TOJDEL
The Online Journal of Distance Education and e Learning

The Online Journal of Distance Education and e-Learning

Volume 4 Issue 1
January 2016

www.tojdel.net
01.01.2016

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Published in TURKEY

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January 01, 2016
Prof. Dr. Aytekin İŞMAN
Sakarya University

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CHALLENGES AND SOLUTIONS TO PROVIDING ONLINE COURSES IN KENYA: A LECTURER'S PERSPECTIVE AT A KENYAN UNIVERSITY

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ABSTRACT-What solutions are there to universities facing challenges in providing e-learning? E-learning has the potential to provide increased educational opportunities for students and enhance lecturers´ effectiveness and efficiency. However, in order to experience the full benefits, factors such as adequate infrastructure, e-learning policy, right attitude, among others, should be present. This unfortunately is not the case for every university that wishes to provide e-learning. This paper presents the case of a Kenyan university currently experiencing challenges in combining conventional face-to-face education and e-learning. It examines the current situation at the university and identifies the specific challenges hindering the efficient provision of online courses by lectures. Based on the identified challenges, solutions are recommended that take into account the university's organizational and budgetary situation. The solutions can further be transferred to other universities facing similar challenges.

INTRODUCTION

E-learning has several definitions including computer-based training, or learning with the assistance of computers. This new approach to delivering educational materials to students has many advantages compared to traditional face-to-face approaches, for example, no classrooms or lecture halls are required, a teacher can reach many students in different areas at the same time, and fewer libraries and/or bound books are required. Looked at this way, e-learning has real potential in many developing countries where infrastructural challenges overwhelm the education sector. As a result, many institutions of higher education are introducing e-learning systems to provide students with online access to learning materials. The University of Eldoret (UoE), a public university in Kenya, recently introduced e-learning. The aim of this initiative was to not only deal with problems of space (class rooms and lecture halls, staff shortages) but also to make education available to many more students who cannot afford the cost and/or the time to sit in a conventional classroom as they have to work to provide for their families, concurrently. So far, one course has successfully been offered fully online to 12 students while the other courses were given using a blended learning approach. Blended learning is defined as "a mixing of different learning environments and approaches that often includes both face-to-face class-room methods and computer mediated activities in and / or outside the classroom", and this is differentiated from pure e-learning where there is "complete reliance on e-learning materials without any face-to-face classroom methods" (Frehywot et al., 2013, p3).

Delivering e-learning content is beneficial to many Kenyan institutions including UoE as it tackles one of the main problems facing Kenyan higher education, the lack of enough qualified staff and adequate infrastructure. In addition, it provides flexibility and addresses the needs of a growing population of students seeking university education in a country where classrooms and infrastructure are not growing at the same pace (Etiegni, 2014). Also, as will be argued, Information and Communication Technology (ICT) has much potential to help in transforming the present isolated, teacher-centered and text-bound classrooms into rich, student-focused, interactive knowledge environments (Omwenga, 2007).

However, providing e-learning services has not always been successful in developing countries. Factors such as social, cultural and economic affect the thinking of people and play an important role in shaping motivations and acceptance of technology (Qureshi et al., 2012). Furthermore, developing countries have challenges that make it difficult to provide efficient e-learning services, for instance, lack of consistent and affordable electricity, lack of affordable and high speed Internet connection, and lack of adequate computer skills among the lectures and students (Amiel and Reeves, 2008). ICT has vast potential to provide and improve learning at a lower cost, improved accessibility, and greater flexibility. This imposes a number of challenges such as; IT support requirements, training, infrastructure, among others; all which must be addressed by institutions before e-learning services can be offered successfully to students (Qureshi et al., 2012). In addition, providing e-learning services requires changes and motivation within the staff in order to redesign the curriculum, learn how to use the required technology, and provide institutional support and infrastructure (Frehywot et al., 2013).

Tarus et al., (2015) in their quest to identify challenges to e-learning in Kenyan institutions conducted a survey with 148 staff members from three Kenyan public universities which are currently using e-learning in blended mode approach. Their work, similar to other related work (Frehywot et al., 2013; Qureshi et al., 2012) identified several challenges affecting e-learning and provided recommendations at a broad level. Though their findings are discussed in this paper, this work delves deeper into providing practical and even low cost recommendations that can easily be adopted and implemented at UoE and other similar universities. For example, one of the recommendations, implementing a Moodle club to provide IT and Moodle support and provide training, is currently being executed at UoE.

In summary, this work particularly focused on identifying and analyzing e-learning challenges from the lecturers' perspective, as the adoption of e-learning among lectures is central to its success. Six broad categories of challenges were identified that include; lack of infrastructure, insufficient training, poor Internet access, lack of technically adept users as well as lack of university support, privacy/security concerns, and lastly, motivation, and contextual factors. Based on the challenges, practical solutions are presented that address all of them. The recommended solutions provided are not only applicable to UoE but can also be useful for other universities at a similar stage.

BACKGROUND

E-Learning and ICT in Kenya

According to Oredo (2008), the past decade has seen tremendous growth in the use of ICT, particularly in education in Kenya. ICT is embraced by a wide range of stakeholders in education including the government (Ministry of Education, Science and Technology), tertiary institutions, colleges, as well as the private sector. Many of these stakeholders agree that delivering courses online is beneficial for many Kenyan institutions as it tackles one of the main problems facing Kenyan higher education, the lack of quality staff (Etiegni, 2014). In addition, it provides flexibility and addresses the lack of classroom space for the growing population of students seeking university admission. A not so common benefit is that it reduces the number of students having to travel on the roads. With the increasing number of road accidents in Kenya, allowing students to take courses in the safety of their homes or offices might save lives (Etiegni, 2014).

Whilst the justification for e-learning is established, challenges to adoption, implementation and use of e-learning exist. For instance, universities like the Jomo Kenyatta University of Agriculture and Technology and the United States International University boast e-learning platforms such as Moodle and WebCT respectively (Odhiambo, 2009). However, students from both universities complain that their sites are not interactive, that more could be done as far as usability is concerned (Odhiambo, 2009). In addition, there have been hindrances to adoption of ICT in teacher training which naturally will adversely impact e-learning, namely lack of ICT infrastructure and poor access by teachers; lack of training and poor usage (Oredo, 2008). As an example, in his research on Kenyan public Primary Teacher Training colleges, Oredo (2008) found that the quantity of computer use in these colleges is as low as 14%, most of the time computers are just lying idle.

ICT and E-Learning at the University of Eldoret

UoE, (former Chepkoilel University College, a Constituent College of Moi University) has a student population of over 12,000 and is located in the town of Eldoret in the Rift Valley, Kenya. The university has full time working professionals and students who would like to take courses even if they work or reside outside of the university town. With the aim of improving education outcomes and in anticipation of increased number of students, UoE realized the significance and role that e-learning can provide. With the large number of students, e-learning can offer an opportunity for customized interactions, especially for marginalized students or those living in towns other than Eldoret.

ICT Preparedness at the University of Eldoret

Currently lectures at UoE use and have the ability to use technologies such as; laptops, projectors, desktops, Microsoft Office, Internet and email, among others in order to research, create and present learning materials to students. Other uses to which computers are used include administrative work such as project management, statistical analysis, management of student records, and accessing other online services at UoE (such as library services). These interactions with technology assure the researchers that the lectures at UoE are computer literate. They further indicate that they have the capability to absorb and implement new online web technologies in education.

