorate of Technical Education Campus, Guindy, Chennai-600 025
11.	Pt. Sunderlal Sharma Open University (PSSOU), Bilaspur, Chhattisgarh - (2005)	Near Pandit Deen Dayal Upadhayay Park, Vayapar Vihar, Bilaspur (Chattisgarh) -495001
12.	Uttarakhand Open University, Haldwani, Distt. Nainitall, Uttarakhand	Teenpani Bypass Road, Transport Nagar, Haldwani-263139, Distt. Nainital, Uttarakhand
13.	Krishna Kanta Handique State Open University, Guwahati, Assam (2007)	Housefed Complex, Last Gate, Dispur, Guwahati – 781006, Assam

Out of the above 13 state open universities, two universities, *-Dr. B.R. Ambedkar Open University, Hyderabad* and *Krishna Kanta Handique State Open University, Guwahati* have been taken into consideration deliberately for the purpose of analysis and discussions. The reason for choosing these two universities is that the first one is the oldest and the other is the newest one.

Dr. B.R. Ambedkar Open University, the first of its kind in the country, established in 1982 with a vision - '*Education at Your Doorstep'***.** Today, it has 206 study centres throughout the state of Andhra Pradesh, with a *multi-media teaching-learning approach* which broadly comprises self-learning print study material, supported by audio, video lessons and regular broadcast of lessons through Radio and Television. Apart from having telecast facilities of video lessons through regional Doordarshan, the university also provides interactive teleconferencing during weekends. This university has recently adopted the digital mode of education (online course) whereby the learners can learn through ICT enabled tools and earn degrees through online mode of study.

At present, the Central Library and Study Centre Libraries of the university have a collection of 1, 47,688 books and non-book material in different languages. It subscribes to 20 newspapers (English newspapers 8, Telugu 8, Hindi 1 and Urdu 3) and 128 journals (98 Indian and 30 foreign) for the Central Library.

Krishna Kanta Handique State Open University(KKHSOU) is the newest State Open University of India established in Assam in 2007. Being the first and sole Open University in the entire north-east region, the university enjoys the privileges of having received huge numbers of learners from the region every year. The motto of the university is '*Education Beyond Barriers*' of age, academic background and geographical boundaries. The university has at present 40 academic programmes of study in various disciplines, the course curriculum of which are designed at par with the national curriculum. One unique feature of this university in the curriculum is that, it has a Bachelor Preparatory Programme (BPP) which provides education at the level of higher secondary education (of two years) and also, a BPP course for 06 months duration which is given to the H.S. Passed students prior to admission into B.Com/BCA/BBA programmes. The university also has number of ICT enabled courses of study. KKHSOU has been running Diploma in Elementary Education (D. El. Ed) for in-service school teachers since a couple of years back. Starting with only 79 study centres, the university has reached up to 220 study centres with 24000 enrollments today. To help learners clearing their doubts with their faculty members, the university started phone-in programmes in All India Radio two years back. It also facilitates the mobile phone sms service and e-mail communications to the learners for keeping them updated from time to time.

3.1 Commonwealth of Learning (COL):

The Governments of Commonwealth countries established Commonwealth of Learning (COL) through a Memorandum of Understanding between these countries in 1988 with its headquarters at Vancouver. It is an intergovernmental organization created to encourage the development and sharing of distance education knowledge, resources and technologies. It is helping the developing nations to improve quality of education and training. COL is the only intergovernmental organization which is solely dedicated to promoting and delivering distance education and open learning. COL is funded by the Commonwealth countries voluntarily, and India is third major contributor after England and Canada. India is represented on the Board of Governors and Executive Committee of COL through Secretary, in-Charge of Higher Education. COL has emphasized on activities in the instructional materials, telecommunication technology and training and information service.

3.2 SAKSHAT: *A One Stop Education Portal*

Keeping in mind the objective of facilitating lifelong free learning for students, teachers and those who are already in employment, or in pursuit of knowledge, the pilot project 'SAKSHAT' was launched in 2006 by the then President of India. The content development task for 'SAKSHAT' was looked after by the Content Advisory Committee (CAC) for the respective subject, which consisted of representatives from many renowned educational institutions, bodies, prominent academicians and NGOs.

"*The scheme is to provide connectivity to all institutions of higher learning to world of knowledge in the cyber space, to leverage the potential of ICT, in providing high quality knowledge modules with right e-contents, to address to the personalized needs of learners, in order to take care of their aspirations. These modules are to be delivered through 'SAKSHAT'. The scheme may also have a provision of certification of competencies of the human resources acquired through formal or non-formal means as also to develop and maintain the database of profile of human resources.*"

3.3 Massive Open Online Course:

A **massive open online course** is an online course of study which will have opportunities for unlimited participations and open access via the web. This will also provide a common platform for interactions where the teachers, students and other participants will be able to participate in the community interactions in addition to the traditional form of knowledge sharing. MOOCs being the widely researched recent development in the ODL system were introduced in 2008 and popularly emerged as an innovative mode of learning in 2012.

"*Early MOOCs often emphasized open-access features, such as open licensing of content, structure and learning goals, to promote the reuse and remixing of resources. Some later MOOCs use closed licenses for their course materials while maintaining free access for students*."

Recognition of Academic Qualifications and Degrees:

On receipt of numbers of requests seeking clarification regarding the recognition of degrees/ diplomas earned through ODL system for the purpose of employment and admission for further studies, the Distance Learning Division of the Ministry of Human Resource Development has made following clarifications public:

- "*It is up to the concerned academic institution/university to recognize the qualification including certificate diploma, degree, etc. for the purpose of academic pursuit, i.e. continuing education for acquiring another academic qualification, with it. As regards recognition of academic qualifications for the purpose of employment, it is the prerogative of the concerned employer to take a view on the recognition of the degree, diploma, etc.*"
- "*Central Government, as an Employer, had made its position clear in respect of academic qualifications; acquired through distance mode of education, for the purpose of employment under it, vide Gazette Notification No.44 dated March 1, 1995.*"

"*The Gazette Notification referred to above is equally applicable to the qualifications acquired from private as well as public institutions/universities.*"

SUGGESTIONS:

4.0 Proposed reformations for the ODL system :

It has been frequently observed that a section of the society claims that the quality of study through the ODL system has deteriorated as compared to that of traditional or formal mode of education. Hence, they want that the degrees/diplomas acquired through ODL should not be considered to be eligible for applying for any higher studies or for any employment. Keeping this in mind and to save, the greater interest of the public and the society in the ODL system, some reformative suggestions are being discussed below:

4.1 Entrance examination for admission:

As all are aware that every educational institution uses the mechanism of entrance examination for admission into their programmes and in some cases, the admission is allowed on the basis of the marks obtained in the previous examinations. This helps the concerned institutions in maintaining their standard or quality of education and at the same time, the students also get rid of any kind of probable biasness in the admissions. The same method can be applied in the ODL system also. But here, the main objective of the ODL system may be questioned. Some will say that if this is the case, then what difference between formal and ODL systems of education will be. Then the straightforward answer should be that there should be no compromise in the quality of education, either it is earned through formal mode of education or it may be through an ODL system of education. The main objective of the ODL system should be to provide the opportunity for learning and earning degrees to those interested people who were unable to go through the formal mode of education due to lack of time and money factors as well as various other reasons, but not because of the poor academic performances are being dropouts from the previous courses. Otherwise, the threat for the learners and teachers of the ODL system will definitely arise one day or the other. However, to accommodate those who are dropouts or having very poor academic performances in earlier courses of study, **another third modality or system under the same ODL mechanism should be introduced**, whereby only this particular section of learners (*whose main objective is not to earn degrees for any employment or any other purpose other than just learning and acquiring degrees for fulfilling their desires of being learned*) should be accommodated.

4.2 Course curriculum:

Since, the quality of education in any system (*either formal or ODL*) cannot be compromised in any case, therefore the course curriculum should also not deviate from the mainstream curriculum that are designed for the formal mode of education. In addition, the question papers that are set for the formal learners, the same should be provided to the learners of ODL system. It should be presumed that the learners under ODL are competent enough to entertain the same kind of examination pattern with that of the learners of formal mode. This will not only help in maintaining the standard of education, but also will enhance the self-confidence and satisfaction of the learners. Otherwise, under the ongoing process of ODL pedagogy, the learners of the ODL system are generally considered inferior as compared to the formal mode learners, and always try to question about their competency and credibility of learning and acquisition of knowledge.

4.3 Classes for ODL:

Earlier, the mode of teaching-learning in the ODL system of education was of one-way of transmission. Learners had to read themselves the printed study materials provided to them through postal communication or by counter collection, to understand the written content and then to produce at the time of examination. Of late, the system of delivering classroom teachings (contact programmes) for the learners of ODL systems during the weekends has been practiced by many institutions, which is definitely an affirmative step in making the ODL system of education more effective and learner-centric. This type of pedagogy may be termed as semi-formal education which provides the same opportunity for the learners as enjoyed by the learners of formal mode education. The ODL institutions generally engage the personnel who have qualified NET or completed a PhD for teaching the learners of ODL systems during the weekends as Guest faculties or Academic Consultants. This exercise has been able to ensure quality education under ODL system thus initiating the students into system of interactive teaching-learning. The same method should be adopted by all the ODL institutions so as to strengthen the knowledge level of the learners.

4.4 ICT in ODL system:

It is obvious that the Information & Communication Technology (ICT) can play a pivotal role in bringing innovations in teaching-learning pedagogy, which has already been utilized by many universities/institutions in the country. In many universities in the developing nations, ODL education has been running and providing their courseware content through the media, viz. print, television, radio, new media (computer, internet) etc. and these are especially for the students of higher education.

Through Radio and Television, IGNOU provides customized courses or classes as per the convenience of the learners. The learners are well-engaged during the time of delivery and discussions of the course content through these media. This practice helps learners in acquiring knowledge and better understanding of their course of study likewise in the formal classroom pedagogy. The introduction of new media has revolutionized the system of learning through the ODL system. Any kind of necessary understanding is available on the internet within a single click of the mouse. Even the formal learners are now using this mode of self-learning to complement and supplement their knowledge. The ICT can also be used for the pedagogy in ODL systems of learning through video conferencing or video calls with any faculty of distance education institutions irrespective

of their distance. E-mails and online chatting have been another mode of learning for the students of ODL system, which help in clearing their doubts or in discussion over any course content with the teachers or their fellow colleagues. Also, recorded audio-visual contents of classroom teachings by the faculties will help the learners in facilitating and accelerating their learning endeavours. In many universities in India, the trend of online courses has been recently started. Though it is not so popular amongst the learners at the moment, but it is expected to go a long way as the generation progresses.

4.5 Fee structure:

The fee structure of the ODL system is seen to be quite high which is generally not expected from the institutions funded by the Government. The high fee structure will detract the interest of the common learners to getting admitted into these ODL institutions. Being funded by the Government, it is apparent that the objective of these ODL institutions is to disseminate education amongst the larger common people rather than to earn money. Therefore, the fee structure should be kept reasonably lower for the learners of the ODL system so as to doubly encourage them to learn. Likewise the scholarships or fellowships given in the formal institutions on the basis of merit or by the various other agencies, the students of ODL should also be provided with these kind of financial support, fellowships. There is an inherent need to streamline the ODL system of education in both public and private funded institutions and the government should develop some mechanism to regulate the fee structure, curriculum and the effective delivery mechanism.

5.1 Discussions and conclusion:

The study has been conducted with analysis of available data and through case study of a few ODL institutions. The time has come to formulate and develop cost effective innovative method of teaching-learning in ODL system which can not only ensure quality education but also increase the Gross Enrolment Ratio (GER) in higher education in India.These innovative supports can be well utilized with the help of concerned technical experts in the respective domains. The quality of teaching and learning should be geared up in this sector by adopting various innovative methods to make the system very effective. The prevailing discrimination between the learners of formal and ODL system should be erased by bringing in revolutionary change in the existing ODL system of learning. The Government has already initiated various innovative mechanisms for modernization of the ODL systems in India. However, most of the innovations in the area are in the pilot mode, whose success will be determined as the time progresses.

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EFFECTIVENESS OF USING E-BOARD FOR LEARNING PROCESS IN A DEVELOPING COUNTRY – CASE STUDY

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ABSTRACT
This study examines the important of e-board learning and its effect in teaching at Defence University in Sri Lanka. Even after 3 years of usage of e-Boards there are some practical issues on usage of e-Boards. Therefore this study examines students' and teachersimpact on e-board for learning and teaching process. In a developing country the importance of underlying information technology principles that are critical for an in-depth learningby e-board platform. A structured multiple choice questionnaire was distributed among students' and lecturesthat were enrolled and employed at the General Sir John Kotelawela Defence University, Sri Lanka. A total of 300 students and 30 lectures participated in this study and completed written and online questionnaire related to e-board. The outcome of this study shows that there is a strong positive response on e-board learning among students and they believe lack of support from the technical support to improve the current situation. Lecturer's perspective was entirely different they believe mixture of traditional method or blend will improve the quality of learning than e-board. Therefore there were somewhat 50% or more lectures avoid using the new technology due to this reason. Both parties believe that e-board is better than multimedia. Although the outcome is preliminary in nature, the results provide cause for concern over the status of e-board education in Sri Lanka which is not satisfactory.
Keywords: e-board, effectiveness, blend method

INTRODUCTION

From the ancient time all the teachers used some kind of board to demonstrate and write the things & display to the class. Time by time that was gets evolved and now there are technically developed electronic display boards can be seen in many educational institutes and companies. Ancient teacher used a sand board called "Weli Pilla" to teach how to draw letters and traditional arts to students. After that South Asian schools used black boards to teaching. It was a black coloured wooden board or a board made on surface of the class room wall. Chalk sticks were used to draw on it. Drawings could be erased by rubbing the board. But it made lots of chalk dust & prolong exposure to that dust brought several respiratory illnesses to teachers in that era.

As a solution white boards came to the story & they were popular among all teachers and students. Because it is very smart looked, clear writing & due to markers can be used as several colours and easy to erase. White boards were made used with different sizes. Even today also each and every school use white boards. By using it teacher can teach freely & manually with illustrating anything.

Sometimes projectors and projector screens were used to illustrate digital media to the class. So to project the image there should be a white surface. Due to that reason whilst conducting lectures the lecturer or someone else have to control the display operating the computer. Today also commonest teaching method is this. As a further development of white boards & projecting on to screens, fixing these both items together, hybrid solution was innovated as electronic illustration boards or Smart boards. Simply we called them as 'e Boards'. It facilitated the projection on to a white board & ability to write on it same time by handling the PC screen manually touching on e board. It based on a simple technique which used same as in laptop touch pads. Actually it is also a magnification of laptop touch pad. It's like projecting desktop screen on to the laptop touch pad. Hall screen or marked particular area of display represents the display. Today different companies produce these smart boards with different marketing brand names. But the concept around is similar.

The E-board also includes many special features such as video and image capture which facilitate the sharing and storing of class content, magnifier and spotlight features which enable part of the screen to be highlighted, magnified or resized, and the file viewer feature which reads documents created on the interactive whiteboard, and to preview tasks currently being operated on the screen. Each content page can be moved, copied, printed or deleted while on display in thumbnail view, on the screen.

The E-board technology helps the students to set their potential free, the Teachers to enhance their communication abilities through an innovative and user friendly display solution that creates a vigorous and efficient learning environment. Multitasking is another noteworthy feature of the E-board. It is capable of giving the audience a seamless educational experience by running multiple programs during lectures or presentations.

Also, there's no lag time while transferring from one program to another. Students can also review past lectures posted onto the school homepage.

Education has always been the most significant aspect of human life. Although the sources of education kept on evolving through the ages, it still remains to be an inseparable part of 'living'. With the advent of the industrial age, occurred the rapid development of technology, helping a great deal in educating the masses all round the world(Alexander&Golja 2007). Technology is proved to be of profound help for teachers in teaching as well as for students in learning. The attractive and easily comprehensible nature of digital technology make the process of education more entertaining, interesting and therefore efficient(Ballera *et al.* 2015; Beatty&Ulasewicz 2006). This could also be the major reason for the adoption of technology in teaching methodologies by education policy makers. With the advances in digital technology, information sharing methods worldwide are gradually evolving(Weller 2007). Yet, the low quality and high maintenance costs of information delivery sources such as projectors are ineffective for modern day classrooms and meeting rooms.Teachers nowadays are incorporating new modes of communication in order to bridge the gap between them and their audience/students and the recent developments in display technology have made it a possibility(Shee&Wang 2008; UNESCO 1994). Reliable sources proclaim that more and more countries have brought internet and interactive display boards into the classroom and other buildings, creating new avenues of information sharing and presentations for education and business applications. Furthermore, they thoroughly believe that the E-board is soon to become an essential element in both education and business sectors.