E-Learning at the University Of Eldoret

E-learning, more specifically, the Moodle Learning Management System (LMS) platform was introduced at UoE in 2013 as part of a collaborative project between UoE and the University of Eastern Finland (UEF). The project aims to strengthen the use of ICT in education. UoE made its first effort in adopting e-learning by installing and integrating Moodle in their curriculum. Moodle was selected because it offers an opportunity for customized interactions and it is both effective and efficient - in terms of overall financial costs to the university. Also, UoE has made strides to improving their ICT infrastructure (for example, providing faster Internet access) which provides better support for e-learning.

In 2013, after installing Moodle, a hands-on, one-on-one training was provided to many of the lecturers by a researcher from UEF. The lecturers were trained in creating e-content, creating Moodle accounts, creating courses, and uploading and downloading materials. The rationale for training the lectures first was it was envisaged the lecturers would then also be competent and adept at cascading the knowledge to the students through issuance of tasks. In 2014, one more training session was held with the lecturers, with 2 other intensive training sessions further provided in early 2015. The second training session held in 2015 provided the setting for this work's research methodology, described in the section below. Overall, the training sessions have been effective in improving the skills of the lecturers as more lectures were able to create courses on Moodle.

So far, one course has been successfully run fully online; 12 students completed the course and received certificates. Other courses (59 courses to date) have primarily been provided using a blended approach, utilizing a mix of traditional face to face and e-learning. The blended-learning approach is suitable for UoE at this stage as it helps students to gradually get accustomed to new ways of teaching (Qureshi et al., 2012).

However, it has been noticed that currently Moodle is only being used for providing course materials, in the same format as they would be given in classroom. In addition, other Moodle functions, such as discussion forums, chats, assignment handling, have not been utilized at all. In addition, it has been noticed, that even though lectures are able to create a course on Moodle and upload materials, Moodle has not yet been well adopted and integrated into the learning process by both the lecturers and students; negating potential student-centred learning approaches inherent in the use of e-learning. Understanding the reasons behind this current state also motivated this study.

METHODOLOGY

This study adopted a qualitative and quantitative approach using mainly a questionnaire as its data collection tool. In order to understand the current usage and identify challenges of lecturers using Moodle, a questionnaire was prepared and administered to a sample of 17 participants who are members of staff at UoE. The 17 participants were chosen for the study because of their participation in the first intensive Moodle training held at the beginning of 2015. Hence, the participants were familiar with Moodle and could report on the practical challenges they have faced.

The university has eight schools which include: Agriculture and Biotechnology, Business and Management Sciences, Education, Engineering, Environmental Studies, Economics, Natural Resource Management, and Science. At least two members of staff from each school were targeted. Eventually the participants in the training were distributed as follows: Agriculture and Biotechnology (1), Business and Management Sciences (1), Engineering (1), Environmental Studies (1), Economics (1), Education (2), Science (2). The remaining participants were drawn from the departments within the School of Natural Resource Management as follows: Department of Wildlife (1), Fisheries (2), and Forestry and Wood Science (5). The sample selection of participants was purposive; the main criterion to select trainees was based on the fact that the members of staff were involved with the curriculum (both courses and course descriptions) development and which forms the bulk of their day to day duties. Further, each of the participants had the requisite ICT skills due the nature of their current duties.

The questionnaire comprised of both multiple choice and open-ended questions, with the issues being explored along a four-point Likert scale, ranging from Strongly Disagree, Disagree, Agree and Strongly Agree. The respondents here were asked to rate their level of agreement. In addition, two open ended questions to mention any other relevant e-learning issues and opportunities were also included.

RESULTS

In this section, findings from the questionnaire are discussed. The discussion focuses on each of the seven main challenges that have an effect on the provision of courses on Moodle at UoE.

Infrastructure

Infrastructure is arguably 'the' key to having successful provision of e-learning. In the questionnaire, participants were asked to give their views on the current ICT infrastructure situation at UoE, both from within and outside campus. Table 1 summarizes the views of 16 lectures who responded to this question.

Table 1: Participant's responses on ICT infrastructure

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
I find that the supply of electricity interferes with using Moodle	23.53	**52.94**	17.65	5.88
I find the cost of Internet affordable to me	18.75	**50.00**	31.25	0.00
I find access to Internet reliable (available everyday)	5.88	29.41	**47.06**	17.65
I find the speed of Internet convenient to download or upload course material on campus	5.88	23.53	**52.94**	17.65
I am able to access Moodle outside of campus	23.53	**41.18**	29.41	5.88
I find the speed of Internet convenient to download or upload course material at home	18.75	18.75	**47.06**	12.50

From Table 1 it can be noted that infrastructure is a concern to providing e-learning successfully at UoE; majority of the lecturers both strongly agree and agree that electricity is an issue on campus. This adversely impacts the use of Moodle, for example, if there is a power cut at the exact time when an assignment is due, or during an online quiz.

Additionally, the cost, speed, and access to Internet is an issue of concern. 68.75% both strongly agree and agree that they can afford to pay for their own Internet connection, while 64.71% feel that they do not have adequate reliable Internet. And 70.59% feel that the Internet speeds are not adequate. These Internet issues therefore pose a negative impact on the delivery of courses, especially if students are not able to interact with their lecturers online or are unable to upload/download learning materials due to unreasonable Internet speeds.

ICT Support

This section sought to examine the level of support provided for Moodle for lecturers and students within campus. Table 2 reveals the views of 16 lectures who responded to this question.

Table 2: Participant's responses on ICT support

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
The university provides enough support for e-learning	5.88	**35.29**	**35.29**	23.53
There is adequate IT support for lecturers when using Moodle on campus	5.88	23.53	**58.82**	11.76
There is adequate IT support for students when using Moodle on campus	6.25	18.75	**43.75**	31.25

Based on the agreement to all the three statements in Table 2, it can be observed that the lecturers view the support for Moodle and e-learning in general, for both students and lecturers, as inadequate. Support for e-learning from senior management has been identified as critical for its successful implementation (Birch and Burnett, 2009; Browne et al., 2008); thus, the lack of support at UoE further poses a great concern.

Security, Privacy and Copyright

The aim of security-related questions was to investigate whether there was a general awareness and or concern among the lectures regarding the security and data privacy of accessing and sharing materials on Moodle. 16 responses were received to these questions which are displayed in Table 3.

Most lecturers are aware of existing standards which can be used to support privacy/data protection requirements. Furthermore, most lecturers do not think their students would spread malware through Moodle in the uploaded assignments. However, this needs to be understood within the backdrop of ICT security awareness - for which training is yet to be undertaken for staff and students. The real or perceived ICT threats are also not yet well understood and appreciated.

Table 3: Participant's responses on security concerns

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
I am aware of existing standards which can be used to support privacy/data protection requirements in Moodle	5.88	**70.59**	23.53	0.00
I (would) feel safe when downloading assignments from students	0.00	**70.59**	23.53	5.88
The university has guidelines for using Moodle for lecturers	6.25	31.25	**56.25**	6.25
I am comfortable with providing my course material online	11.76	**58.82**	17.65	11.76

Based on Table 3, 62.50% of the 16 participants who responded both disagree and strongly disagree that there are guidelines in place to address the usage of Moodle at the university. This shows that the importance of guidelines on ICT usage, specifically Moodle, have not yet been articulated and disseminated at the university. Whilst policies and guidelines will not ascertain proper online conduct, they are important to put in place for both students and lecturers.

Altogether, based on the lecturers' responses, they are optimistic as they would go ahead to provide courses online despite security/privacy/copyright challenges.

Motivation

Motivation has to do with a focus on 'self-drive' and how it impacts Moodle being successfully implemented at UoE. In this study, the lectures motivation was investigated by looking at their skills levels, willingness to use Moodle, as well as need for incentives. 16 of the participants responded to this question and their views are summarized in Table 4 below.

Table 4: Participant's responses on motivation

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
I find that providing courses online is a good idea	**58.82**	41.18	0.00	0.00
I am motivated to provided courses on Moodle	29.41	**35.29**	29.41	5.88
I believe I have sufficient skills to provide a course on Moodle	**41.18**	17.65	**41.18**	0.00
I am confident in using Moodle	23.53	**41.18**	35.29	0.00
I find Moodle user-friendly	25.00	**62.50**	12.50	0.00
Being able to be compensated for putting content on Moodle is important to me	**58.82**	17.65	17.65	5.88

Based on the responses, it was observed that on the one hand most of the participants strongly agree that online courses are a good idea and that Moodle is user friendly. 64.71% of the lecturers both strongly agree and agree that they are motivated to provide courses online in Moodle. On the other hand, an even larger number, 76.47% both strongly agree and agree that they would want some incentives and compensation to use Moodle. These results seem

to contradict each other; it is therefore arguable that the desire for incentives might be contributing to the slow up-take of Moodle at UoE mentioned earlier.

Moreover, that 41.18% disagree they have sufficient skills to offer courses online using Moodle; is quite significant in light of the sample. Perhaps it can be argued even though they have some have received some training, they are not yet confident in using Moodle.

Social Aspects

The questionnaire further inquired from the participants if enabling online communities for student interaction and discussion was desirable for learning. Table 5 shows the 17 responses from the participants.

Table 5: Participant's responses on social concerns (%)

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
I like that I can engage with students online	**47.06**	**47.06**	5.88	0.00
I think online discussions are important (student-student) for learning	**58.82**	41.18	0.00	0.00
I think online discussions are important (student-teacher) for learning	**47.06**	**47.06**	5.88	0.00
I find that using Moodle makes it easier for students to communicate with lectures	41.18	**52.94**	0.00	5.88
I prefer more face to face interaction	23.53	17.65	**52.94**	5.88

Based on the responses, 94.12% both strongly agree and agree that they like that they can engage with students online. All the participants both strongly agree and agree that these online discussions are important: either between students or between lecturers and their students. In addition, all the participants both strongly agree and agree that Moodle facilitates easier communication between lecturers and their students. These are all scenarios afforded by Moodle, which are important in improving learning outcomes.

Nevertheless, 58.82% both strongly disagree and disagree that they prefer face-to-face interaction than online communication. This stems from the view that if online interactions are encouraged, many students might not attend classes. This indicates a need for exposure to blended learning pedagogical approaches because they might not be well understood at this stage of the implementation.

Course Administration

The functions of an LMS, such as Moodle, are meant to provide more efficient handling of assignments, grading, structuring and sharing of learning materials. With this item, it was important to find out from the participants on which functions of Moodle were important to course administration. Table 6 displays the views of 16 participants who responded to these items.

Table 6: Participant's responses on course administration

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
Receiving assignments and providing feedback to students on Moodle is important	35.29	**58.82**	5.88	0.00
Receiving assignments and providing feedback to students on Moodle is convenient	29.41	**70.59**	0.00	0.00
I find it easy to get online support in using Moodle (e.g. Internet search, Moodle docs)	18.75	**56.25**	25.00	0.00

94.12% of the participants both strongly agree and agree that using Moodle to receive soft copy assignments and to give feedback to students is important and convenient. This certainly makes it easier for students and lecturers to submit and provide feedback on assignments respectively.

Preparation of Learning Materials

The introduction of e-learning at any university causes shifts in how lecturers prepare their lessons, issue handouts and generally carry out their teaching. Thus, questions were posed to the participants to obtain their views in this area. All 17 participants gave their responses on these items.

Table 7: Participant's responses on learning material preparation

	Strongly Agree	Agree	Disagree	Strongly Disagree
	Percentage Scores %			
I find it difficult to layout/structure course material for Moodle	0.00	11.76	**70.59**	23.53
I find communicating concepts with students in Moodle restrictive	0.00	11.76	**64.71**	23.53

Most of the participants find that structuring of courses and communicating through Moodle is not difficult. Additionally, most lecturers do not find Moodle restrictive in terms of pedagogy - and they were confident that they could handle a broad spectrum of subjects in their courses adequately. This is positively reinforces the existence of capability and understanding at UoE for carrying out e-learning, but only at a general level.

Despite this, there were certain exceptions; there are courses that participants felt could not be provided efficiently on Moodle, due to their abstract or practical nature; these are shared below.

Contextual Concerns

In this section, other concerns that were brought up by the participants are discussed, apart from the above challenges. To begin with, three lecturers cited courses like Entomology, Pathology, Fluid Mechanics, Physics and Mathematics as being difficult to teach using Moodle. Reasons for this included the practical nature of the courses, inability for students to problem-solve without hand-holding.

Also, six lecturers do not see Moodle complementing but rather competing with class attendance, and so have a problem with Moodle as a substitute. Reasons for this include that face to face interaction actually motivates and inspires learners (the LMS might be impersonal); a teacher can gauge the level of comprehension in class through student interactivity, that using Moodle might encourage academic dishonesty (sharing of logins, cheating on exams and tests) and impede direct communication between lecturers and students.

Whereas these are valid concerns to the lecturers, it shows the broader need for tackling training in Moodle from a stance that highlights the role of pedagogy and what a blended approach entails. All the same, it reinforces the need for a blended approach at this stage of Moodle implementation at UoE.

CHALLENGES AND RECOMMENDATIONS

This study set out to explore existing challenges impeding the effective provision of courses on Moodle at UoE. Based on the questionnaire responses (from the Methodology), the seven broad challenges have been banded into six categories; lack of e-learning and Moodle skills, infrastructure, Internet access, university support, security, and motivation. Figure 1 illustrates the challenges and in the subsections to follow, each category is discussed in more detail. Moreover, for each category, practical recommendations are provided to the staff and the university in order to move beyond these challenges.