E-Boards are one of the many different interactive whiteboards available for learning purposes. The SMART Board is a touch-sensitive whiteboard which is connected to a PC and a projector. Lessons are made on computer programs and then the projector displays the image onto the whiteboard. The computer is then controlled by either using your finger to open or close programs and move objects, or by electronic pens to write words. SMART Boards are powerful learning tools as they enable teachers to teach using the latest technology, with access to the internet, videos, and educational software (Fernandez&Luftglass 2003).This help students to learn and explore new concepts with technology to create a more dynamic learning experience. However, SMART technology more than "75% of classrooms in the United Kingdom have adopted the multimedia technology" (Moorhouse 2007). School districts, principals and educators are now seeing the importance of this technology in the learning process as it enables students to explore concepts in ways that were not previously possible. As more schools are becoming equipped with interactive whiteboards, "there is a real need for teachers to play an active role in specifying the ways in which this extremely powerful tool is installed and used" (Technologies 2015). There is a high relationship between e-learning and e-boards because the combinations of modern technologies give more effective outputs. The SMART Board provides teachers and students with a whole new interactive learning environment to share ideas, information, images, animations, audio or video(Pintrich&Schunk 1996; Reis 1998). Learning is much more powerful if it is multimodal and the SMART Board supports several different learning styles - visual-spatial, auditory and kinaesthetic. Young students are highly motivated when content is presented on a SMART Board. It increases their enjoyment by being physically involved touching and moving objects and by the size of the screen which makes images large enough for everyone to see. The engagement and knowledge building of young students is fostered when they are given the opportunity to interact in a physical and mental way in the learning environment.However, there are some major obstacles to overcome such as technical issues, computer facilities, and treatment of errors. (Suvorov 2015)

The massive effectiveness of an e-board lies on the fact that it holds the attention of an audience to the extent that it increases participation, enhancing the overall learning and information sharing experience to a great deal. As a combination of the simplicity of a whiteboard and the power of a computer, the e-board is capable of enhancing any learning environment showing an evident increase in student participation, better visual presentation and more efficient lessons. The multimedia educational content technology of an e-board facilitates virtual lectures, also offering a wide range of classroom activities. In addition, the e-board provides dustless air and thereby a more comfortable atmosphere as it doesn't require chalk. E-boards also provide simplified and direct access to e-books, CD's, videos, animations, images, power-point presentations and other internet content(Martín-Blas&Serrano-Fernández 2009; Narciss *et al.* 2007). This element encourages interactive communication, connecting teachers with students or presenters with attendees. Participants are given the space to share files and other material while the teachers or the presenters are given the authority to control audience devices during the classes. This method helps in improving learning skills outside of the classroom while also making the students focus more during class. E-boards are embedded with touch sensitive optical technology, permitting the presenter to access PowerPoint presentations, videos, images and more with the mere touch of a finger(Kaminski 2005).

At the beginning companies used resistive technology for interactive whiteboards. Between flexible plastic front sheet and hard back board there was a resistive thin film inside. Pressure applied to the front sheet

and it act as the acceptor point for input. This acceptor point then converted into an analogue signal to data flow. It sends to the computer for further processing. This can manage with finger or pen tool like pointer. This E boards which are currently using for the teaching purposes, company presentations, Exhibition is displayed and conducting meetings. It has been used on the Discovery channel also.

In 2011 General Sir John Kotelawala Defence University in Sri Lanka introduced their e-board system to the every department, though it was common in the west still it is indeed a luxurious thing for us. So it helped both lecturers and students maximize the teaching and learning out puts. Though, it was introduced still there are some problems of usage. So in this study we address the issues ofapplication of the system how far successful the mission and if there are gaps how to bridge it.

METHODOLOGY

In this study we have examined teachers, students' capabilities of learning with e-board, especially concepts and knowledge on the learning platform in university system. This topic was judged to be extremely important to have a conceptual understanding of what is e-board and to find out in detail knowledge on current trends in interactive board. The study design in this study is presented in the Figure 1. Approval for the study was obtained from the Staff Development Center. Target population of this study represents all faculties from the university, including staff and students. All lectures and students were given a questionnaire related to e-board platform known as interactive board. One hundred students and thirty lectures,which participated in the consecutive e-learning and gave their consent, were included in the study. The purpose of the study was explained to the lecturers and students at the beginning of the lecture. The students who consented to participate in the study were individually tagged and given them a tag. They were allocated to a group the e-board based practical spot test group (n=130).

Qualitative analysis of this study was done with an in depth interview with Mr. Neranjaka Jayarathne (lecturer in Mathematics KDU), because he is the expert on this field. What are the benefits to KDU by using e-board? Using e-board and MOODLE we can reduce paper works. Lecturers can upload lecture notes, assignments, video clips and etc by using simultaneously with the both application. Using e-board we can conduct the lecture in real time and online assignments can be given because of this facility no one can cheat and we can grade them automatically, and the safety of MOODLE and e-board is very high so no any 3rd party allowed entering the system.

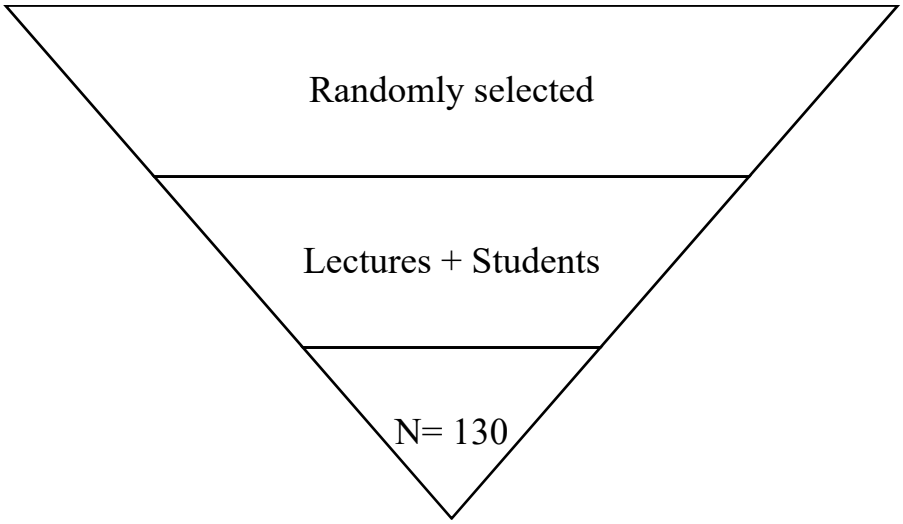

Figure 1 – study design

Questionnaire Used

A questionnaire, onself generated e-board was introduced ''Learning with e-board''. The data were collected by means of the questionnaire consisted of 20 items including questions which generated in the printed platform (Appendix 1 and 2). The use of the questionnaire was justified because it had been prepared by an experienced research group working in e-board learning education and it had already been tested and validated before the distribution. In addition, the questionnaire was designed to assess conceptual understanding of e-board in the Sri Lankan university. The question which was used is attached as the Annexure.

Research Context and Participants

One hundred and thirty took part in this study. Six faculties including Law, Medical, Allied Health Sciences, Engineering, Management and Defence equally represent from General Sir John Kotelawela Defence University, which was located in Ratmalana, Sri Lanka. All studentswere employed at the university as lectures or enrolled as students. The students learned about basic of e-board learning by self learning and all the materials were provided at the learning phase. The Faculty is a socially and economically diverse community in Western Province of the country and this is the one and only Defence University in this country. The students had the backgrounds knowledge of knowledge on computing and e-learning with respect to e-board.

Administration of Questionnaire among the Students

The questionnaire was administered among each of the respective students at theuniversity; with respect to e-board within a period of a week they have to answer the entire question online or printed form.Care was taken to avoid exchanging the students' information or ideas.

Data Analysis

To analyze the questions, we compared informal reasoning displayed by individuals representing high and low level of understanding of e-board with the computer aided interactive board system. The validity of the translation was independently assessed by two observers competent in English language. We analyzed our data as a balanced figure in a percentage of application. For statistical analysis, we transformed all our data using the basic statistical analysis package

RESULTS AND DISCUSSION

According to our study 30% students only have aware on e-boards before join to the KDU. It seems still overall students enter to the university system doesn't have an experience on new technology. Final outcome revealed that, 70% students learn from e-boards because of introduction of new technology to KDU. It is a large amount of students had their first experience hereat KDU.

According to the Figure 2 most of the students don't have an idea on basic operating e-boards. Main reason is lack of knowledge on use of e-board and therefore they try to learn from it. If they have an idea they can arrange the class room to make the best out of it and learn from it. So because of less knowledge of students always need a training support officer for the connecting and arranging the class rooms. Normally class room arranging is done by the training support staff for the e-boards. Therefore before the lecture they should connect the e- boards and should check whether it works or not before the lectures start.

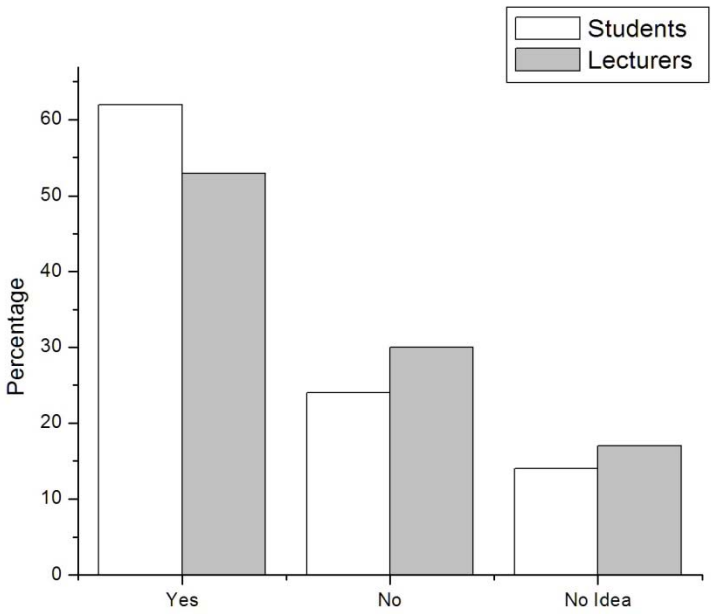

Figure 2: Awareness of operating E-Board system

As per our findings students said there is no any person fully aware on operating e-boards. But 70% or above technical support staff are well trained and know how to use the e-board Next important thing is lecturers' awareness on e-boards. Because it is vain having all the things if the lecturer is don't know how to conduct a lecture using e-boards. So the lecturer should aware on how to work with the e-boards. According to figure 2 more

than 50% lecturers are aware and manageable to use e-boards. Out of all the lecturers 18% are not aware in using the e-board.

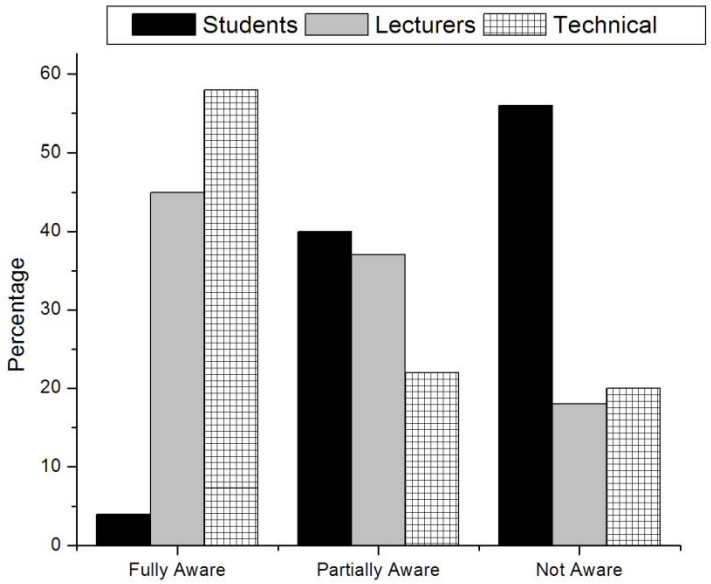

Figure 3: Use of E-Boards better than multimedia projectors

However most of the students don't have the knowledge on e-board while they were enrolled butstudents like to learn from these e-boards they need to take real benefit from it. In this study 62% students agreed that e-boards are better than multimedia because of its usages and stored things can be accessed remotely. (Figure 3). But according to theirviews, most of them inside the KDU use e-boards as multimedia screen. As per the figure 3 most of the lecturers agreed that the e-boards are easier than the multimedia. Because the multimedia gives as only image if we want to do something we have to do it in computer. But 15% lectures not agreed due to the subject field multimedia might easier to them.

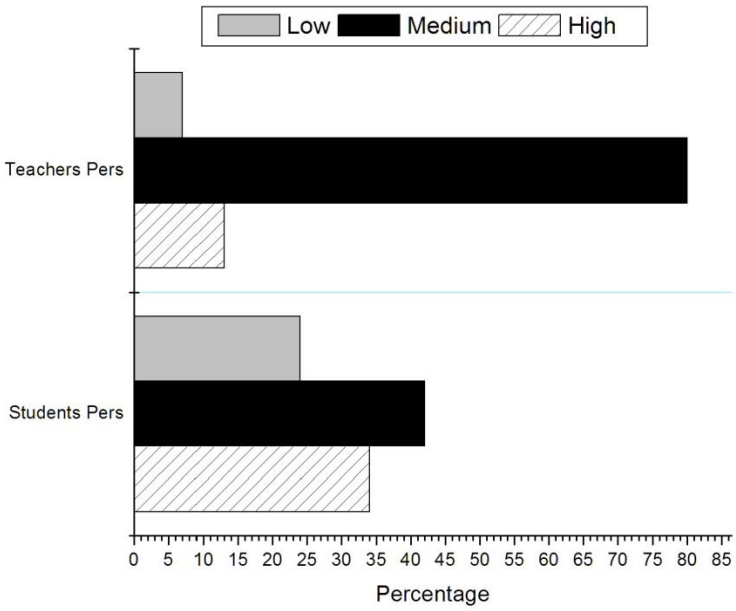

Figure 4. Attraction towards the lectures using E-Boards

As per the Figure 4 the important thing is the attraction towards the lectures. Student's attraction is high towards the lecture; it means the effectiveness also high. One of the purposes of introduction e-boards is to increase the students' attraction towards the lectures and it was kind of fulfilled by e-board. According to the questionnaire that purpose has fulfilled because all of the students in good side. This is strength to the KDU by using e-boards we can increase the results of the students. Furthermore according to the figure 4, when consider teachers

perspective the main purpose of fixing e-boards was to give more support for the conduct lectures and to increase the attraction of students towards the lectures. But as per our research according to the lecturers view the attraction of students not increased very much. According to this study findings 80% lectures said the attraction is medium.

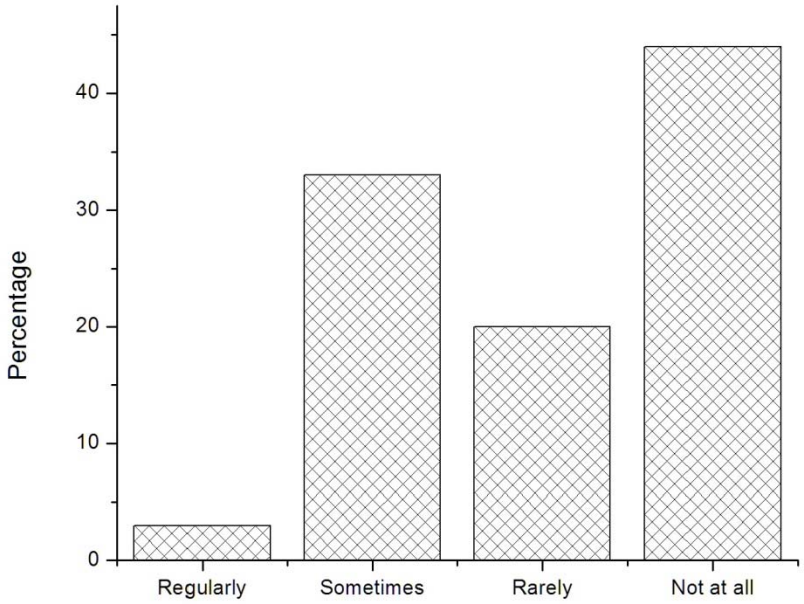

Figure 5: Lecturers use of E-Boards

In this study we selected lecturers randomly and distributed questionnaire among them. As per our research most of the lectures not use the e-boards for their lectures. The reason behind this is most of the lectures don't have the technical support for the operating e-boards. As per our research even ICT department don't use e-boards properly. According to the figure 5 out of 30 lecturers 13 don't use the e-boards (45%)

CONCLUSION

The technical support officer has the responsibility of operating e-boards. Normally they fix the computers to the multimedia as well as e-boards. But the problem is still they don't have fix computer for the class rooms. They have only few laptops and they fix them as per the requirements. Still the technical support officer computers run windows 7 operating system. Updated version of e-boards software not works properly for the windows 8 and 10. So most of the lectures, they have to install version of windows 7 for the technical support officer laptops.