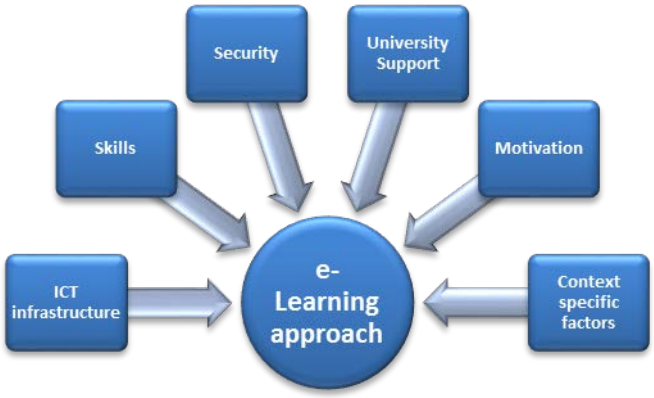

Figure 1: Challenges that adversely impact the provision of online courses at UoE

E-Learning and Moodle Skills

Description: The ability to use e-learning tools is a significant success factor in the provision of online courses. However, from the questionnaire responses, it was identified that there is a lack of sufficient e-learning and Moodle skills. Among all the responses, the majority stated that they had received between 0 and 3 training sessions on Moodle (66.7%), which is insufficient. Especially since the majority (72.2%) has had no previous training on any other e-learning platforms; Moodle is their first e-learning tool. This was also reiterated by some staff members who said that 'hands-on' awareness was needed among the staff and students, suggesting that further training is needed. So this is an important challenge that needs to be resolved systematically since in the current UoE setting the lecturers are responsible for introducing and guiding their students on using Moodle.

Recommendations: All the lectures who responded to the questionnaire are computer literate and currently use computers for their lesson preparation and classroom teaching. However, these skills may not be adequate for them to intuitively use Moodle in teaching as well as in developing effective and well-designed e-content. The solution to this is an emphasis on more training in the effective use of Moodle and encouraging users to practice on their own.

Based on the responses, there is a group of staff (11 %) that has received more training than the others. With further training, this particular group can become the champions of Moodle at UoE. Each staff member from this group, can then team up with a less experienced colleagues for a period of time to also train them to improve and increase their use of Moodle.

In addition to this group of Moodle champions, another solution is envisioned. The solution lies in the formation of a Moodle student club. The club would be the change agents appointed to drive the use of Moodle and provide support. The club would comprise of students who have been trained on Moodle and have skills in IT (for instance, installation, and maintenance), digital content creation, and communication and research (i.e., training). When the Moodle club is institutionalized, it will lower the total cost of ownership of the Moodle implementation - because students can be cheaper to train, hire or issue with study credits, than hiring professionals to do similar work. Additionally, it would create a sense of ownership and responsibility to the students and the university.

Finally, the university should further encourage the lecturers and students from the Moodle student club to attend and participate in e-learning conferences and workshops for increased knowledge management (for example, e-learning Africa; International Conference on e-learning - http://elearning-conf.org; IST Africa conference - http://www.ist-africa.org).

Infrastructure

Description: Infrastructure by far is the biggest barrier to providing courses on Moodle. The biggest concerns over the infrastructure include electricity, availability of computers, and access to existing computer labs at the

university. Infrastructure is arguably the key to a successful provision of e-learning. With electricity concerns, majority of the responses agreed that (yes) it is a big problem and interferes with e-learning. The frequency of power outage cited currently is almost once a week, with each power outage ranging from 20 minutes to almost 24 hours (during study time).

Another significant barrier to Moodle usage is lack of computers and access to current computers. Challenges to do with access to computers are of two kinds; firstly that there is a lack of sufficient computers, and secondly, that students lack access to the existing computers. This is attributed to real concerns over the physical loss of computer equipment in the labs - and which has occurred in the past. Consequently, some labs at UoE are completely inaccessible to some students without the present supervision of a staff member.

Recommendations: Whereas power outages may be beyond the control of UoE administration, it is prudent for universities in a similar position to make alternative power arrangements such as generators or batteries. For instance, some departments at UoE (e.g., Department of Forestry and Wood Science) have already installed a generator. However, challenges still remain because there is no in-house expertise to service and maintain the equipment. Thus, due to lack of maintenance of generators, power problems still persist. This indicates a need for the procurement department to work closely with the respective schools and departments in order to identify support services which need to be out-sourced. Ideally, a third-party supplier with the requisite service level agreement would be able to give specialized maintenance and service to the power backup arrangement.

In order to address the challenge of access to existing computer labs, many of the departments at UoE can follow a model in their labs, where a student is designated a role to look after a computer. This model is currently being used in the School of Agriculture labs at UoE and has proven to work for them. It is something that other schools and departments can borrow and learn from. The model, in particular, requires the right kind of personnel, with the right skills and responsibilities to oversee lab equipment during their shift hours. The Moodle club proposed in previous sections is a probable solution to this challenge; as it could be mandated to also manage the labs for longer period of time.

Moreover, at UoE, it has been observed that many students have smartphones as opposed to personal laptops. Thus deploying a mobile version of Moodle could prove to be another solution to the limited number of computers available.

It is further recommended that UoE nurtures the requisite strategic partnerships with industry or other academic institutions with an overall goal of improving the provision of computer access and availability, for example through leasing of equipment.

Internet Access

Description: Whilst Internet access is part of infrastructure, it deserves to be discussed separately as it is also one of the big barriers to e-learning at UoE. Whereas the questionnaire responses indicated that the cost of Internet access was affordable to the participants; majority said that the access is not reliable and the connection speed when it is available is not satisfactory. Furthermore, Internet access is poor outside of campus which makes it difficult for UoE to achieve its vision of providing courses everywhere at anytime.

Recommendations: Internet access ought to be a right for everyone in this academic setting, particularly for the lectures and students at UoE. With the growing provision of Internet access at reasonable prices in Kenya and projects like Internet.org (https://internet.org/) and Google's project loon (https://www.google.com/loon/) that aim to provide Internet connection to areas that do not have, reliable and fast Internet, access is envisioned to not be a big hindrance to UoE in a few years' time.

Currently, UoE has installed a fiber optic cable connection at the university. The cable is connected to the University main Internet server. Moreover, monitoring systems can be improved and a proxy server, including bandwidth allocation put in place, such that the bandwidth use is closely monitored to ensure emphasis on learning related work. On the other hand, it is still notable that there is no redundant provision of Internet access to the university. It means there is no failover whenever the main ISP links are unavailable - and this impacts adversely on access to

Moodle. The university therefore has to consider procuring from a different ISP backup links that ensure learning continues.

Similarly, the bandwidth speeds have to be improved from the current 30Mbps in order to support multiple concurrent users - especially during peak times of the day whence staff and students might be accessing Moodle and the Internet.

Also, in case there is continued poor Internet access, UoE can further customize their Moodle version to allow it to be accessible offline. This can be addressed with the use of for instance, the application cache interface (https://html.spec.whatwg.org/#appcache). Using the application cache, allows for offline browsing and availability of learning materials even when the Internet is down.

University Support

Description: For e-learning to succeed, it needs to be supported by the university. Unfortunately, more than half of the responses (55,5%) acknowledged that the university does not give enough support to e-learning, 66,7% felt that there was not enough IT support to the lectures when using Moodle, and even more (72,2%) felt that there was not enough IT support for students when using Moodle.

Recommendations: UoE should create an e-learning policy in order to streamline the activities. These activities include providing access to computers or creating a plan to optimize the use of existing computers. Providing a good reliable Internet connection and providing IT support can in particular be provided by the Moodle student club described in the discussion section below. The club would be responsible for installations, maintenance, assisting with uploading, downloading, etc. The policy should further outline guidelines for using Moodle, and in particular address security issues as discussed further below.

Another important consideration, closely related to the recommendation, is the need for the university to allocate a dedicated staff member from the ICT department whose role will be to coordinate and oversee the overall implementation of Moodle across schools and departments. The Moodle club might address training and adoption challenges among staff and students; but there are other concerns that require purely technical and strategic interventions. These may include issues such as software patches in case of security or upgrades, business continuity planning for e-learning, planning and monitoring allocation of resources (computers, servers, bandwidth and even technical support), software audits or reports in the event of security breaches. This is therefore an important technical role that can support all the activities of the e-learning community at the university.

Security

Description: Although the questionnaire results show that majority of the staff are comfortable with providing their course material online (72,2%), the open question asking about the biggest challenge to providing online courses provides different insight. Some of the lecturers are quite worried about providing their lecture materials online. This concern was expressed by the following phrases and words: 'mistrust of materials being pirated by others', 'piracy and plagiarism', 'security' and 'Internet security issues'. This comes down to the concern about the protection of their hard-work included in the learning materials. The lectures do not want their materials to be downloaded or distributed to just anybody as this increases the chances for them being misused to profit others, with no attribution to the original author of the material. This security concern was also reiterated by the Dean at the School of Natural Resource Management, as being a major hindrance to the lectures to providing online courses.

Additionally, there were concerns about security including mistrust of other students being able to login on behalf of others. The concern on security in this context has two aspects: protection of learning material and assurances that only the authorized students will access the materials and participate in the course discussions or submit assignments.

Recommendations: Protecting learning materials from misuse without acknowledgment; is almost impossible. Once material is online, it is difficult to prevent those who want to misuse it from to doing so. However, there are measures that UoE can take to deter these actions or make it difficult. A simple approach would be to watermark and / or password-protect the pdf documents uploaded on Moodle. The watermark would ensure that even when redistributed, the original author's name or signature is there. Password protecting the documents ensures that only students with the password are able to read the materials - especially if they are distributed electronically. Secondly

lectures could be encouraged to upload slides using Slideshare (http://www.slideshare.net/) or videos rather than text to deter the efforts; however these methods can disadvantage the students who have slow Internet speeds.

For successful protection of the materials, the students must also be made aware that they should not share the material outside of the school or profit from them in any way. Thus UoE should have in place regulations and guidelines mandating the use of Moodle, for instance, by including copyright clauses in the course syllabus and Moodle course pages. The clauses should state that lecturers hold copyright to the course materials they create and, as a result, students are not allowed to reproduce, distribute, or publicly post their course materials without express faculty permission. This can be aligned to an e-learning policy.

In addition, because technology such as biometric access can be quite expensive, access to course content should be restricted to university students who are enrolled at UoE. That means integrating the registration system with Moodle. This capability will also give the staff the security that only their students have access and the staff can also be trained to add students whom they want. Moreover, the students should be held accountable for their accounts, and not allow other students to login on their behalf. The dire consequences of misusing Moodle should be stipulated in the policy.

Motivation

Description: 64.7% of the lecturers both strongly agreed and agreed that they were motivated to use Moodle, however when asked whether they would like incentives for using Moodle, an even larger number (55.6% strongly agreed and 22.2% agreed) consented. Thus it seems reasonable to say that the motivation is there but compensation is important for the adoption of Moodle among the lectures. The incentives ought to encourage adoption, integration, and make the lecturers feel "appreciated" for creating and updating online course material.

Recommendations: The University, when creating the e-learning policy, should take into account that online teaching takes about three times the work load than face-to-face teaching (Robert and Kedrayate, 2011). Th, compensation methods taking into account this added teaching load and time, should be identified. Compensation could include; promotion, tenure offer, or remuneration.

Unfortunately, these compensation methods might require a very bureaucratic process, especially for public educational institutions. Thus, it might be better for UoE to consider other compensation alternatives and business models, for example, adjusting students' fees to include a budget vote-head which is dedicated to administration of e-learning services at UoE.

Figure 2 below summarizes all the challenges and the recommendations discussed above.

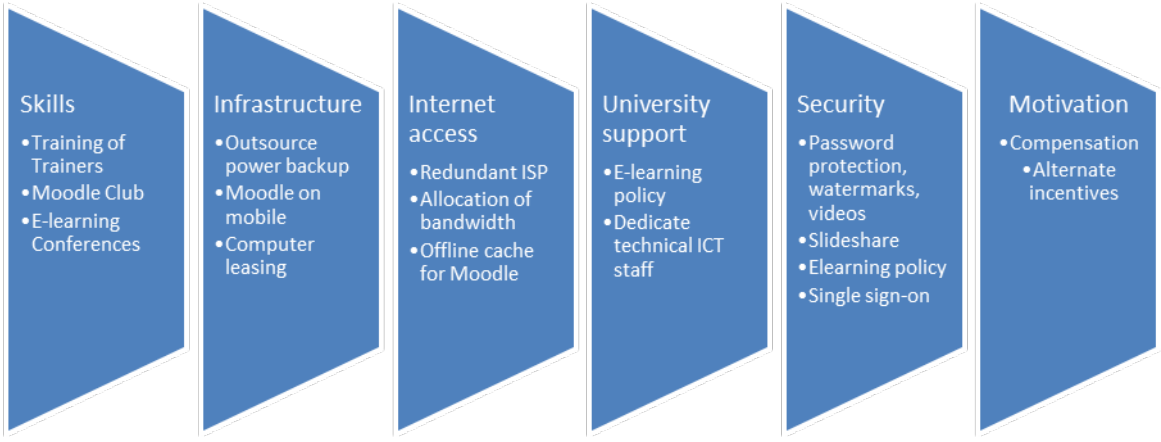

Figure 2: Challenges and recommendations for e-learning implementation at UoE.

DISCUSSION

In section above, the barriers impeding the adoption and successful use of e-learning at UoE were identified and discussed. The challenges further inform research and practitioners on the factors that are essential when trying to provide e-learning. Many of the challenges are similar to the ones that have been identified in literature (e.g., Tarus et al., 2015). However, the work presented in this paper differs through the recommendations given to address the challenges. For the discussion, more focus is given on those recommended solutions that require minimal costs and resources to implement for UoE. Optimizing the use of existing resources would yield faster results than trying to allocate more budgetary resources (which might not be forthcoming upfront). Ultimately however, an e-learning budget and policy are necessary.

Moodle Club

To address the lack of skills, IT support and security of materials, the set-up of a Moodle club was recommended. The Moodle club is envisioned to be set-up as a special interest student group having the aim of ensuring the effective use of Moodle by both students and lecturers at UoE. Having a Moodle club run by skilled students will cost UoE less than if they had to hire an experienced ICT person. It is due to the fact that one professional-person's salary can be used to hire more students who would be tasked with 1) providing assistance and technical support to students and lecturers, 2) promote the utilization of Moodle for the courses offered by UoE, and 3) provide assistance in the development of learning material and subsequent dissemination.