The technical support officer has trained by the IT department. They give the basic knowledge on operating e-boards. Installation of software to the technical support officer computers are done by the IT department, technical support officer not allowed doingthose things. Still the KDU has small number ofe-boards in small in size and it is notenough for a big class room.

Finally we would like to recommend all laptops install a stable version of operating system for E-Board software. Furthermore each classroom must have a permanent laptop, projector if not increase the number of laptops for the technical support officer. Finally all must be educated the importance and effectiveness of e-board at university level first then go for the state level as well.

Acknowledgement

We would like to acknowledge Mr Neranjaka Jayaratne is a lecturer in mathematics in the Faculty of Engineering, General Sir John Kotelawela Defence University. The authors wish to thank all the lectures whoparticipated in this study at General Sir John Kotelawala Defence University, Sri Lanka

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APPENDICES

QUESTIONNAIRE FOR STUDENTS ON USING OF E-BOARDS AND ITS EFFECTS.

Please be kind enough to fill these two types of questionnaire in order to derive important findings in our research.

Please put ✓ mark in front of your stream.

MBBS ☐ ENG ☐ LLB ☐ MTS ☐ SS ☐ LG ☐

1. Do you have experience on e-boards before join to the KDU?

   Yes ☐ No ☐

2. Are you aware on how to operate e-board system?

   Totally aware ☐ Partially aware ☐ Not at all ☐

3. How many times do you learn from e-boards per week?

   Every day ☐ 1-4 days ☐ Never ☐

4. Do you think e-boards better than projectors?

   Yes ☐ Same ☐ No ☐

5. Compared to other teaching techniques do you think e-boards enhanced your attraction towards the lesson?

   Poor ☐ Average ☐ Good ☐ Very good ☐

6. 'Introduction of new technology to the class rooms is important to improve learning ability of students' do you agree with this?

   Strongly agree ☐ Agree ☐ Neutral ☐ Disagree ☐

7. Are you satisfy with learning through e-board system here at KDU?

   Strongly satisfy ☐ Satisfy ☐ Neutral ☐ Not satisfy ☐

8. As per your experience at class rooms do you feel that the technical support staff (TSO) ate fully aware on operating e-board system?

   Fully aware ☐ Manageable ☐ Partially aware ☐ Not aware ☐

9. Do you think the learning from e-boards is effective for students at KDU?

   Yes ☐ Neutral ☐ No ☐

10. Do you agree that Awareness of e-boards among the students to be increased to get maximum results

    Strongly agree ☐ Agree ☐ Neutral ☐ Not agree ☐

11. As per your experience do lecturers aware on how to teach using e-board in class rooms.

Fully aware ☐ Manageable ☐ Aware but not manageable ☐ Not aware ☐

12. Anything you need to mentioned

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QUESTIONNAIRE FOR LECTURERS ON E-BOARDS

Dear sir/madam,

Please be kind enough to fill this questionnaire in order to derive important findings for our research.

Please put ✓in front of your answer.

01. Do you use e-boards for your lectures?

Regularly ☐ Sometimes ☐ Rarely ☐ Not at all ☐

02. Do you feel it is easier than projectors when conducting a lecture?

Yes ☐ No ☐

03. Do you have confidence on new technology?

Yes ☐ No ☐

04. When conducting a lecture do you have enough technical support to use e-boards?

Yes ☐ No ☐

05. Compare to the traditional learning systems the attraction of students on lectures is

High ☐ Medium ☐ Low ☐

06. Do you think e-boards are effective for every subjects?

Yes ☐ No ☐

07. According to your opinion the number of e-boards in KDU should increase or not

Yes ☐ No ☐

08. Do you have any suggestion to enhance the productivity of e-board system in KDU?

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EFFECTS OF COLLABORATIVE M-LEARNING AND INDIVIDUAL E-LEARNING ON THE ACADEMIC PERFORMANCE, ATTENTION BENEFIT AND CONSISTENCY OF LEARNING

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ABSTRACT
This study was a pre-test post-test non equivalent quasi-experimental design where both the experiment groups pre-tested.after an initial training, Experiment group 1 practiced through collaborative mobile learning for 3 months with 30-minutes session each day. Meanwhile, the experimental group 2 practiced individual e- learning with similar time frame and duration of learning and practice. The objective of the study was to study the effect of collaborative M-learning and individual E-learning on the academic performance, attention benefit and consistency of learning of the learners over the traditional approach of learning. To conduct the experiment, the researcher has selected 125 university students out of three Indian universities. The sample students were randomly selected from MA (Education) odd semester, those were the targeted population. Out of more than 10,000 PG students of five universities of Assam, the researcher has randomly selected odd semesters from three education departments from three Universities. It was found that collaborative mobile learning and individual e-learning provides better academic performance among the students over the traditional approach. It was generalized that new method creates awareness among the learners over traditional approach. In this 21st century learners are thinking freedom of learning which is beyond normal classroom situation. That is why students were performed better in collaborative m-learning and individual e-learning but not in a traditional mode.
Key words: Academic performance; attention benefit; collaborative m-learning; consistency of learning, and individual e-learning

Origin of the research problem: An introduction
21st century, called as the 'Information Age', brought along with itself an era where computer technologies develop rapidly and become widespread among all levels of the community. Alkan, 2002 and Isman, 2006 stated that the 2000's are based on the scientific and technological developments because of their being scientific and technological age, that scientific and technological developments of the 2000's increase global, national and individual necessities. Learners require new structuring in education and that education has 1) Science, 2) Technology and 3) Application dimensions. However, Mobile learning is a candidate system to fill the deficiency of former distance learning systems with mobile technologies as well (Inceoglu, 2006). Harris, 2001 defined mobile learning as an point interacted to provide mobile computer technologies and internet-based learning to be 'everytime, everywhere' learning experience. Grosso, 2003 defined mobile learning as an obtainment of every kind of information and ability by using mobile technologies. Mobile learning is a type of learning which appeared as a conclusion of co-evaluation of 'mobile informatics' and e-learning fields, provides accession to e-learning content independently of a specific location, utilization of services created dinamically and communication with others. Mobile learning can be used to support traditional learning (Wang, 2009) as well as distance learning (Mutlu et al., 2000). Mutlu and others stated, laptops, tablet computers, pocket PCs with phones, pocket PCs, portable media players, MP3 players and smart phones exist within mobile informatics devices. Georgiev and others stated that mobile learning is a part of e-learning, m-learning should provide learning without any physical network connection every time and everywhere, communication technologies of GSM, WAP, GPRS, Bluetooth, IEEE 802.11 are used by mobile devices. M-learning is a distance learning model which is designed to meet education needs with the help of mobile devices. Thanks to m-learning, there appeared an education model which can be very beneficial for students with providing the opportunity of education independent of time and environment.

Collaborative M-learning academic performance, attention benefit and consistency of learning
Mobile collaboration in education and within organizations is a challenging task. Rezchav & Wu (2015) studied the effect of Mobile collaborative learning and found the relationships between the learning process (i.e., peer-influenced learning and individual cognitive absorption) and learning impact (i.e., satisfaction, perceived understanding and performance), especially the role of individual learning in groups. Significant differences were found between content delivery types in both individual and group learning modes in regard to how the learning

process influences learning impact. Ke & Hsu(2015) examined the effectiveness of smartphone-based, AR artifact creation and other mobile collaborative learning activities in reinforcing the technological pedagogical content knowledge (TPACK) of pre-service teachers. The study indicated that mobile AR artifact creation with peer discussion tended to better promote the componential competencies of technological pedagogical knowledge (TPK) and the integrative development of technological pedagogical content knowledge (TPACK), whereas mobile media seemed to better support the content knowledge (CK) development. Glackin, Rodenhiser & Herzog (2014) examined the effect of mobile device use on student learning. Findings show that eBooks and mobile device use in the classroom have a significant impact on the student's educational experience. Wald, Li, & Draffan (2014) found that mobile enhancements to Synote, the freely available, award winning, open source, web based application that makes web hosted recordings easier to access, search, manage, and exploit for all learners, teachers and other users. Taleb, Ahmadi, Musavi(2014) found that Mobile technology opens the door for next generation and let the learning occurs in anytime, anywhere and to be influence in a variety of learning contexts. ANOVA was used to examine the effect of teachers' educational level and teaching experience on the effect of M-leaning on Mathematics learning. The results revealed that in teachers' viewpoint, mobile learning has a positive effect on motivating the students towards Mathematics. In addition, there is a positive and significant relation between using mobile learning and students' participation in Mathematics. Moreover, the relation between mobile learning and diversity of training methods of teachers is positive and significant. The findings of this survey show that teachers of Mathematics are interested in using the mobile technology in Mathematics learning. Miguel, Caballé, Xhafa, Prieto, Barolli(2015) found that mobile collaborative learning is an emerging educational model devoted to providing the learner with the ability to assimilate learning anytime and anywhere. Dai, Chen, Rau(2015)found students' learning, explore the problem-based learning effects, refine the history course, and reinforce the teacher's professional development. Ting & Tai (2013) found collaborative mobile learning practices enhanced learners' social interactions are synthesized with the subject content to represent the instructional information. In the above literatures, it is not clarified, whether collaborative mobile learning has certain effect on academic performance, attention and consistency of learning. That is why the present study undertaken this independent variable to assess its impact on the dependent variables like; academic performance, attention and consistency of learning.

Individual E-learning academic performance, attention benefit and consistency of learning

Tarhini, Hone & Liu (2014) studied the effects of individual differences on e-learning users' behaviour in developing countries and found individual differences as the moderators (e.g., age, gender, experience, educational level) in an extended Technology Acceptance Model (TAM). Liao, Yu, & Yi(2015)found a statistically significant moderating effect of two contingent variables, gender, job title and industry, on the relationship between predictors and e-learning system behavioral intention. The results suggested that a serious consideration of contingent variables is crucial for improving e-learning system behavioral intention. Hu , Hui , Clark , Milton , Ma and Tam(2005) found that learning effectiveness (measured objectively and subjectively) associated with e-learning is significantly higher than that observed in the conventional classroom. Subjects supported by e-learning are also more satisfied with the course contents than their conventional classroom counterparts. Personalized learning support appears to be stronger in e-learning than in the conventional classroom setting but the difference is not significant statistically.Oye, Iahad, Madar, and Rahim(2012) examined the application of e-learning model to explain acceptance of the e-learning technology within the academic settings. Individuals' intention to use an e-learning, positive perception on e-learning use is crucial. Linear regression analysis verified that, while attitudes have influence on intention to use, the actual e-learning use has significant effect on students' academic performance. E-learning use is associated with increased students' academic performance. Liao, Yu,& Yi(2015)showed that individual-level e-learning(performance expectations, effort expectancy, perceived behavioral control), and group-level variables (incentive, social influence) have a positive effect on behavioral intention. The incentive has an effect on behavioral intention through the moderating role of manager influence. Literatures are not clarified, whether individual e-learning has certain effect on academic performance, attention and consistency of learning. That is why, the present study undertaken this independent variable to assess its impact on the dependent variables like; academic performance, attention and consistency of learning.

Research questions

Whether M-learning and E-learning has certain effect on the academic performance, attention, and consistency of learning or not. If so, then what extent the collaborative M-learning and individual e-learning has certain impact on the academic performance, attention, and consistency of learning? Does the collaborative M-learning is better effective over the Individual E-learning on the academic performance, attention, and Consistency of Learning? If so, then what extent and how frequent?

Objective

To study the effect of collaborative M-learning and individual E-learning on the academic performance, attention benefit and consistency of learning of the learners over the traditional approach of learning.

Hypothesis

There is no significant effect of collaborative M-learning and individual E-learning on the academic performance, attention benefit and consistency of learning of the learners over the traditional approach of learning.

Methodology

Population and sample

The present study conducted among the university students to assess the effectiveness of collaborative mobile learning and individual e-learning on the academic performance, attention and consistency of learning of the university students. Collaborative m learning and individual e-learning was the independent variables. Similarly academic performance, attention & consistency of the learning were the dependent variables. To conduct the experiment, the researcher has selected 125 university students out of three Indian universities. The sample students were randomly selected from MA (Education) odd semester, those were the targeted population. Out of more than 10,000 PG students of five universities of Assam, the researcher has randomly selected odd semesters from three education departments from three Universities.

Design of the study

This study was pre-test post-test non equivalent Quasi-experimental design where both the experiment groups pre-tested and after an initial training, experiment group 1 practiced through collaborative mobile learning for 3 months with 30-minutes session each day. Meanwhile, the experimental group 2 practiced individual e- learning with similar time frame and duration of learning and practice. The present study was a pre test post test quasi experimental design where the samples were selected on the basis of their interest of participation in the experiment and few students were randomly selected for the experimental purpose. In this design there were two experimental groups and one control group was learnt through collaborative mobile learning on philosophy of education. Group 2 was learned through individual e-learning model. Before instruction pre test and attention test was administered to each group. After three months intervention, both the experimental and the traditional group appeared attention test, and post-test, and after one month a stability test was administered to both the group. To minimizing the effect of ***extraneous variables***, the researcher has used ***ANCOVA*** and ***simple random sampling techniques*** and the findings of the study was generalized upon the whole population. See design of the study on box 1.

Box 1 Design of the study

Sl. no	Group	Pre Test	Treatment	Post Test	Stability test
1	Collaborative M-Learning Group (n=42)	Pre-test Attention Test	Collaborative M-Learning	Post Test Attention Test	Stability test
2	Individual E-learning Group (n=40)	Pre-test Attention Test	Individual E-learning	Post Test Attention Test	Stability test
3	Traditional Approach Group (n=43)	Pre-test Attention Test	Traditional Lecture	Post Test Attention Test	Stability test

TOOLS

In the present study three tools were used. These were Learning Attention Rating Scale, Achievement Test and Stability test.

1) Learning Attention Rating Scale

Learning Attention Rating Scale (Jena and Pokhrel,2015) has four basic areas: immersed, diffuse, objective and narrow, and all the four areas contain 20 items means each area has 5 items. The immersed area assessed

learners' integration, optimization of functions, physiological normalization, creativity, love, spiritual experiences. Similarly diffused area of the attention assessed well learned behavior, multiple modalities and wide field of knowledge. Objective area of the attention scale was assessed learners judge mental states, century and perceptual bias and learners' intention of learning. The fourth area of the scale was narrow. In this area the items were assessed learners' states of interest, diminished time sense and oneself consciousness. In all the four areas items were equally distributed having five point options.

These were definitely falls:
(1) Falls for the most part
(2) Sometimes true, sometimes false
(3) True for the most part and
(4) Definitely true
(5) Immersed area of the question found in item number 1,5,9,13,17, diffused area of the items were 2,6,10,14,18; objectives area of the items were 3,7,11,15 ad 19. Similarly narrow area of the questionnaire represent in item number 4, 8,12,16,20. The pilot study was conducted to find out the effect of factors through factor analysis. Similarly the content validity (CVR=.78) was calculated. The reliability coefficient was r=.85. Each individual took 10 minutes to response all the items. The detail of the tool specification is given in box 2.

Box 3.2 Learning Attention Tool specification

Standardization	
Material	Scale has four basic areas: immersed, narrow, diffuse All the four areas contain 20 items means each area has 5 items. The immersed area assessed learners' integration, optimization of functions, physiological normalization, creativity, love, spiritual experiences. Similarly diffused area of the attention assessed well learned behavior, multiple modalities and wide field of knowledge.
Scoring	01 point for each correct response of the item
Administration	Flexible
Norms	Percentile norms available
Reliability	
Internal consistency (Cronbach Alpha)	r=.85
Split-half	r=.81
Validity	The validity coefficients, with English version of this instrument was estimated on a sample of 200 students of PG classes
Criterion: concurrent	The concurrent validity of the tool (Cronbach, 1990; Cronbach & Meehl, 1955) has been supported in the form of positive correlations
Construct : convergent	The construct validity of the tool (Cronbach, 1990; Cronbach & Meehl, 1955) has been tested in several studies, showing moderate correlations (0.40-0.65)
Usability	
Availability	Sample available to administer the tool
Ease of use for tester	no
Range of use	no
Time limit	No time limit is given for the test. However, most of the students finish it within 10 minutes.

Achievement Test

Jena and Pokhrel (2015) has developed an achievement test on philosophy having 25 multiple choice items. Each item has four options and out of this one correct response and other three are good distracter. The pilot study was conducted to calculate the content validity ratio/reliability. The researcher has followed all the steps to standardize the tool. In planning stage the researcher has planned and prepares the blue print. In the preparation stage more than two times multiple choice questions were prepared and supervised by six experts of education and philosophy departments. The content validity ratio was established and it was found .83. In the secondary try out

item analysis was calculated and in the final try out stage the reliability was established and found .81. Each individual took 10 – 12 minute to response all the items (See Appendix-II). The detail of the achievement test specification is given in box 3.