The duties of the club will include providing:

i. Training and support: the club will be mandated with providing training sessions and user support on Moodle to both students and lectures. For instance, the club will assist lectures and students access functions and resources when requested. In addition, the students will also facilitate access and supervision of existing computer labs.
ii. Technical: members with technical skills/experience who will handle the technical aspects of the Moodle platform such as upgrades, maintenance, and performance tweaks, among others.
iii. Research and material development: the club will provide a service for material development when requested. This could be to transfer learning materials to digital format, organizing and formatting the materials for online use, among others. In particular, they will investigate how they can protect the copyright of the material, for instance password protect them. In addition, the club will periodically and purposefully engage with students and teaching staff with a view of improving or providing suggestions for improvement of the e-learning services and experiences through obtaining feedback in areas such as; quality, contexts, content, pedagogy, infrastructure, among others.

The supervision and support for Moodle Club will be provided by those UoE lectures who have participated in training (such as those identified in the Methodology section) as 'champions' of Moodle as well as the dedicated ICT staff members. The supervisors will also be responsible for bridging and ensuring effective communication between other lecturers and club members.

The sustainability of the club can be ensured through its structuring - each year, new students will be absorbed into the club and trained to ensure continuity of the club. Moreover, external funding will be actively sought to supplement remuneration of the participating students as well as acquisition resources on need basis.

Mobile Version of Moodle

Infrastructure, lack of computers and limited access to existing computers was another major impediment to effective use of Moodle. In Kenya however, there is a proliferation of smart phones, tablets and mobile Internet access. According to the Communications Authority of Kenya (CAK), as at the end quarter 1 of 2014, 99% of Internet access was from a mobile device (that is, a phone, modem or tablet); it represents a penetration of about 13.1 million out of 13.3 million Internet subscriptions in Kenya (CAK Quarterly Statistics Report, 2014).

Moodle has an official mobile application for Android, iOS, and Windows Phone 8.1 that is freely available for download. The app allows convenient access to Moodle sites, with access to course content, contacts and ability to view discussion. Having a mobile version additionally allows access to Moodle for students and lectures at home.

To accomplish this, UoE has to activate the Moodle site to allow the site to be available on mobile devices.

Offline Moodle Option

Having Moodle also available offline is an attractive option for UoE considering the Internet access challenge that they currently have. This work's suggestion is for UoE to implement an application caching mechanism for browsers that access UoE Moodle server. The application cache mechanism creates a cache manifest file which allows web-based applications to run offline. A developer or even a member of the Moodle club can be hired to implement this, and they would need to specify resources that the browser should cache and make available to offline users.

Besides offline browsing which is useful for the lectures and students, the application cache has the following benefits (Mozilla, 2014):

i. Increased speeds - cached resources load faster improving also the user experience.
ii. Reduced server load - the browser will only download update/change resources from the server.

CONCLUSIONS

In order to efficiently provide online courses, certain resources and support structures are required to be in place. This work showed that there are specifically six major factors that pose the biggest barriers to the provision of online courses at a Kenyan public university. By analyzing and understanding each of the challenges, practical solutions to address them were recommended. In particular, this work focused and delved deeper into those recommendations that would easily be integrated into the organizational structure at the University of Eldoret and especially be within the budget constraints. Such detailed solutions are lacking in previous related works. Tentative to the success of the recommended solutions at the University of Eldoret, they are planned to be extended to other universities that have a similar setting.

The researchers recognize that in the short- to mid-term, the recommended solutions will need to be extended from a baseline to actual implementation and monitoring of their success in the university setting. It is expected that most will have a positive impact, for instance the three solutions discussed in the discussion section, while others will need more inputs and resources. The long-term goal is that this study will inform the conceptualization of a practical framework which can form as the basis for implementation of e-learning at public universities in Kenya. For the framework, there is a plan to also investigate student's views and concerns towards e-learning. As stakeholders of e-learning, their perspective is important in providing a more holistic solutions and framework.

ACKNOWLEGDMENTS

This work was supported by the Ministry of Foreign Affairs of Finland.

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CONTRADICTIONS IN E-LEARNING: THE NATURALNESS OF UNNATURALLY LEARNING ONLINE

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ABSTRACT - Online learning has many advantages for students who choose that learning modality. Yet, certain limitations exist. These limitations manifest themselves in various contradictions and dichotomies experienced by educators and learners. Without understanding these dichotomies in the online learning environment as well as the root causes of these dichotomies, educators, educational theorists, educational administrators, and course designers cause barriers to be raised between the subject material and learners; the result is impediment of knowledge acquisition. Only by understanding and implementing strategies to overcome these barriers and their causes could knowledge acquisition take place. Unfortunately, sometimes overcoming these barriers requires extensive modifications to the course and/or academic calendar that might not be feasible. In these situations, workarounds are necessary.

Introduction

Though the concept of learning at a distance has been in existence for more than a century (Caruth, 2013; Keegan, 1996), with the advent of the Internet in the 1990s, the concept of online or e-learning is relatively new. Though approximately 20 years old, online learning has not yet fully matured. Presuming that Moore's Law (Cumming, Furber, & Paul, 2014) is applicable in the discussion of Internet technology and e-learning, it is reasonable to believe that this modality of learning will continually and rapidly evolve as newer technological tools are created.

Nonetheless, during the last decade, online (or e-) learning has, so to speak, made a name for itself in the field of education. In many post-secondary institutions worldwide, online education has become a stable form of learning for millions of learners who cannot (or choose not) to study in a traditional manner. In the United States, the number of students studying online is increasing; more than 7 million are learning online (Allen & Seaman, 2014). Given that this type of learning is continuing to increase, and that 33.5% "of higher education students [are] taking at least one online course" (Allen & Seaman, 2014, p. 4), it seems clear that this form of learning will continue to be an important vehicle for knowledge creation and transmission.

As online learning progresses, several areas of concern still exist. These areas may be formulated as the following questions: (a) how could educators and students get away from the isolation that seems so prevalent in online learning? (b) How could the expectations of educators and students be aligned with their prior experiences in order to create a positive online experience? This second question is rather important and will also enable this researcher to touch on a tangentially valuable topic: How could students and educators experience subject specific (Cochran, 2015) online best practices (Palloff & Pratt, 2007)? In order to examine these questions, which form the basis for this research, it will be important to understand some existing contradictions as well as some possible solutions in online education.

Discussion

The discussion is divided into two broad sections corresponding to the two aforementioned issues of (a) reducing isolation and (b) aligning what people expect with their experiences (Chametzky, 2014; Kiliç-Çakmak, Karatas, & Ocak, 2009). Within each subsection, I will discuss pertinent literature and offer suggestions regarding how to overcome the corresponding contradictions. The discussion of these two concerns will lead to a tangential topic of subject specific online best practices.

Reducing isolation: contraction #1.

People study online for a variety of personal or professional reasons. One of the reasons might be the ability to learn at any location whenever the need arises (Crawford-Ferre & Wiest, 2012; Desai, Hart, & Richards, 2008). With the ability to study in any location at any time, online learning is a lonely venture. People are often sitting behind computer screens or other technological devices rather than being face-to-face in-person. Such an environment may be desirable to some learners. However, such a learning milieu is not ideal for everyone. In his book entitled *Group*

dynamics, Forsyth (2010) commented that though humans are able to live in isolation, "few humans seek or enjoy the challenges of solitude" (p. 2). Such a statement might explain why in an online learning environment, where distance separates students and facilitators, some learners do not succeed. Yet, such isolation and solitude can easily be reduced in some online learning environments through the use of collaborative activities.

One benefit of online learning is that without the traditionally-accepted, teacher-centered learning (Morrison, 2014) generally found in K-12 and post-secondary classrooms, students are empowered; they are able (and need) to take a more active role in their education (Chametzky, 2014). One way to accomplish this objective and experience a richer learning environment is through collaborative activities.

Many researchers (Chametzky, 2014; Koper, 2015; Puzziferro & Shelton, 2014; Wang, 2014; Woo & Reeves, 2008) have studied collaborative activities. Through active interaction with the course material (Chametzky, 2015a) via collaborative activities (Wang, 2014), and through scaffolding (Chametzky, 2014; Cook, 2012), learners are able to understand the subject material more completely. With collaborative learning, students have the opportunity to delve into a subject area more thoroughly than if they studied in isolation. In addition, with collaborative activities, learners are able to develop higher-order thinking (Bloom, 1984) and "deep learning" (Svirko & Mellanby, 2008, p. 219).

According to Wang (2014), students in online classes "benefit most from actively engaging in learning activities through social interaction with the immediate learning environment" (p. 24). Indisputably, such constructivist learning is ideal. More active learning and student-student interaction also results in higher course satisfaction (Swan, 2001). Wang (2014) concurred stating that "peer interaction" (p. 30) was the most important element for students in an online learning environment.

Presuming that all online learners were willing to engage in collaborative activities involving higher-order thinking and richer learning (Chametzky, 2014), no contradiction would exist. However, such is not the case. Based on experiential knowledge, I have seen how students in online courses do not like collaborating with each other on group assignments or projects. Such a statement is also supported in the literature (Koper, 2015). People generally do not like collaborative work because of past experiences where team members did not do their fair-share of the work (Wang, 2014).

Traditionally, with group assignments, the teacher would put students in groups, explain the assignment, and expect a group project submitted at the end. Consider the following two plausible and often-seen situations:

> (a) In a group of three students—Denise, Sally, and Charles—Sally and Charles are doing adequate work; Denise is not. As a result of Denise's minimal efforts, Sally and Charles are forced to do their work plus that of Denise in order to obtain a good grade in the group assignment.
>
> (b) With the same students, if Charles is a controlling overachiever, he might want to do his work as well as the work assigned to Denise and Sally in order to ensure a very high grade in the group assignment.

In the first situation, Sally and Charles might become resentful of Denise and her indifferent behavior. In the second situation, from the perspective of one overachieving group member, it would seem that everyone would benefit if he were to do the majority of the work: a win-win for everyone since Denise and Sally do not mind letting Charles do their work. However, in both situations, an unfairness and inequitable distribution of the work exist. And, the next time a collaborative activity is required of students who had been in either of these situations, they will recall with displeasure their prior experience.

Reducing isolation: possible solution to contradiction #1.

How could divergent feelings of dislike for collaborative work and the need to do well in a class be reconciled? Each of the two aforementioned situations can easily be allayed if collaborative work is done in a different manner from what might be expected. After a group or team is created—and it could be challenging in an asynchronous environment (Palloff & Pratt, 2007)—the first task of the newly formed groups is that members must come to a consensus in answering the following questions:

> How will [the] group identify itself? [. . .]
>
> How will the group communicate? [. . .]
>
> How quickly should group members be expected to respond to emails or discussion board postings? [. . .]
>
> What role or duties will each person in the group perform? [. . .]
>
> Who is responsible for posting group responses to the main discussion board?
>
> How will the group handle a member that [sic] is not participating? (Palloff & Pratt, 2005, pp. 27-28;

Palloff & Pratt, 2007, pp. 165-166)

Palloff and Pratt (2007) commented that an implicit hope exists that group members would work together (Guo & Stevens, 2011) to solve the common objective (the final submitted assignment). It is the "positive interdependence" (Guo & Stevens, 2011, Section 2) that makes the collaborative activity successful. Group member accountability "significantly predicted [the] quality of teamwork learning experience" (Wang, 2014, p. 24). Likewise, the division of work must be spread amongst each student evenly (Guo & Stevens, 2011). Thus, little need exists for an overachiever to do most or all of the work in a collaborative activity or assignment (Palloff & Pratt, 2007).

Additionally, at the end of an activity, group members would have an opportunity to evaluate the work of fellow members. This review ensures that students worked jointly with each other on the task at hand (Palloff & Pratt, 2007). In order to accomplish this evaluation, team members would be given the rubric created by Palloff and Pratt (2005) (or a similarly created rubric) when the group was created. As the last task of group members, each would privately submit grades for all team members (including him or herself) based on "teamwork, presentation style/delivery, information/content, general attitude, working with others, collaboration, preparedness, and focus on task and time management" (Palloff & Pratt, 2005, pp. 45-47). It would, of course, be the responsibility of the instructor ultimately to issue the final grade, but he or she would be able to use the input from the group members to make that decision. With the aforementioned questions answered and with the fair grading scheme in place, educators and learners would not have to worry about students like Denise or Charles; everyone would work and be graded in an equitable manner.

Reducing isolation: contradiction #2.

Another contradiction exists with collaborative activities: a reduced sense of belonging (Palloff & Pratt, 2007). Imagine the same students in the earlier scenarios. In this scenario, Charles stops participating in the group work. He no longer attends class and has not dropped out of it. Charles does not respond to the e-mail messages from Denise and Sally. The group members are confused as to what to do; they will probably need and want to contact the educator for guidance.

Reducing isolation: possible solutions to contradiction #2.

Part of the problem may be that Charles does not feel a sense of belonging (Palloff & Pratt, 2007) in the class. Because of this deficit, he feels no need to explain to his group members (Lim, Morris, & Kupritz, 2007) his absence, his possible plans to drop the course, or any issues outside of school that are affecting his educational work. Clear problems arise from such isolation and minimized connection.

Maintaining the status quo of a group can be challenging in an asynchronous online environment (Thomas, Herbert, & Teras, 2014) for several reasons. One reason may be due to the collegiate academic calendar. If students are able to drop the course during the first several weeks (or even up to the penultimate week) of the class, feeling any sort of connection cannot easily be achieved. Without developing a sense of belonging (Palloff & Pratt, 2007), students have little reason to inform any group members or the educator about plans that affect their work in the course.

An easy answer might be to modify the academic calendar so students are not able to drop a class three months into the 16-week semester. However, such a desire might be unrealistic, as that would involve all classes and the approval of many committees. Several class-level suggestions may be proffered, however. Perhaps the easiest approach is for the educator to increase communication. Being available—and letting the students know frequently of this availability—is vital in such a situation. Communication can take place in the course area via the Discussion Board or privately via e-mail, telephone, Skype, and/or social media.

A second solution to increase feelings of belonging would be to have an icebreaker activity be part of the course design. During the first week or two of the class, all course members (students and educator) could get to know each other on a more personal level via an icebreaker activity. Another way for students not to feel isolation would be for the educator to encourage peer interaction via a lounge (Thomas, Herbert, & Teras, 2014) in the course area. In this lounge, students would be free to discuss whatever they wish without any fear of retribution. Depending on the functionality of the learning management system (LMS), postings in this area could even be done anonymously.