Box 3 Achievement Test specification

Material	Achievement test on philosophy having 25 multiple choice items. Each item has four options and out of this one correct response and other three are good distracter.
Scoring	1 point for each correct response
Administration	Flexible
Norms	Percentile norms available
Reliability	
Internal consistency	r=.81
Split-half	r=.83
Validity	
Content	Lawshe(1975) developed a formula termed the content validity ratio:CVR=(n_e—N/2)/(N/2) where CVR = content validity ratio n_e =number of SME panelists indicating "essential" N= total number of SME panelists. This formula yields values which range from +1 to -1; positive values indicate that at least half the SMEs rated the item as essential. The mean CVR across items may be used as an indicator of overall test content validity. Here, the CVR=.83
Usability	
Availability	Sample available to administer the tool
Ease of use for tester	no
Range of use	no
Time limit	No time limit is given for the test. However, most of the students finish it within 10 minutes.

Consistency Assessment Test

This tool is just the parallel form of achievement test the researcher has followed all the procedures to develop the standardized test. The Consistency Assessment Test (Jena and Pokhrel, 2015) has developed an achievement test on philosophy having 25 multiple choice items. Each item has four options and out of this one correct response and other three are good distracter. The pilot study was conducted to calculate the content validity ratio/reliability. The researcher has followed all the steps to standardize the tool. In planning stage the researcher has planned and prepares the blue print. In the preparation stage more than two times multiple choice questions were prepared and supervised by 6 experts of education and philosophy departments. The content validity ratio was established and it was found 63. In the secondary try out item analysis was calculated and in the final try out stage the reliability was established and found 81. Each individual took 10 – 12 minute to response all the items. The detail of the consistency assessment test specification is given in box 3.

Box 3 Consistency Assessment Test specification

Standardization	
Material	Achievement test on philosophy having 25 multiple choice items. Each item has four options and out of this one correct response and other three are good distracter.
Scoring	1 point for each correct response
Administration	Flexible
Norms	Percentile norms available
Reliability	
Internal consistency	r=.81
Split-half	r=.83
Validity	
Content	Lawshe(1975) developed a formula termed the content validity

	ratio:CVR=(n_e—N/2)/(N/2) where CVR = content validity ratio n_e =number of SME panelists indicating "essential" N= total number of SME panelists. This formula yields values which range from +1 to -1; positive values indicate that at least half the SMEs rated the item as essential. The mean CVR across items may be used as an indicator of overall test content validity. Here, the CVR=.83
Usability	
Availability	Sample available to administer the tool
Ease of use for tester	no
Range of use	no
Time limit	No time limit is given for the test. However, most of the students finish it within 10 minutes.

Procedure of Experiment

The present study examined the effects of collaborative m–learning and individual e-learning on the academic performance, attention and consistency of learning over traditional approach. To conduct the experiment, the researcher has randomly selected the samples and assigned into three groups for traditional treatment, collaborative mobile learning and individual e-learning intervention.

Experimental group I

Experimental group 1 (one) was learnt through collaborative mobile learning that is why M.A. education semester I (one) student was assigned and accordingly the researcher installed 3 months interactive packages in the mobiles of all the participants and provided them the selected courses to learn philosophy of education. Before going to start the experiment, the experimental group I students were advised to interact in the mobile with conferencing. This was the self study collaborative mobile learning where the researcher only facilitated the learners with a interval of time. Initially, the researcher advised the learners to interact every day in conferencing mode for 1-2 hours.

ACTIVITY I

Collaborative Mobile Learning: Experimental group I (n=40) was assigned collaborative mobile learning. All the participants used normal mobile phone, Tablets PC's and 3G internet packages. All the students were trend how to connect and talk through mobile conferencing. The researcher everyday connected one another with mobile conferencing applications and shared information like knowledge skill and other competences among their peers. Collaborative mobile learning was a collaborative self study where researcher was the facilitator. Collaborative mobile learning needs smart mobile phone or tablet PCs, 3G internet package and learners' technical knowledge. The contents of learning is fixed by the researcher and accordingly learners will connect their networking to share these contents for their better sharing of information understanding for developing the skills and competencies. The following contents the learning will share through their mobile networking. Box 3.5 is showing the time table of collaborative mobile learning. Before co-cooperative Mobile learning, a pre test on Philosophy of education, and an attention test will administer among the group of students. After the treatment, an attention test and a post test will administer. After two months, the researcher will administer the stability test to assess the stability of learning performance.

Experimental group II

It was assigned the individual e-learning. This participants had the laptop and through the laptop the individually learned through online the selected concept of philosophy of education. The researcher has advised the individual e-learners to read the website pages on the assigned concept for 1 hour every day. However, the content syllabus and duration of the study provided equal to both the experimental group.

ACTIVITY II

Individual e-learning was assigned to 3rd semester students of M.A. education of an Indian University. These participants had their own Laptop, Desktop and 3G Internet connection. The researcher for the experimental purpose provided 3 months internet packages for their individual data packages. Before instruction, the researcher has provided the contents and curriculum of study to the participants. In this way the researcher continued three months of self study on philosophy of education regarding the contents given below in the table no.

Individual e-learning needs laptop, Dextop or tablet PC, 3G internet package and learners' technical knowledge. The researcher fixes the contents of learning, and accordingly individual learner will learn online the e-learning materials or they will learn the downloaded e-contents. There is no need to share the knowledge, skill, and competency among the peers. Table 2 is showing the time-table of Individual e-learning. Before Individual e-learning a pre test on Philosophy of education and attention test will administer among the students and after the treatment an attention test and a post test will administer. After two months, the researcher will administer the stability test to assess the stability of learning performance. Box 3.6 is showing the time table of individual e-learning.

Traditional Approach Group

No modern/approaches were exposed to the traditional group students except traditional lectures on these concepts.

Procedure of Data collection

According to the design of the study the researcher has assigned semester 1 of M.A. to collaborative mobile learning and 3rd semester of M.A. participants to individual e-learning. Before, instruction and pre test of philosophy of education assigned to both the group. Along with this an attention test was administered to both the groups. All the participants of the collaborative mobile learning group took 20minutes to respond the pre test and attention test. Similarly, all the individual participants of individual e-learning took 20-21 minutes to response the pre test and attention test. After collecting these pre test and attention test from the participants of collaborative mobile learning group and individual e-learning. After 3months collaborative m-learning the researcher again administered the post test and attention test to assess learners' performance and attention in their learning. These questionnaires like post test and post attention test was collected. After 3months the researcher again administered consistency assessment test to assess learners' consistency in the learning.

Analysis and result

There is no significant effect of collaborative M-learning and individual E-learning on the academic performance, attention benefit and consistency of learning of the learners over the traditional approach of learning.

Table 1 The mean S.D of collaborative m-learning individual e-learning on the academic performance attention benefit and consistency of learning of the learner over the traditional approach

		N	Mean	Std. Deviation
Post-test	Collaborative M learning	42	23.64	.727
	Individual E learning	40	20.53	3.226
	Traditional Approach	43	14.19	1.651
	Total	125	19.39	4.506
Post-attention	Collaborative M learning	42	18.98	2.006
	Individual E learning	40	18.30	2.472
	Traditional Approach	43	10.09	1.784
	Total	125	15.70	4.588
consistency	Collaborative M learning	42	22.50	.890
	Individual E learning	40	20.13	2.980
	Traditional Approach	43	8.28	1.368
	Total	125	16.85	6.591

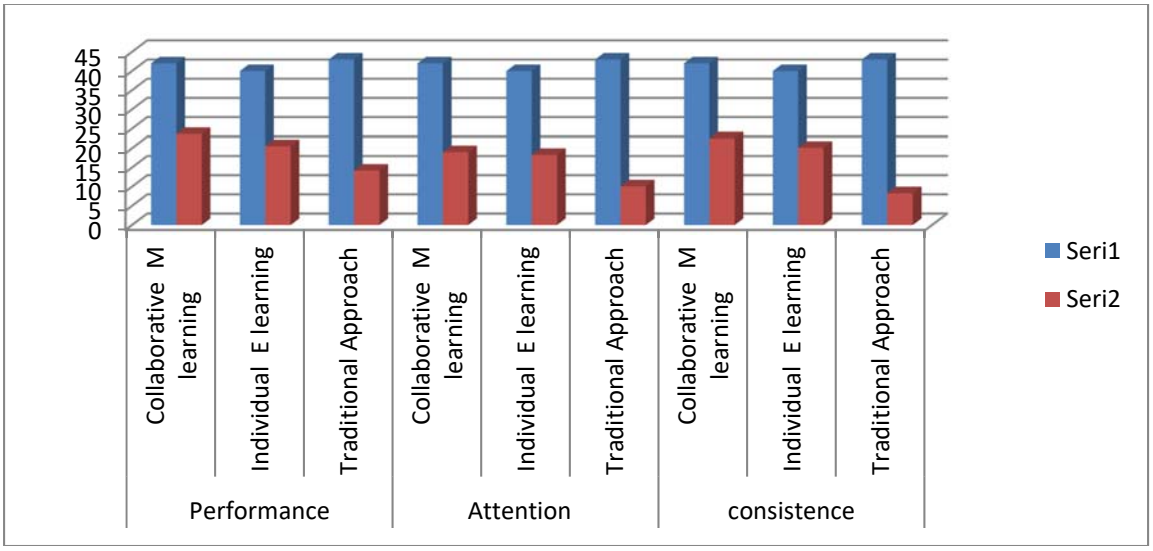
Table 1 analyzed the mean and S.D of collaborative m-learning and individual e-learning on the academic performance attention benefits consistency of learning over the traditional approach. Collaborative m-learning performance (m=23.64 ± .727) was surprisingly better over individual e-learning (20.53 ± 3.226) and traditional approach (m=14.19 ± 1.651). Similarly the post attention benefit was better in collaborative m-learning (m=18.98 ± 2.006) was better over individual e-learning and traditional approach. The consistency of collaborative m-learning m=22.50 ± .890) was surprisingly better over individual e-learning and traditional approach.

Table 2 ANOVA for collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach

		Sum of Squares	df	Mean Square	F	Sig.
Posttest	Between Groups	1975.663	2	987.831	222.300	.000
	Within Groups	542.129	122	4.444		
	Total	2517.792	124			
Post-attention	Between Groups	2073.044	2	1036.522	235.484	.000
	Within Groups	537.004	122	4.402		
	Total	2610.048	124			
Consistency	Between Groups	4928.586	2	2464.293	657.107	.000
	Within Groups	457.526	122	3.750		
	Total	5386.112	124			

Table 2 reveals that there was significant difference in the methodology of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach. The academic performance among the students of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach was significant. The F-value (d*f* 2/122 222.300 P<.05) was significant. The post attention difference among the students of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach was significant. The F-value (d*f* 2/122 235.484 P<.05) was significant. Similarly, the consistency difference among the students of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach was significant. The F-value (d*f* 2/122 657.107 P<.05) was significant.

Graph 1 showing learning performance of students through different methods, attention benefit and consistency of learning of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach



Graph 1 interpreted the learning performance of students through different methods, attention benefit and consistency of learning of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach. The mean learning performance of students through different methods, attention benefit and consistency of learning of collaborative m-learning, individual e-learning on the attention benefit of learners over traditional approach. Here x-axis is based on types of learning methodology and y-axis was showed the mean consistency score of the learner.

Findings and discussion

It was found that there was significant effect of collaborative m-learning and individual e-learning on the academic performance, attention benefit and consistency of learning of the learners over the traditional approach of learning. There was no significant difference between collaborative m-learning and individual e-learning on the

academic performance of the individual attention benefit of the learners and consistency of learning of the learners.The researcher assessed the effects of collaborative m-learning and individual e-learning performance over the traditional approach. It was found that there was significant difference between the virtual learning (collaborative m-learning and individual e-learning) and traditional approach. This result was supported by (Alvarez, Alarcon & Nussbam, 2011; Kiger Herro & Prunty,2012; Chiang,Yang & Hwang, 2014; Mendoza,2014; Zheng, Yang,Cheng & Huang,2014; Fabian,Topping & Barron, 2016) but not supported or rejected by (Caballe, Xhafa & Barolli, 2015; Chen, Seilhamer, Bennet,Baller,2015; Shadiev, Hwang, Huang, Liu, 2015;Shin,Sug, Kang & Minseok,2015; Sun, Chang & Chen, 2015). In the present research work, the researcher has found collaborative m-learning and individual e-learning provided more attention benefit over the traditional approach of learning. This result was supported by (Meng,Chu & Zhang, 2004; Roxas & Uranoy, 2012; Scottman & George, 2014). It was also found that there was a significant effect of collaborative m-learning and individual e-learning on the consistency of learning of the learner over the traditional approach of learning. This result was supported by (Vogel,Kennedy,Kuan, Kwok & Lai, 2007;Wang,Shen, Novak & Pan, 2009; Lglesia,Milrad & Anderson, 2012; Jabbour, 2013; Jumoke,Oleruntoba & Blessing, 2015; Kua, Chu & Huang,2015; Reilly, Shen, Calder & Duh, 2015). It was found that there was significant effect of collaborative m-learning, individual e-learning on the academic performance attention benefit and consistency of learning over traditional approach. This result was supported by (Li & Iribe, 2010; Mahmoudi, Koushafar, Saribagloo & Pashavi, 2015) and not supported by (Iigaz, Altun & Askar, 2014).

Policy-makers should take stock of existing ICT investments and approaches, and devise strategies to complement rather than replace the current infrastructure. Policy-makers should consider the local contexts of the country or region when creating new policies or adapting existing ones, as strategies that work for one country may not be appropriate in another. Policy-makers should encourage the use of open, standards-based platforms for mobile learning applications, to increase access and streamline the development process. Policy-makers should promote cooperation between different branches of government and encourage partnerships between stakeholders from a variety of sectors and levels. Policy-makers should create or revise mobile learning policies at both the national and local levels, regardless of whether education is decentralized. National policies should provide overarching structure and guidance, while local policies direct implementation in individual districts or institutions. Policy-makers should revisit existing policies, particularly at the local level, that may be overly restrictive in regard to the use of mobile technology at schools and universities. National policies may need to be clarified or revised to give better guidance to districts and institutions. Policy-makers should ensure that mobile learning policies promote gender equality and accessibility for learners with disabilities. This effort is essential to meeting EFA goals of providing quality education to all learners worldwide. ICT is a powerful vehicle for enhancing learning, and mobile devices form an essential part of that vehicle. If current ICT strategies for education begin to include mobile devices along with digital learning materials, support for teachers, and guidelines on best practices, mobile learning will soon become an important part of education.

Conclusion

The present study was an experimental study assessed the effect of collaborative m-learning, individual e-learning on the academic performance, attention benefit and consistency of learning of t he learners over the traditional approach. In general it was found that collaborative mobile learning and individual e-learning provides better academic performance among the students over the traditional approach. It was generalized that new method creates awareness among the learners over traditional approach. In this 21st century learners are thinking freedom of learning which is beyond normal classroom situation. That is why students were performed better in collaborative m-learning and individual e-learning but not in a traditional mode. In the second objective of the research work revealed that collaborative m-learning and individual e-learning provides better attention benefit over the traditional approach. Traditional approach is teacher centered and does not attract y=the learner to listen even the lecture. But collaborative mobile learning needs learners' mobile conferencing and technology which is more attention centered than listening centered. That is why collaborative m-learning and individual e-learning provided more attention benefit over the traditional approach. If we observe the result of the study related to hypothesis 3, we can find collaborative m-learning & individual e-learning provides more consistency of learning performance among the students over the traditional approach. This is because collaborative m-learning and individual e-learning needs a student's attention, awareness, interest and which are ultimately provide better consistency of learning among the students. So, collaborative m-learning & individual e-learning has the significant rule in the world of education.

Educational Implications

The following educational implications, the researcher has developed for the world of colleagues, researchers and students.

1) Recent mobile learning is an innovative ICT to apply in the various level of education to encourage t he self reading efficiency of the learner.
2) Mobile learning is adequate for network of learning and at a short time many students could be share their experience, learning out comes and their draw backs.
3) In a self study teachers should promote to use all the learners to read through collaboration and co-operation through mobile conferencing.
4) Individual Laptop, Tablet, Smart Phone should be provide to the learners to minimize the learning kit bags.
5) Freedom should be given to the learners for self study discussion and thinking creativity.
6) Mobile conferencing is the actual method in remote and rural areas where schools are not in a common place or not to accessible to the students.
7) Internet facilities should be provided to the schools institution and that should be assessable to rural and urban areas.
8)

Recommendations of the study

The following recommendations the researcher has put in front of the world of education:

1) It needs to further study how collaborative mobile learning is applicable to elementary and secondary level.
2) The present study investigated the effect of mobile learning on learning attention, consistency and achievement but it needs further to investigate how mobile learning influence learners creativity, personality, intelligence and emotion.
3) It needs to further investigate the level of anxiety after exposed to collaborative m-learning and individual e-learning.
4) Whether mobile learning and individual e-learning is applicable in virtual learning environment if so how YouTube learning, Wikipedia learning effective over collaborative mobile learning.
5) It needs to investigate effect of collaborative mobile learning on learner attention, memory and retention of the learner.

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E-LEARNING AT THE UNIVERSITY OF CAPE COAST, GHANA-ARE OUR DISTANCE EDUCATION STUDENTS TECHNOLOGICALLY READY?

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ABSTRACT
Since the adoption of e-learning involves high investment cost, Educational Institutions are expected conduct considerable up-front analysis to assess readiness among their stakeholders-lecturers, administrators and students in order to derive maximum benefit. Thus the study was conducted to measure University of Cape Coast Distance Education (UCC DE) students' perceived readiness to engage in e-learning. The research design adapted was a descriptive survey, using open- and close-ended questionnaire developed through literature search to solicit responses from students' readiness (self-assessment or perception).
The results show that majority of DE students have diverse basic computing and Internet skills with regular Internet access. However, they have very little or no experience with LMS tools and majority are less freely willing to fund their e-learning activities. The study then recommended ICT and e-learning skills training as a solution to reduce or minimise the identified deficiencies.
Keywords: e-learning, distance education, technological-readiness, self-assessment

INTRODUCTION

Distance education (DE) has gone through many different stages or generations with accompanying learning environments and definitions portraying these phenomena. Contemporarily, distance learning is an educational process in which teaching and learning (instructional methods) are planned and delivered using a wide spectrum of technologies to reach learners who are significantly removed from instructors inspace and time (at a distance) and so designed to encourage learner interaction and certification of learning [(Greenberg, 1998;Teaster and Blieszner, 1999). The learner is freed from the necessity of travelling to "a fixed place, at a fixed time, to meet a fixed person, in order to be trained" (Keegan, 1995, p7).

The Centre for Continuing Education in the University of Cape Coast, Ghana (CCEUCC) was established in the year 1997 and became fully operational in 2000/2001 academic years with an initial intake of seven hundred and fifty basic school practicing teachers to pursue a three-year Diploma in Education to develop their professional skills. As of 2013, the DE programme had a total enrolment of about 18,765 students pursuing diploma and degree programmes in Basic Education, Commerce, Management Studies and Marketing.

In CCEUCC, the mode of operation is only through the print media (modules), bi-weekly face-to-face sessions in all the fifty-three study centres nationwide. Officials from the main University and the Centre visit the study centres every face-to-face session to register and distribute study materials, monitor the session, offer counselling, and organize quizzes or examinations. It should be well noted that DE is not simply publishing and mailing learning materials, but also involves a mechanism, which utilizes a variety of media in a structured manner with a clear system of feedback that ensures that educational goals are met.

Since 1980's DE modes have changed from what used to be correspondence study whereby study materials were mailed to students to a combination of audio and video technologies, satellite base delivery system, Internet and web-based systems with delivery for student support mechanism (Renwick, 1992). This

trend shows clearly that there is a paradigm shift in the instructional mode of delivery that includes the use of e-learning via Internet to interact with students from both far and near.

Although e-learning and DE are different concepts (Guri-Rosenblit, 2005), e-learning is increasingly being used in DE delivery such that they have become synonymous and used interchangeably (Bates 2001; Peters 2001). E-learning has emerged as an essential standard for modern education that is not limited by time and space, providing flexible and cost-effective distance learning environment to students usually adult learners who for constraints such as time, family commitment, job, disability, and the like cannot attend regular campus universities.

There is no universally agreed definition of e-learning. Nichols (2008) defines e-learning as "pedagogy empowered by digital technology". Resta and Patru (2010) described e-learning as learning by communicating, using the Internet and interacting with content accessed on the internet, all within the context of sound pedagogy. Various pedagogies such as constructivism, connectivism and rhizomatic learning are being used for e-learning to promote student-centred, peer or self learning. Internet is used to facilitate tutor-learner or learner-learner interactions, which could be synchronous or asynchronous.

Statement of the Problem

Lim, Eberstein, and Waint (2002; in Watkins, Leigh, & Triner, 2004) suggested that research related to the readiness of learners to adapt to the e-learning environment has not kept pace with the changes in the field of DE. UCC DE learners consist of those that have had experience in traditional classroom/face-to-face (FTF) environments but may not have experience in e-learning situations. As CCEUCC is planning to use e-learning to augment its FTF mode of delivery, the question that remains to be answered is that "are UCC DE learners ready to engage in e-learning environment?" Thus the purpose of this study was to measure UCC DE learners' perceived readiness to engage in e-learning. Specifically, the research sought to obtain empirical evidence of UCC DE learners': computer proficiency; Internet proficiency; e-learning tools proficiency; and financial commitment.

Research questions

Based on the set objectives the following research questions were developed:

1. What is the level of DE students' computer proficiency?
2. To what extent are DE students Internet proficient?
3. What is the DE students' proficiency in using e-learning tools?
4. Are DE students financially ready to contribute to their e-learning endeavour?

Theoretical framework

There abound many frameworks that deal with issues and constraints of e-learning readiness. The factors dealt with by Chapnick (2000) include psychological readiness, sociological readiness, environmental readiness, human resource readiness, financial readiness, technological skill readiness, equipment readiness and content readiness. Khan (2009) cites issues such as pedagogical, institutional, technological, interface design, evaluation, management, resource support, and ethical considerations as critical dimensions. Anderson (2002) considered culture, content, capability, cost, and clients as key factors. Mercado (2008) categorized dimension of e-learning readiness assessment into technology access, technical skills and attitude towards e-learning. Finally, Andersson & Grönlund (2009;p.9-10) grouped theirs into individual challenges, technological confidence, course challenges, contextual challenges, and technological challenges.

Considering the afore-mentioned success factors coupled with the objectives of the study, this paper considered factors such as basic computer skills, online skills, software application literacy, access to Internet connection and cost. These factors can make or unmake e-learning implementation for DE students at UCC possible.

METHODS AND DATA SOURCES

The research design adapted was a descriptive survey, using open- and close-ended questionnaire developed through literature search to solicit responses from students' readiness (self-assessment or perception) in areas of basic computer application literacy and technology access (dependable computer and stable Internet connection), technical skills or aptitude (observable and measurable technical competencies in the use of Internet and e-learning tools) and financing. The target population was all UCC DE students in the Central and Western Regions of Ghana totaling six thousand eight hundred and forty-nine (6849). These two regions were chosen for this exploratory study because they used to be one administrative region in Ghana and share similar socioeconomic structure. Stratified random sampling technique via balloting was used to select 400 respondents based on learning centres, programmes and lastly classes to participate in the survey during their last face-to-face session of the 2013/14 academic year with recovery rate of 86.3% (345). The questionnaires answered and retrieved were edited to ensure accuracy and responses were entered into the Statistical Package for Social

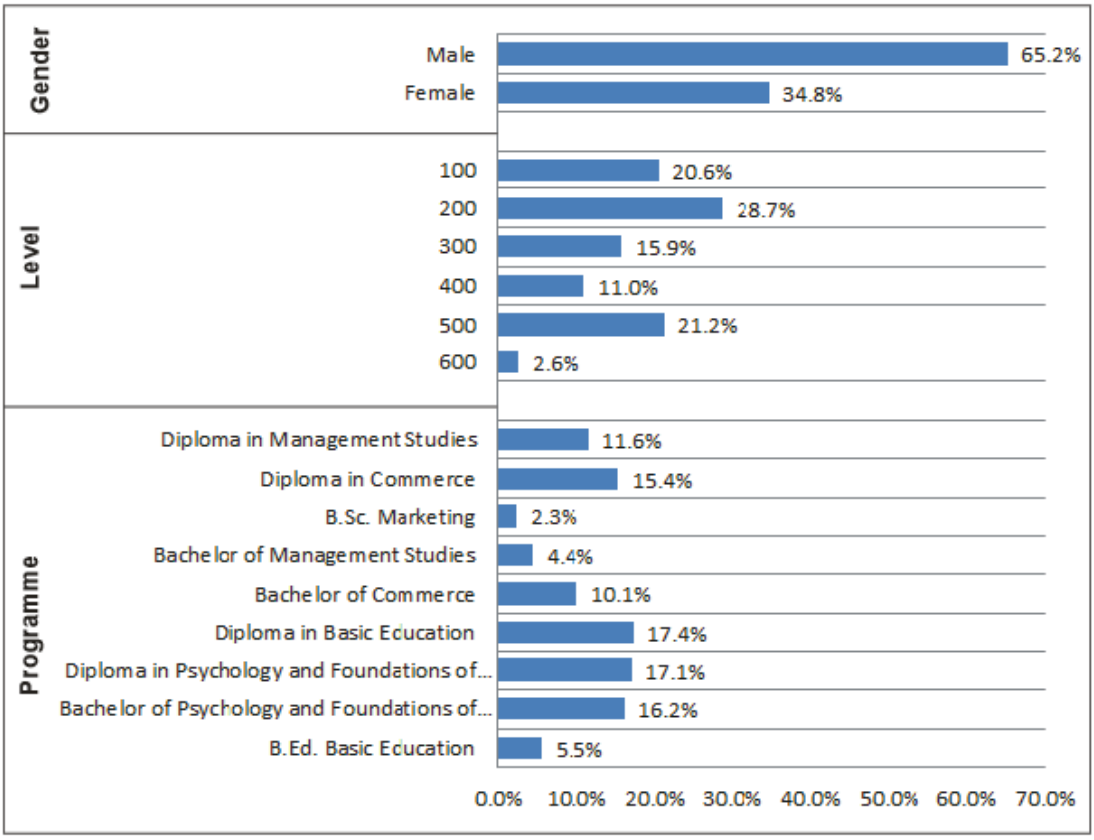
Sciences (SPSS) version 20.0 to compute frequencies and percentages to show distributions of varied responses. Using CorelDRAW Graphics Suite X7, the results were presented as bar graphs for analyses.

RESULTS AND DISCUSSION

Background

As shown in Figure 1, there are two main categories of programmes being offered by CCEUCC namely, Education and Business. The first four programmes listed belong to the education category while the last five belong to business category. There are more students enrolled in education programmes (56.2%) as compared to 43.8% pursuing business programmes. The level of respondents shows the year of study. For example the first year students are at level 100 and third year students are at level 300. Regarding gender of the respondents, 65.2% were males while 34.8% were females. The male respondents were the majority and this distribution reflects quite well the general distribution of gender in CCEUCC.

Figure 1. Background of respondents

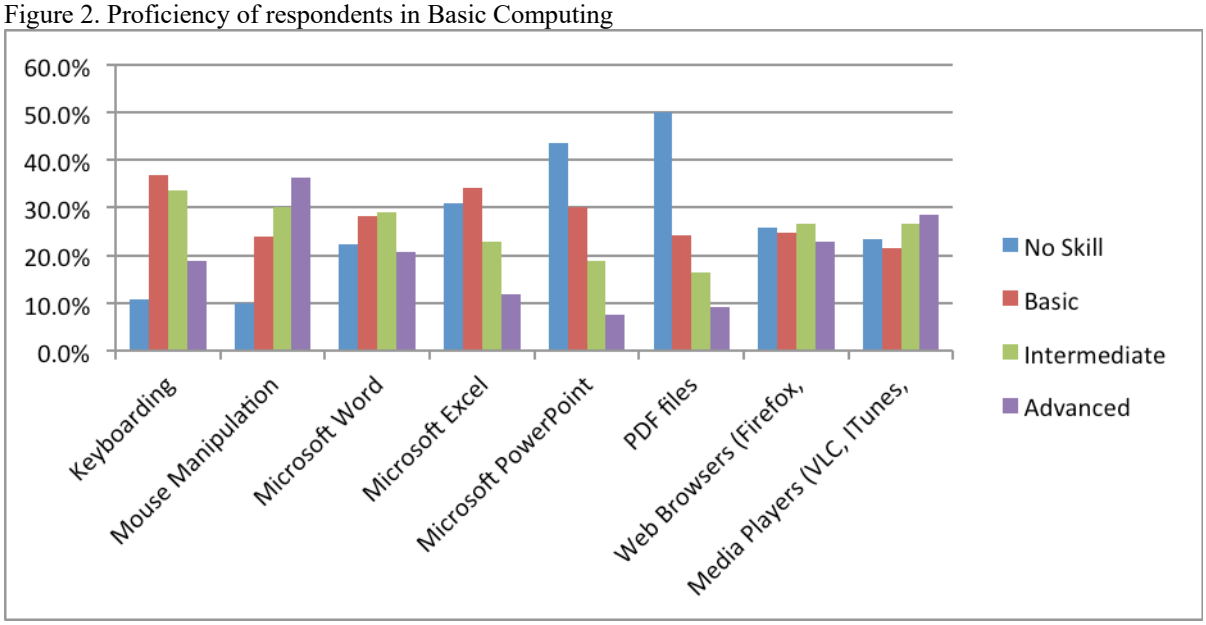


Source: Field data, 2013.

Research Question one: What is the level of DE students' computer proficiency?

Access and use of computer are one of the success factors of e-learning implementation. The basis of computer proficiency is literacy. Respondents were asked to indicate whether they were computer literates or not. The responses showed that 264 (76.5%) were literate and 81 (23.5%) were not. The indication is that high percentage of the respondents are computer literate and thus have potential to engage in e-learning activities. This could be as a result of the computing courses being offers for both categories of programmes at the degree level. While the business students study Management Information Systems at level 400, the education students read Computers in Education also at the same level. Others could have learnt these skills privately. It is also important that measures are put in place to bring on board the non-computer literates because at their present status they may not be able to effectively engage in e-learning interactions.

Figure 2. Proficiency of respondents in Basic Computing



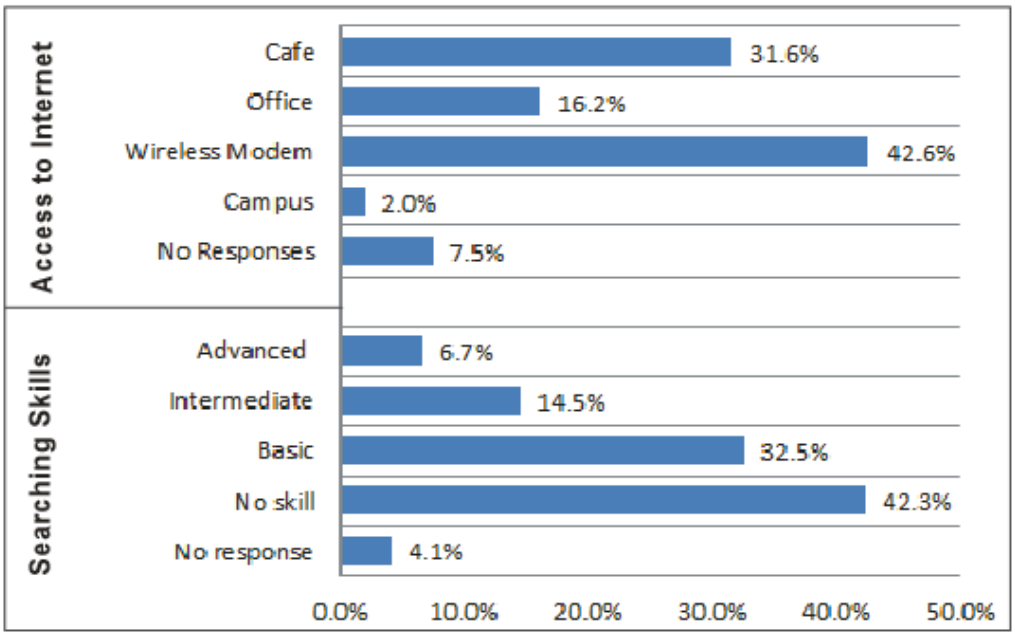
Source: Field data, 2013.

Figure 2 indicates that respondents who are computer literate have quite diverse computing skills. They possess varying skills in using keyboard, mouse, Microsoft Word and Excel as well as Web browsers and media players except Microsoft PowerPoint and pdf document handling, where majority of them lack the basic skills. In this regard, there is the need to narrow IT skill differentials through training during pre-matriculation orientation for freshers and remedial training for continuing students. This will make them more autonomous learners and consequently improve their learning outcome.

Research Question two: To what extent are DE students Internet proficient?

To answer this question, respondents' Internet accessibility, searching skills, and frequency of use and were assessed.

Figure 3. Respondents Access to the Internet and Search Skills

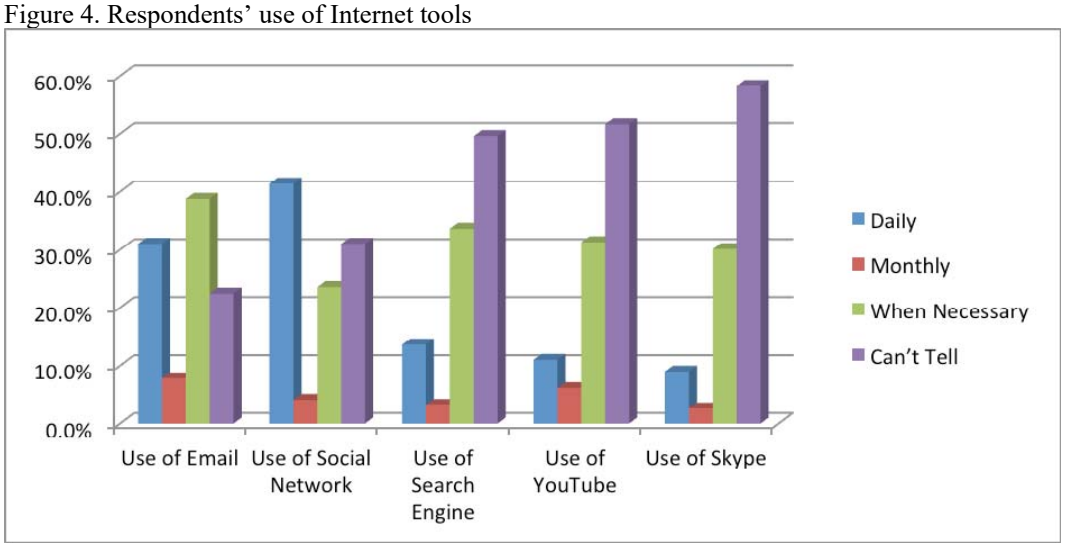


Source: Field data, 2013.

Accordingly the study sought to ascertain DE students' ability to use Internet services in their studies. Access to the Internet is one of the critical factors to e-learning success since enrolled students will have to access the Internet before logging into a particular learning management system (LMS) platform. Though numerous technologies/media such as CD/DVD, TV, and radio among others can be used for e-learning, Internet is the technology of choice due to its potential for effective interactivity. The result in Figure 3 shows that the respondents are quite good for searching information for academic purposes using the net. Over 4 out of 5 have access to Internet mainly through the use of wireless modems, at Internet cafés and office as against the other alternatives. Figure 3 also shows that majority have acquired Internet searching skills but these are mainly basic and intermediate with very little advance skills. Citing Pew's study, McGee (2012) said, "94% of teachers say students equate research with using Google". Respondents therefore possess the capability to search all kinds of information for all uses from the Internet.

The study also sought to assess DE students' frequency in using Internet facilities and the result is depicted in figure 4. With exception of e-mailing and social networking where respondents use Internet daily, they mainly use Internet in studies when necessary such as producing assignments and project work. It is also observed that students use tools for social interactions more than those that could enhance their academic work. This could be due to the fact that e-learning is not officially part of the current mode of instructional delivery. From the preceding discourse, it is deduced that DE students are proficient in using the Internet.

Figure 4. Respondents' use of Internet tools

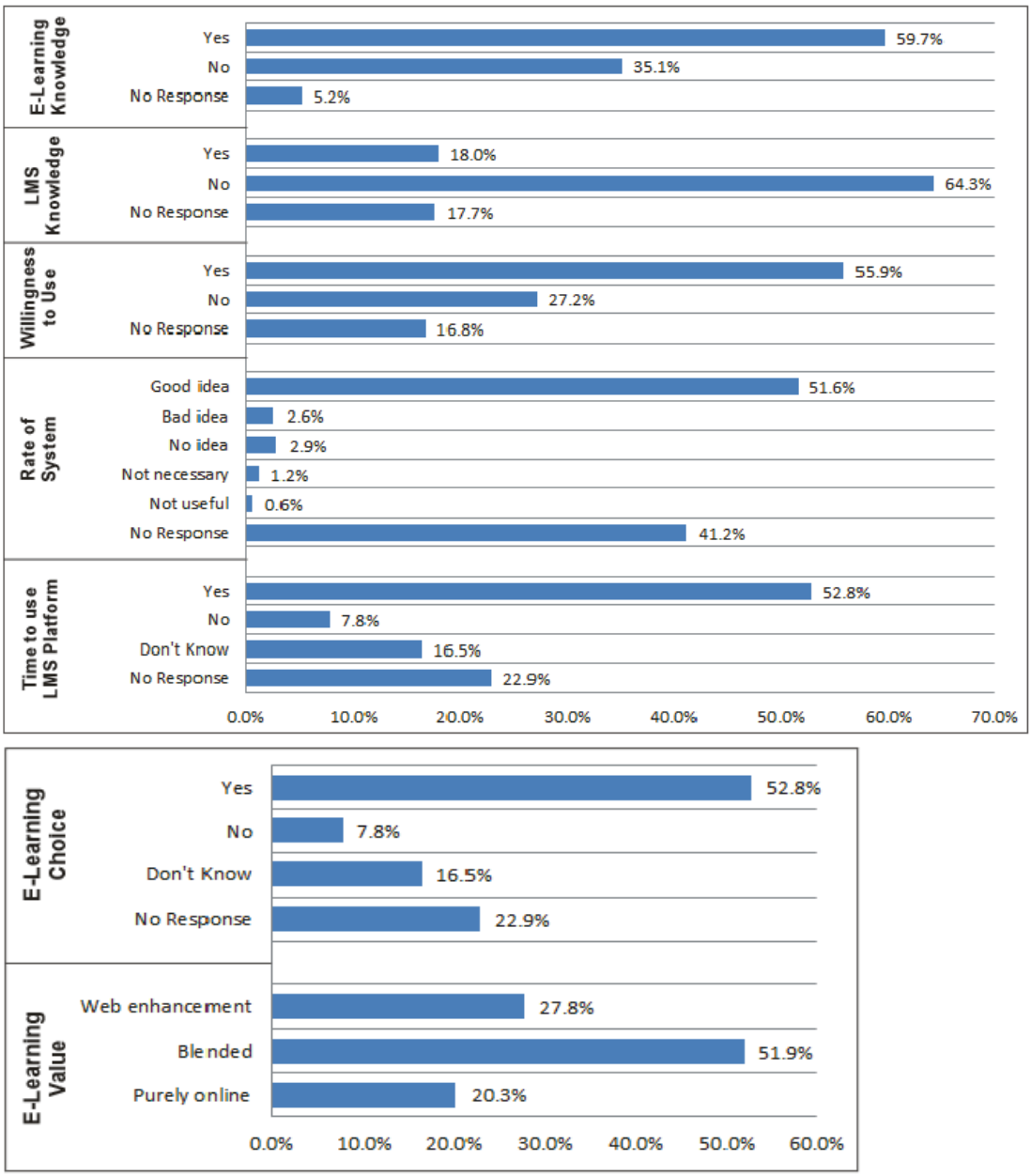


Source: Field data, 2013.

Research Question three: What is the DE students' proficiency in using e-learning tools?

Learning management system (LMS) also known as e-learning platform enables student-instructor and student-student interaction anytime, anywhere on a subject matter using tools such email, discussion forums, wiki, video conferencing among others. Figure 5 shows respondents' awareness of LMS. It is observed that 6 out of 10 of the respondents are informed of e- learning but barely 2 out of 10 are acquainted with LMS. However, 5 out 10 of the respondents perceived that LMS will be useful to their studies and almost 6 out of 10 are willing to use course materials when placed on LMS. Similarly, 6 out of 10 are of the opinion that it is time for DE students to use a LMS. Also a little over 5 out of 10 think the use of LMS platform will be helpful in their studies. Finally, majority (a little over 5 out of 10) prefer the use of the blended mode of instructional delivery to web-enhancement and pure online. Generally, a slim majority see LMS as useful and are prepared to use it.

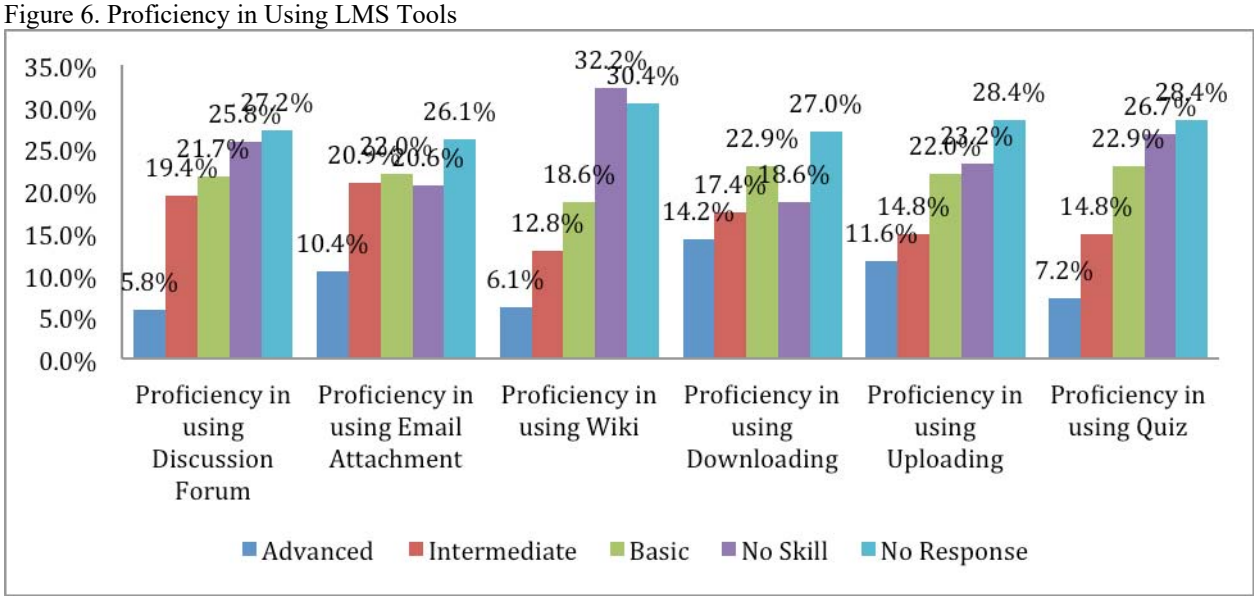
Figure 5. Respondents' awareness of LMS



Source: Field data, 2013.

Figure 6 depicts DE students' proficiency in using commonly used LMS tools. With exception of e-mail attachment and downloading of files where a little over 5 out of 10 have skills in, the rest, discussion forum, wiki and uploading have just a little over 4 out of 10. It is worth noting that majority of the respondents are proficient in email attachment and downloading but lack the requisite skills in using tools such as discussion forums, wikis and uploading of documents. In all cases, DE students mainly have basic skills.

Figure 6. Proficiency in Using LMS Tools



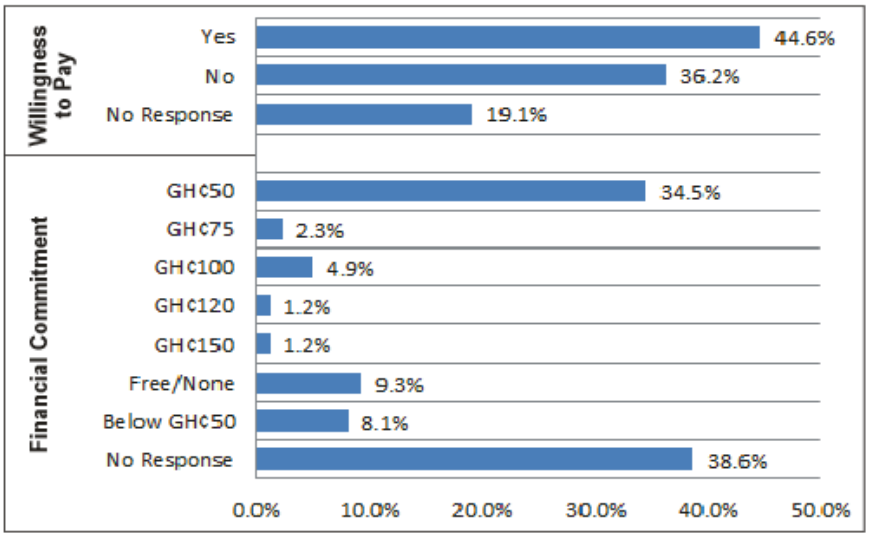
Source: Field data, 2013.

From Figures 5 and 6, it is deduced that though DE students have working knowledge and positive attitude towards e-learning, they have limited skills in the use of LMS tools.

Research Question four: Are UCC DE Students financially ready to contribute to their e-learning endeavour?

Students' e-learning participation involves having access and use of computing devices and regular Internet connectivity among others. These have financial implications. Thus the purpose of this question is to assess DE students' financial commitment to their e-learning endeavour.

Figure 7. Financial readiness for e-learning



Source: Field data, 2013

Majority of the DE students are not freely willing to contribute financially to their e-learning activities but if asked to pay, a little over 5 out of 10 are prepared to pay amounts up to GHC 150.00 for use. They are not freely willing to contribute financially to their e-learning endeavour because it would be an added cost to existing expenditure such commuting to study centres, and accommodation during their bi-weekly face-to-face sessions and general sustenance. Despite these, they are still willing to pay due to the perceived importance of e-learning to their studies.

CONCLUSIONS AND RECOMMENDATION

Based on the following conclusions, distance education students are adjudged to be ready to use e-learning to enhance their academic pursuit at the University of Cape Coast.

1. Majority of the UCCDE students are computer literate with diverse basic computing skills such as ability in using hardware (keyboard and mouse) and software (Microsoft Word, Excel, Web browsers and media players).
2. Although 92.5% of UCCDE students have regular Internet access, 53.6% have search engine skills with 6.7% of them being advanced.
3. UCCDE students have limited skills in the use of LMS tools although they have good knowledge and positive attitude towards e-learning.
4. And finally, a slim majority of UCCDE students are prepared to commit amounts up to GHC 150.00 per semester for their e-learning activities although they may not do so freely.

The following have been recommended to ensure effective implementation of e-learning mode of delivery. Firstly, for DE students who have no skills in basic computing or search engine, practical training sessions should be organized for them at their study centre by liaising with the Government's Tele-centres. Secondly, since Internet accessibility is expensive in Ghana at the moment, management of CCEUCC should hold negotiations with Cellular operators for educational discount for distance students. Thirdly, since LMS will be used, a basic course in online learning proficiency should be designed with offline on CD/DVD and online versions for private viewing and public practicing respectively. Furthermore, for effective monitoring, the online version should be sub-grouped according to study centres. Finally, for a level playing field in the e-learning environment, management of CCEUCC should negotiate with suppliers of computing devices (Laptops, mobile devices) so as to make these available to students at reasonable prices or hire purchase.

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HOW ONLINE COURSEWORK IMPROVES THE EDUCATIONAL ATTAINMENTS IN CLINICAL TRANSPLANTATION

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ABSTRACT
Introduction: Distance education is not yet popular in clinical medicine due to the strongly ingrained belief among medical professionals that face-to-face and bedside teaching is a pre-requisite to learning clinical medicine. Transplantation Science is a challenging subspecialty to teach and we demonstrate how our educational approach can be effective in improving the attainment of the postgraduate students.
Methods: This online course was designed in the UK by an international board of academic and clinical experts and attracted international students (n=28) from 12 countries.
The diversity of the student demographics presents inherent challenges mainly due to a fundamental disparity between perception and implementation of the knowledge. We employed multi-disciplinary coursework as the main strategy to improve the attainment of these students to overcome these challenges.
Results: The significant attainment changes noted by implementing multi-disciplinary coursework-based pedagogy is exemplified by qualitative and quantitative improvement in performance in the final assessment marks when compared to the first assignment (66% ± 3.2 vs 56% ± 5.1, P <0.05). This improvement is reflected in 'habitual use' of critically reflective practice and implementation of evidence-based medicine.
Conclusions: Well-designed, multi-disciplinary formative coursework is a valuable tool to develop the attainment of postgraduate sub-specialty trainees perusing a career in clinical medicine.
Keywords: coursework, transplantation, attainment, online course and distance learning.

Introduction

As an undergraduate medical student, we all have had anxious moments in the period leading up to examinations. Many of us thought that education, without examinations, would be an enjoyable experience. Unfortunately, because of the requirements of educational bodies, peer pressure and expectations from parents, examination scores become a surrogate marker of the knowledge achieved and success in doctors' future medical careers. In this kind of culture, the aim of examinations is to nominate "who is the best performer", rather than establishing 'who has virtues of being an effective doctor', where doctors should be endowed with knowledge, attitudes and behaviours commensurate with life-long learning appropriate to a safe doctor (GMC, 2013). Critical reflection on, and appraisal of, one's own practice have not been on the medical educational agenda until recently. Traditional didactic approaches to learning are not geared up to implement the ethos of continuing education as a way of life. Traditional medical education was neither designed nor subsequently perceived as the driver of continuing life-long education. Focus on examination-based rather than coursework-based education leads to "patchy" patterns of learning. Such focus leads to 'surface learning' where students learn to regurgitate information in the examinations leading to a situation that undermines 'deep learning' by missing on key areas of medical curriculum that remain un-assessed (Newble and Enwistle, 1986). Surface learning has an untoward effect on patient management, increases the incidence of adverse events and jeopardizes the patient safety, which goes against the grain of modern healthcare as suggested by Durani *et al* (2013).

As more mature students, we realised that the nature of assessment in general and coursework in particular, could drive the learning process and change the behavior as suggested by Gibbs (1999) and Wass et al (2001), where

medical education should have a positive impact on medical practice as suggested by Carr et al (2014). We appreciated the concept that medical education is not just a passive knowledge transfer, which works well with the student at the receiving end (Lavis et al, 2003). Rather, we strongly believe that the opposite is true, where assessment signals the beginning rather than the end of education (Cumming and Maxwell, 1999).

The skills learned from coursework can be, if properly blueprinted, implemented in day-to-day working life. Evidence-based, reflection-driven, critical appraisal of evidence, academic honesty, meeting deadlines and many other principles enforced by well-designed, formative coursework all are behavioural attitudes required to succeed in medical careers.

A well-designed education system has many drivers that work together in harmony leading to one goal, a successful medical career. It is a "package deal" where a well-designed curriculum, robust assessment strategy supported by high quality, research-led teaching and technology drives education to improve student learning (Sireci, 2007). In fact, a quality education is the product of continuous interaction between curriculum, instruction and assessment as suggested by Hamblton and Pitoniak (2006) (figure 1).

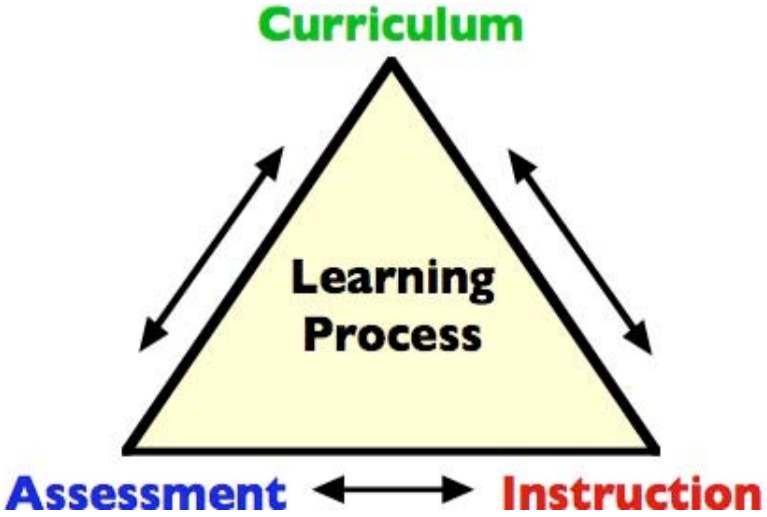

Figure1. The Curriculum-Instruction-Assessment Cycle

In this article, we illustrate our experience in conducting a 30-credit postgraduate online modules (level 7, formerly Masters level) in transplantation science. The modules were designed to deliver up-to-date, research-led knowledge to support state-of-the-art clinical experience in transplantation reflecting the clinical practice of many UK as well as well-known international transplant centres. The modules run over a 26-week period, with 300 hours of student effort expected for a 30-credit module. Twenty eight doctors (surgeons and nephrologists) were recruited from 12 countries. Some students are experienced consultants in related sub-specialties and were keen to expand their experience in transplantation science. Activities include interactive online lectures/tutorials, clinical case scenarios, journal club, MCQs/quizzes, discussion fora, formative and summative assessment. All materials to support these activities are released online in a 10-day cycle. Formative and summative assessments are phased to ensure students are afforded feedback to enhance their performance as the module progresses. A variety of formative coursework formats were offered, some were visible to the entire group (multi-disciplinary clinical scenarios and critical appraisal of current/leading scientific papers to promote reflective learning) to facilitate peer support; whilst others were only visible to the individual students (notably MCQs with ideal answers reflecting on the national and international guidelines, feedback on draft assignments and constructive specific feedback on individuals contribution to discussion fora). The underpinning philosophy was the implementation of knowledge into clinical practice to traverse the theory to practice interface. Consequently, the needs of a diverse geographic group of international students were integrated into the design during the planning phase. It is challenging to teach the implementation of evidence-based medicine in transplantation science remotely under different sky and on different soil, mainly due to the fundamental disparity between perception and implantation of the knowledge where the knowledge is not translated into behavioural changes (Miller, 1990). Difference in the local resources, which has a strong influence on the medical practice, was a further challenge. Many of these international students work in an environment suffering from limited resource, absence of local guidelines and lack of awareness of international guidelines.

The learning style of these mature international students has been an educational challenge for the faculty. A common theme emerged early in the delivery of the module notably that these students had little experience of self-directed learning and placed too much reliance on the tutor to feed the knowledge. We adopted the formative coursework strategies to cross these virtual barriers and bridge these gaps.

Coursework strategies

In our opinion, performing well on a particular assessment task is not the same as achieving the learning outcomes. The educational institution may focus on improving the student's performance using a particular test instrument, for example, practicing MCQ may lead to mastery of the instrument itself rather than focusing on testing knowledge and its application. The Universities and Colleges Admissions Service (UCAS) in the UK focuses mainly on students' acceptance in higher education. It indicates the performance of the individual student rather than reflecting school performance. These types of tests also are not designed to test the retained concepts and they do not promote behavioural development. Additionally, they do not encourage reflection and foster evidence-based practice as a way of life. For these reasons, they do not have a long-lasting educational outcome, rather they test only how good the student is in mastering the test instrument.

Consequently, we designed this transplantation module to be a dynamic pedagogy, a form of teaching that integrates assessment, curriculum and instruction in the service of learning. The constant adaptation of assessment, curriculum and instruction in response to both the potential and demonstrated learner behaviour adds a labile quality to the construct.

Coursework format & monitoring the student's progress

The formative coursework was punctuated by summative assessments at 3 phased specific intervals over the 26-week period (weeks 12, 18, 26). Nature of summative assessment were written assignment, evidence based management planning and a poster presentation respectively. We designed these summative assessments to gauge the attained knowledge, monitor the progress of students and identify underperforming ones. The assignments were clinically oriented addressing the behavioural attitudes and clinical skills required to be gained as suggested by Miller (1990). Carr *et al* (2014) also supported this view where they demonstrated that academic performance has a strong impact on performance as a practicing clinician. The assessment strategy also required the consideration of employment skills required for continuing education including communication such as written, narrative, scientific, critical appraisal, evidence-based practice, synthesis and concise presentation. Students were encouraged to submit a draft prior to final submission and another feedback was provided promptly after final submission to "feed forward" into future assignments. Our objectives being to improve the cognitive skills "know" and "know how" as in Miller's taxonomy (figure 2) (1990). We designed clinical scenarios to address the behavioral skills "shows how" and "does" through the proper application of concept, sensible justification and reasoning and also by reflection on the student's local practice. We aimed to inspire the student with other unrecognized dimensions of the coursework such as copyright, referencing and meeting the deadlines to change their educational behaviors to improve their attainments (Taylor and Hamdy, 2013).

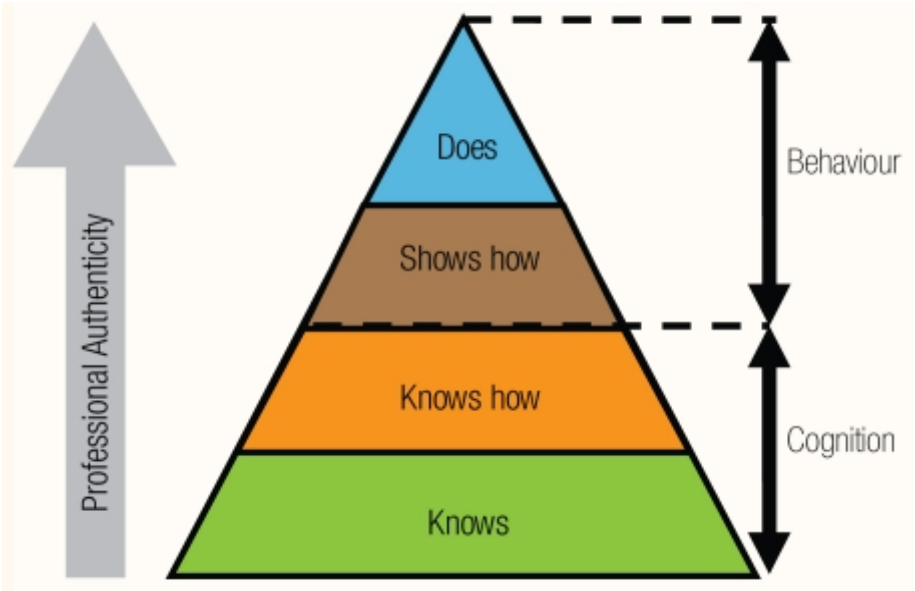

Figure 2. Simple model of competence (Miller, 1990)

General considerations

The design of this module is based on the "backward design" as suggested by Wiggins & McTighe (1998). We tailored the assessment to ensure that the published module learning outcomes were assessed. We reshaped the knowledge attained in a format acceptable to the student's local practice and culture; for example, the principle of brain death is not acceptable and donation after cardiac death constitutes an ethical dilemma due to religious reasons. Transplantation science involves many judgments calls, and the best answer often depends upon the precise context. We train the students to reason and justify their treatment plan based on the available resources at their work places supported by the up-to-date scientific and clinical evidence base. Indeed, this coursework-based formative and summative education strategy allows better exploration of the depth and breadth of knowledge, affording students the freedom to study a complex subject area from multiple angles and different perspectives.

Benefits of formative and summative assessment strategy

Coursework was planned to address many other behavioural skills such as critical reflection and complex achievement (Linn & Miller, 2005). Our emphasis has been on how to integrate critical thinking and problem solving (behavioural changes), which is one of the major learning objectives of this module, thus encouraging students to design rather than regurgitate their response (Linn RL & Miller MD, 2005). This also allows direct assessment of other cognitive skills, critical analysis skills, information literacy and writing skills (Pangaro L& ten Cate O, 2013). All these "extras" match very well with state-of-art audio-lectures delivered by experts. We promoted peer assessment of formative coursework as an innovation in teaching and learning on this course to encourage team-based learning (TBL) as suggested by Parmelee and Michaelsen (2010). This educational approach provides "added value" to the student experience, enhancing active learning, critical reading/thinking and promoting engagement of the students.

We mirrored the coursework with high quality constructive feedback mechanism as suggested by Hesketh and Laidlaw (2002). Delivery of this extensive feedback was based on user-friendly and familiar instruments such as the university blackboard® e-mail (Curtis& Lawson, 2001), Viber®, Skype® and Facebook®, (Davidson-Shivers *et al*. 2001). Underperforming students were further supported with robust mentoring facilities and escalation of the level of communication between the course faculty and these students.

We were able to support 5 high quality coursework submissions to be published in peer-reviewed journals and presented at international meetings, reflective of the high level of student attainment in academic practice and promoting the principles of additional skills such as referencing, copyrights and academic integrity.

Performance indicators

We employed Kirkpatrick algorithm (see figure 3) as a performance indicator aiming at moving the student up in Kirkpatrick pyramid (see below).

Figure 3: Kirkpatrick pyramid for programme evaluation (after Phillips 1996).

Satisfaction (level 1):
The university conducted an anonymised end of module evaluation online survey and data collection. 93% of the cohort documented excellent satisfaction in all domains addressing the organisation of the module, suitability of the teaching style, the communication and support provided by the faculty and the assessment tools used (80% strongly agreeing, 20% agreeing with satisfaction in each domain).

Learning (level 2):
Twenty-eight students commenced the module. Seven students re-sat one or more of the assignments. Five students failed assignment 1 (written assignment), one student failed assignment 2 (evidence based management plan), two students failed assignment 3 (poster presentation). At completion of the module, twenty-six students achieved a pass (93% success rate).

Impact (attainment) (level 3):
There was significant improvement in the average mark between assignment 1 and the final mark (56% ± 5.1 vs. 66% ± 3.2, P=0.0065) (figure 4). Our scoring rubric was based on the behavioral characteristics such as academic writing skills, critical reflection and implementation of evidence-based medicine.

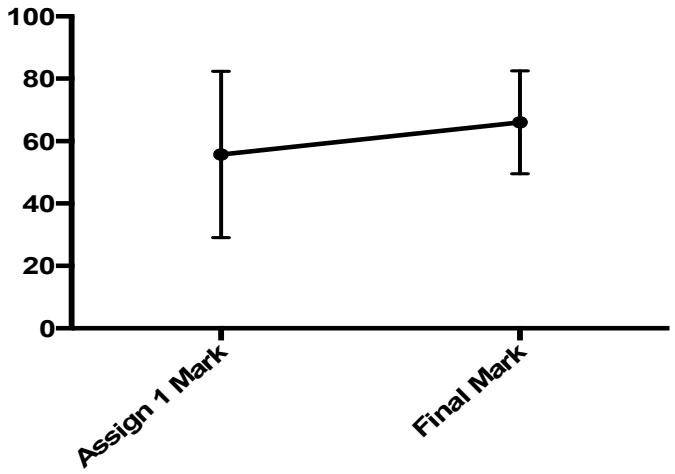

Figure 4: Significant improvement of students' marks (P=0.0065).

The reasons for failure as expected were multifactorial. None of these were due to lack of knowledge, but poor academic writing and plagiarism were the main reasons for failure.

Deeper analysis of the engagement of students in the cyclical activities was directly related to the level of student attainment in summative assessment. The students who failed assignments have a common theme, which is the lack of engagement and poor communication with the course faculty. As a remedy for the relatively high failure rate in assignment one (18%) and to achieve our learning objective, we advised the students to submit a draft before the final submission through Turnitin® to reinforce their skills in copyright and academic integrity. We encouraged the students to reflect critically on their local practice whenever appropriate as the first step towards improving their local clinical practice based upon robust evidence, hereby enhancing patient care as well as promoting professional development.

Return on investment (ROI)(level 5):
We considered students enrollment to module 2 as a marker of ROI as suggested by Phillips (1996). Twenty-six of successful students subsequently enrolled (100%) on the second module.

Conclusion

In distance education, the advances in technology facilitated the delivery of knowledge, assessment and feedback. The structure of our formative and summative coursework assessment strategy in this distance-learning course in transplantation science is not much different from that found in many traditional face-to-face medical courses. However, it is the DELIVERY, which is different and needed more attention for online learning in a diverse international group. Indeed, distance education can reach clinicians deprived from education crossing both virtual and physical barriers and spreads widely compared to traditional education applying "anytime anywhere"

principle. The assessment strategy we implemented managed to reform the educational behavior and improve the attainment of international students with expected strong impact on their local health services and patient care/management. We ensured a high level of student mentoring and coaching to overcome the absence of face-to-face interaction and promote the team-based learning. We relied on structured qualitative feedback throughout to promote learning otherwise the coursework will lose its formative function. Feedback provides the foundation for reflection, hence promotes learning.

This work has many strong aspects. We followed Miller Taxonomy (1990) to achieve the learning objectives. It focuses mainly on the multidisciplinary formative and summative coursework strategy as the main pedagogy in transplantation science to reform the educational behavior of the students. We focused mainly on how to translate the attained knowledge into evidence based clinical behaviour ("shows how" and "does"). This was evident when we used clinically oriented summative assessments to monitor the students' progress in the context of Kirkpatrick model as a performance indicator. Improvement in the students' marks is a clear indication of our effective pedagogy. We explored the different formats of formative coursework in a reflective style gauging each format against the planned behvioural attitude required. This approach enabled the course faculty to structure a successful teaching strategy to achieve the learning objectives. The improvement in educational behaviour is reflected in better academic writing skills, 'habitual use' use of reflective practice and implementation of evidence-based medicine.

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LEARNING SCIENCE THROUGH DISTANCE EDUCATION- A CHALLENGE AT KARNATAKA STATE OPEN UNIVERSITY

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ABSTRACT

Distance education is the education of students who may not always be physically present at a class room. The modern use of electronic educational technology (also called e-learning) facilitates in distance learning and independent learning by the extensive use of Information and Communications Technology (ICT), replacing traditional content delivery by postal correspondence in general and for science discipline in particular. Science is an art related to field of study which draws upon many disciplines such as chemistry, physics, physiology, biology, hygiene, economics, rural development, child development, sociology and family relations, community living, art, food, nutrition, clothing, textiles and home management. The science, technology, society and environment education movement has a long history in science education reform, and embraces a wide range of theories about the intersection between science, technology and society. In delivering science courses by distance, a key challenge is to offer the learner an authentic and meaningful laboratory experience that still provides the rigour required to continue on in science. On developing strategies for successful Science and technology programme in Distance Education is to identify relevant mode to approach and to define and prioritize short and long-term objectives and the need to align the agenda with requirements.

The present paper attempted to understand the challenges in Open and Distance mode with special reference to science subjects at KSOU and analyze the reasons in teaching science stream, and throw some light on the possible ways of solving the problems of ODL and encourage learner's scientific mind.

Keywords: ICT, Science Education, KSOU

INTRODUCTION:

The term open and distance learning reflects both the fact that all or most of the teaching is conducted by someone who is away from the learner, and that the mission aims to include greater dimensions of openness and flexibility, whether in terms of access, curriculum or other elements of structure. Open and distance learning systems can usually be described as made up of a range of components such as: the mission or goal of a particular system, programs and curricula, teaching/learning strategies and techniques, learning material and resources, communication and interaction, support and delivery systems, students, tutors, staff and other experts, management, housing and equipment, and evaluation. The ODL system is used for school-age children and youth those who are unable to attend ordinary schools, or to support teaching in schools, both at primary and secondary level. However, most courses and programs are aimed at the adult population.

Science education has been recognized worldwide as a pre-requisite in technological development. It is almost impossible today to live a full and satisfactory life with little or no knowledge of science. This is because science education has introduced a lot of changes in our world and it will continue to do so in the future (Orukotan, 2007). Science education remains a very potent factor that promotes national development.

Considering the nature of science, students studying science courses are expected to engage in first-hand experiences such as observation, measurement, testing hypothesis, or experiment, particularly in higher education (Kirschner, 1991). This can be a serious challenge, for distance education institutions when offering science courses because of the fewer occasions for students to be on campus where laboratory facilities, relevant equipment, and teaching staff are provided (Kennepohl and Last, 2000; Jason and Namin, 2006).

Much debate has been going on, however, as to the role, value or effectiveness of practical work not only in distance teaching settings but also in education in general (Watson, 2002). According to Jason and Namin (2006), the advantages of providing distance students with practical work include; reinforcing student's motivation towards subject matter, generating within students positive attitude towards overall learning and intensifying interpersonal relationships with tutors and peer students.

Practical work means any teaching and learning activity which involves at some point the students in observing or manipulating real objects and materials. The term "practical work" is used in preference to 'laboratory work' because observation or manipulation of objects could take place in a school laboratory or in and out of school setting, such as the student's home or in the field e.g. when studying aspects of Biology or Earth science (Irwin, 1995).

Moreover, because of the nature of the discipline, science often involves students in first-hand experiences such as observation, measurement or experiment, particularly in tertiary level education. It can present a challenge, however, for distance education institutions when offering science courses because of the fewer occasions for students to be on campus where laboratory facilities, relevant equipment and teaching staff

are provided. Apart from basic academic reasons, ensuring that student engage in practical work becomes critical when it comes to the issue of credit transfer between educational institutions as it can fairly represent the credibility to science courses (Osborne, 1993). For example, while you can study a history lesson completely online, you cannot perform nursing clinical online. Thus, physical classroom attendance is mandatory for the completion of some degree programs and this is why practical exercise is necessary due to what they contribute to the learning process.

However, not much research studies have been carried out to investigate the kind of effect brought about by a specific method of practical work on distance student learning. Instead, relevant literature on science courses involving distance education method is rather illustrative.

WHAT IS SCIENCE AND SCIENCE EDUCATION

Science is a systematic study of nature and natural phenomenon in order to discover their principles and laws. (Urevbu 2001). There are several definitions of science. Science can be defined in terms of its processes or its products. When defined as a process, science involves observing, classifying, measuring, experimenting, questioning, hypothesizing, recording, controlling variables, interpreting data and communicating. As a product, science is an ordered body of knowledge in form of concepts, laws, theories and generalisations. Over the years these have become formalized into systematic bodies of knowledge in the fields of biology, chemistry, physics, and geology and so on. These bodies of knowledge have to be transmitted from one person to another and from one generation to another. The process of transmitting scientific knowledge can only be done through education - in this case science education. Science education deals with sharing of science content and process with individuals who are not considered traditionally to be members of the scientific community, the individuals could be students, farmers, market women or a whole community (Kola, 2013). According to Okeke (2007), science education is an integrated field of study which considers both the subject matter of science discipline such as biology, chemistry, physics, agriculture etc as well as the processes involved in the learning and teaching of science. It can be said to embody all education processes aimed at providing unlimited opportunities for learners to understand and utilize necessary knowledge, skills and attitudes required to operate effectively in a scientific and technological society. In other words, science education implies exposing learners' usually prospective teachers of science to scientific and technological knowledge, to the nature of science and scientific processes, to scientific attitude as well as equipping them with professional skills of a science teacher. There is a thin line separating science education and education in science. Education in science refers primarily to understanding and application of scientific concepts and principles, while science education includes the development and acquisition of processes required to assist others acquire scientific and technological knowledge.

CHALLENGES OF TEACHING AND LEARNING SCIENCE IN KSOU

Several distance educators have found that print media dominates in the delivery of content materials to open and distance learners and also in communicating with instructors. (Butcher 2003, Tooth 2000). Research studies (Yusuf and Falade 2005, Nnaka 2012) have also shown that open and distance learners enrolled in most of the open universities including KSOU programmes use mainly print media for instructional delivery. The science courses are no exceptions, despite the critical role that hands-on experiments play in the teaching and learning of science. Owoyemi and Akinsete (2012) in their study on "learning science at a distance – students' perception of practical work in learning science" found that the students were of the opinion that it is more challenging to learn science without any practical work.

Their study also revealed that distance learners were of the view that it is essential for a science course to include practical sessions even though the course materials have been delivered to them. Practical work is an essential component of science teaching and learning, both for the purpose of developing students' scientific knowledge and that of developing students' knowledge about science (Millar 2004).

Some of the challenges of teaching and learning science education in KSOU include:-

LACK OF INFRASTRUCTURE

This has constituted a major challenge to the use of more sophisticated multimedia for instructional delivery in science education in KSOU. The following examples will illustrate the magnitude of this challenge-

- The television can be used to communicate information live to a large number of people or in recorded audiovisual form. It has been successfully used in open and distance learning programmes in some Universities of South Africa, India and China. Television programmes can be used to emphasize the experimental sides of science by demonstrating the use of complex equipment and by leading students

through experimental and pedagogical procedures. However there is no functional dedicated television station for open and distance learning in KSOU.

- Teleconferencing is a good open and distance learning instructional strategy that enables learners to get connected simultaneously so that interaction takes place even though participants are physically apart. It aids in minimizing learner instruction by creating a learning environment that is similar to face-to-face instruction. This facility is not in use in KSOU.
- Available evidence and visits to some KSOU study centres reveal that they lack the physical infrastructure to accommodate science laboratories.

INTERNET CONNECTIVITY

This has also posed a challenge to the teaching and learning of science through open and distance learning in KSOU. This is because access to the internet is generally very poor in the country and students in the rural areas never get access to the internet. Moreover the cost of accessing the internet is very high in developing countries. Most students make use of the cybercafés who charge between Rs. 10 and Rs. 20 per hour despite their poor services and slow rate of their server. Study has shown that most of KSOU study centres do not have internet connectivity. This implies that any instructional media that requires the use of the internet cannot be utilized at such study centres.

High cost of Software –The high cost of software and its licence is another serious challenge to instructional delivery of science courses in KSOU. The appropriate software for the teaching and learning of science through open and distance learning is usually very expensive because they are not developed locally. They are developed in Europe and other developed countries, and are usually made to suit their environment. In short, the software that is appropriate and culturally suitable to the Indian education system is in short supply.

Poverty –Inequality of access to the available technology by all the students is another challenge to science education through open and distance learning .The cost of personal computer (PC) and laptops have remained high in developing countries. Their prizes are beyond what the average worker or student can afford. Moreover the few students who are able to afford PC/Laptops are not connected to the internet, since this means additional cost which many cannot cope with.

RECOMMENDATIONS

1. KSOU should adopt a “media mix”-namely interactive and non-interactive media, electronic media, and print material. The use of television instruction, videoconferencing, teleconferencing and Worldwide web applications need to be introduced into the instructional delivery mode for science education. These communication and technology devices will ensure that the delivery of science education through open and distance learning is effective and efficient.
2. All KSOU study centres should be equipped with functional internet facilities, so that students and tutorial facilitators can make use of any multimedia facility that is available.
3. It is necessary for KSOU to partner with information and communication technology companies in the country to assist students to acquire their own personal computers/laptops.
4. KSOU study centres that have adequate physical infrastructure should have fully equipped science laboratories. Frequent review and strengthening of existing Memorandum of Understanding (MOU) for students practical work with conventional universities is critical, to ensure that it is working.
5. Training and re-training of science tutorial facilitators on the use of various electronic media for instructional delivery, whether online or face-to-face interaction.

CONCLUSIONS

The establishment of the Karnataka State Open University during 1996, open and distance learning system has come to be accepted as an alternative mode of acquiring higher educational qualifications. Through this system one can effectively pursue any programme of study at KSOU including sciences. However, pusuing a programme in science in KSOU is faced with a lot of challenges. In order to meet these challenges there is need to integrate the use of technologies such as, computer conferencing, television broadcasts, and so on into the instructional delivery method so as to produce knowledgeable and skilled scientists and science educators. With the advancement of technologies, learning and collaborative work in the future can become radically different from what it is today. Although no one can expect that educational networks will totally replace the traditional lecture. The traditional lecture has some drawbacks: students have to attend at a fixed time, the needs of students with different backgrounds cannot be met and students have no control of their learning pace or environment. Many web-based training and learning platforms have been developed. However, none of these platforms offer an integrated and open platform for learning according to our requirements. Some of them do not

support all the necessary ODL services (synchronous, asynchronous and collaborative learning). The ODL system is now a fast growing subject. The time is not far from now when the entire education and training system will be fully controlled by ODL system. In India especially IGNOU is doing key role in this area.

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NEW REVOLUTION IN EDUCATION– DIGITAL CLASSROOM

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INTRODUCTION

Teachers can no longer afford to embrace the motto "This, too, shall pass!" when viewing technology's role in education. Research has shown that appropriate applications of technology greatly enhance learning. As long ago as 1995, a U.S. Department of Education forum reported, "Through the use of advanced computing and telecommunications technology, learning can also be qualitatively different. The process of learning in the classroom can become significantly richer as students have access to new and different types of information, can manipulate it on the computer through graphic displays or controlled experiments in ways never before possible, and can communicate their results and conclusions in a variety of media to their teacher, students in the next classroom, or students around the world. A more recent study found that online learning allows individual student needs to be more effectively met and instructors have more time to address individual student learning issues.

The Digital Classroom courses are not about learning isolated technology skills or using any particular application. While we will do those things, the more important issue is integrating those skills and applications into real-world projects useful to improving a student's understanding of any curricular area while learning the necessary objectives for life-long success. In addition, technology lets educators unite students with students, classrooms with stakeholders, parents with teachers. When everyone is informed, real progress can take place. That is the real power of technology. It allows teachers to accomplish what Susan Patrick, the new head of the federal Office of Educational Technology, said was the necessary use of educational technology. "Technology is becoming the adhesive that unites formerly disparate parts of the education enterprise." (*eSchool News*, May 2004) Technology is that place to stand that Aristotle was looking for so many years ago; it allows us and our students to "move the world."

CURRENT DEVELOPMENT OBJECTIVES

Currently lectures for all remote courses are available on video and delivered via cable TV, satellite transmission, or tapes that are sent by conventional mail. As bandwidth to the home increases, videos will be made available on-line. As an immediate step, to conserve the bandwidth we design lectures as a combination of picture slides and audio files. Rather than watching talking heads, students can view the slides (equivalent to a blackboard in the traditional classroom) and optionally hear the teacher's voice. The students are sent electronic forms of the slides that are used in the lectures so that they may amend these notes provided by the lecturer with their own notes, utilizing a word processor of their choice.
The authoring activity of the current Digital Classroom allows faculty and teachers to publish assignments, exams and lectures. An author can use almost any word processor and can include reference to multimedia objects on the INTERNET or on local systems. The back end of the authoring agent is a combination of various software tools which produce data in file formats recognized by the front end (X tools and Mosaic). Common image file formats can include GIF, JPEG and Postscript, which all can be displayed by Mosaic along with text (HTML format) in a hyper-media environment.

Requirements

Multimedia Requirements

Computer aided interactive multimedia courseware is being developed at NJIT (Bengu, 1994) to introduce an early and comprehensive understanding of interdisciplinary applications of engineering systems, with a focus on manufacturing. The manufacturing engineering multimedia courseware will include on-line lectures, audio-video education tools, interactive computer software (process and equipment design, simulation and animation software). It will also make access available to related academic, industry, and government research and education information through the World Wide Web.

The initial course material is being prepared by faculty, with the modules referred to as topics. Each topic contains illustrations in various media such as text, still pictures and slides, video, and interactive software. The students will invoke the courseware through an activity link in the Virtual Classroom or though a World Wide Web interface. An "electronic blackboard" serves as the current interface metaphor.

The power of multimedia technology can be used to assemble course materials in various media forms such as text, slides, full motion audio-video, live video and interactive software on a single powerful interactive

platform, referred to as simply "courseware." The introduction of multimedia into courseware allows the instructor complete freedom to incorporate into a remote course those learning situations that previously could only be accomplished in a face-to-face environment. An example would be, the manipulation of complicated machinery by simulation, animation and multimedia presentations.

The integration of Virtual Classroom[and multimedia on the Information Superhighway is also underway at NJIT (Kushwaha & Whitescarver, 1994, Deek & Kimmel, 1994). Current work is the enhancing the media richness of the Virtual Classroom using the standard protocols of the Internet (e.g., HTML and Mosaic). World Wide Web client software is utilized to integrate the virtual library resources of the information highway as well as the group communication facilities of EIES to provide a comprehensive fully interactive collaborative learning multimedia environment.

The multimedia digital Classroom courseware can be viewed as a computer-mediated application, where the computer acts as a mediator between the application author, who publishes the on-line classroom courseware or "encyclopedia", and the user, who browses the available information and contributes to the authoring as a participant. The author is not just restricted to publish his original work, but has capabilities to reference, include and publish all the relevant information available on the Internet in a multimedia environment.

In similar fashion, users of the courseware, in addition to their innovative contributions, have access to abundant information which can be easily referenced in the courseware discussions. The instructor has to have the ability to integrate new material generated by the current class for the benefit of future classes. The underlying semantic structure for the effective incorporation of material is still a research issue. The ultimate objective for the instructor is the evolution of a knowledge base with a learning oriented semantic and pragmatic topic structure oriented to the given subject matter. This synergetic paradigm creates an information garden for the subject topic under discussion and the author takes the role of a moderator, who communicates with the users in a group communication environment, to manage and organize the information.

The software architecture of the multimedia courseware may be viewed as having three components: the authoring agent, the user agent and the distributed database or group agent. The authoring agent consists of various tools which allow authors, such as instructors, to publish the course material in a manner which is easy and comprehensive. The text material from various sources which have multimedia objects can be submitted using a user friendly authoring environment. For this environment an extremely easy to use and integrated authoring and submitting tool needs to be developed. We cannot expect most educators to master the current hodgepodge of protocols and software. Finally the educator must have the ability to efficiently manage the growing volume of information and communications resulting from the collaborative learning process.

There is a great deal of work still to be accomplished to make this distributed system appear to be completely transparent to both the educators and the students. Currently there is no comprehensive authoring system and no integration between the authoring tools that do exist and the browser type capabilities. In addition, a clearly missing piece is the ability of the educators to develop their courseware on their personal computers and to turn their machines into personal servers to control and regulate the communications environment with their students.

Hypertext Requirements

In rich hypertext systems (Nanard 1991) all the nodes have types. The type of a node may reflect its role in the Hypertext, e.g., its syntactic category. In the use of Hypertext to support learning applications we see the requirement for semantic typing of both nodes and links. We cannot add any form of intelligence to the course materials unless there is some standardized semantic typing of nodes and links.

CONCLUSION

While one can conceptualize most of the functionality that would make up an advanced learning system and even point to ways to implement it, the integration into a single interface that is easy to learn is still a key challenge. An interesting and appropriate interface metaphor adds to the usability and user acceptance of software. That is one reason why we have viewed this as an evolutionary process that must be tied into an evaluation program that provides feedback to the design process. Furthermore, the objective of doing better than the standard approach to education requires that we evaluate effectiveness.

The resulting system must be viewed as a toolkit that gives the instructor full control of what aids and techniques to employ in delivering their course. That is one reason we have focused on the metaphor of "activities" that can be chosen and integrated dynamically into a given class conference. The key expansion of the conference database to incorporate a full collaborative Hypertext approach will provide complete freedom for the instructor

to facilitate or "weave" the conference discussion. We are beginning to refer to our advanced system as the "ABC" (Activity Based Conference) system to further reflect the idea of tailoring and the idea of simplicity in structuring communications around the learning objectives of a group.

Currently many of us use the technology to integrate our face-to-face classes with our remote students so they are all one class. In addition, there are opportunities for the use of the technology to facilitate multiple instructors, multiple courses, material used across different course sequences, training on the job, and numerous other requirements that in themselves can add to the requirements for software functionality. For example, a management game might involve a sequence of management courses where the more advanced students are assigned higher level management positions in the game.

Once we free ourselves from the mental limits of viewing this technology as a weak sister to face-to-face synchronous education, the potentials to revolutionize education and learning become readily apparent.

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