The benefits of increased communication and interactive tasks, beyond helping students not feel alone in a potentially lonely environment (such as asynchronous online learning), are evident. First, with increased feelings of

belonging and camaraderie, an increase in satisfaction (Thomas, Herbert, & Teras, 2014) will occur. According to Thomas, Herbert, and Teras (2014), with increased satisfaction, "less anxiety, . . . more retention, [and] less attrition" (p. 73) will ensue. For part-time post-secondary contingent educators in the United States, the possibility of reducing dropout rates has an important potential benefit; more student retention could easily translate into increased (and potentially sustained) employment (Chametzky, 2015b). Second, in an environment—especially in a high-stress subject like mathematics (O'Leary, 2014; Richardson & Suinn, 1972; Tan, Yeo, & Lew, 2015) or foreign languages (Chametzky, 2013a)—where students may probably already have negative experiences—having lower anxiety and a lower affective filter (Chametzky, 2013b), is most certainly desirable.

Alignment of expectations and experiences.

In order for a person to succeed at an endeavor, experience and expectation need to be in synchronization one with the other. When reality does not match, and thus is not congruent with, a person's expectations, a misalignment exists. Such a misalignment causes a disruption or a dissonance. Such a statement is universal—not exclusively in the field of online education. For example, in everyday life, if a person were to receive cold food from a server in a restaurant—presuming it should have been initially hot—it is commonplace to be surprised and then send the food back to be reheated. If the mishap occurred repeatedly, it would be reasonable for the customer to become increasingly upset. Being surprised and subsequently upset, then, is the visible and emotional manifestation of the misalignment between a person's experience and his or her expectation.

In an asynchronous online learning environment, too, experience and expectation (Chametzky, 2014; Kiliç-Çakmak, Karatas, & Ocak, 2009) must also be aligned one with another in order to have a positive learning experience. To understand more completely the contradiction (as well as the causes and effects of the misalignment) in an online learning environment, it will be valuable to do several things. First, it will be important to examine briefly the theory of offsetting the affective filter (Chametzky, 2013a, 2013b). Second, it will be valuable to examine several dichotomies that stem from a misalignment of experience and expectation (and the ensuing anxiety) as well as possible solutions to these issues. Finally, it will be valuable to examine a tangentially important topic: How could students and educators experience subject specific (Cochran, 2015) online best practices (Palloff & Pratt, 2007)?

Offsetting the affective filter.

In the field of education—and indeed even more generalizable to fields outside the online learning realm—the dichotomy between experience and expectation (Chametzky 2014; Kiliç-Çakmak, Karatas, & Ocak, 2009) stems from a place of unknowing and anxiety. Online learning requires a different way of learning (Kabilan & Rajab, 2010) from a traditional classroom setting. Because of possible technological (Anderson & Williams, 2011; Nsomwe-a-nfunkwa, 2010; Rogerson-Revell, 2007) and psychological challenges (Chametzky 2013a; Pino, 2008) affecting many learners, new challenges in online (or e-) education exist (Palloff & Pratt, 2007).

In 2013, Chametzky (2013a) conducted a classic grounded theory study and interviewed 15 post-secondary, online, foreign language learners to understand more clearly and comprehensively how they dealt with the online foreign language learning experience. The result of the study was the theory called offsetting the affective filter. When students experience anxiety caused by either being out of their comfort zone or a conflict between experience and expectation, they try to do things to comfort themselves. Not always are they able to relieve their discomfort an anxiety. One important fact from the study, Chametzky (2013a) found, was that knowledge acquisition took a back seat to affective needs. A hierarchy of needs à la Maslow seemed to be involved with the online learners. If anxiety and other affective issues were not addressed, learning could not and did not adequately happen.

In order to alleviate anxiety thereby countering any undesirable effects of misalignment, students exhibited covert behaviors including but not limited to self-isolating, feeling demotivated, feeling unable or not confident to take chances in class, losing or having insufficient self-direction, or, if those items failed to yield positive results, dropping the course (Chametzky, 2013a). In all instances, the students were unable to acquire knowledge because their affective filters—the psychological barriers present in everyone—were too elevated and impeded the learning process. In the following section, I will turn my attention to some issues involving contradiction stemming from the lack of congruity between experience and expectation.

Several possible solutions to the contradictions.

To reduce anxiety, online educators could and need to do several things that fall under the categories of (a) course

development, (b) teacher-student interaction, and (c) student engagement (Chametzky, 2015a). By understanding any learner-centered or learner-related issues, educators would be able to help them develop the necessary skills required to succeed in the class while simultaneously reducing their anxiety levels (Chametzky, 2013a) caused by a misalignment of experience and expectation.

The first suggestion, under the category of course development, is to avoid overly mechanized classes. Educators who are not accustomed to online learning need to understand what the best practices are in this educational milieu. Because of preferences, abilities, and teaching styles, some educators might not be best suited to teach in an online environment. In the early days of e-learning, Fraser (1999) coined the term "shovelware" (p. B8) to indicate work that was merely shoveled onto the web for students to absorb with minimal modifications. In an online environment, it is important to have a variety of materials—text and multimedia—in order to stimulate learners (Chametzky, 2013c).

Tangentially related to course development is the idea that if learners are expecting to have peer and teacher interaction but get a course filled with text and slideshows, they will be disappointed and disillusioned. The possible result of this disappointment and disillusionment could be an increase in anxiety and a decrease in motivation. Similarly, in an online environment, without visual clues, it might be difficult for educators to know why some learners do not succeed in an online learning environment. With minimal interpersonal interaction, in the event that learners had questions—perhaps because of a lack of clarity in some aspect of the course, their anxiety would increase because assistance would not be forthcoming. To the extent possible, it is imperative for educators to address all student issues (whether they are normal course-related concerns, or ones that could easily cause anxiety) as soon as practicable. If educators are able to respond (via e-mail, telephone, Skype, the Discussion Board in the course area, or any other mutually agreed upon tool) to students within 24 hours, students will be appreciative of the attentiveness of the instructor. In addition to this appreciativeness, the levels of unmanageable anxiety will not be a concern. The longer the educator waits to help the student, the greater his or her anxiety will be.

The aforementioned issue regarding the student-education interaction is sometimes apparent when students, too, are new to online learning and do not understand what constitutes best practices. Such a bidirectional dichotomy causes this issue to be extremely complicated. One way to help learners overcome the anxiety caused because they are not accustomed to an online environment would be for educators to organize their courses to include an extended period (roughly 3-4 weeks) during which time learners could explore the online environment and gain the necessary experience before commencing with the course work. During this period, students would be able to gain experience using all the technological tools and learn the etiquette required for online interaction.

According to Pillay, Irving, and Tones (2007), "a lack of familiarity with online learning and the added perceived complexity seems to have affected students who were less conversant with computer technology" (pp. 221-222). Zheng, Lin, and Romig (2015) agreed with Pillay, Irvin, and Tones (2007) that in an online environment, when compared with traditional classroom learning, greater demands are placed on learners because of the need to be technologically proficient. The opportunity to practice using the technology during an initial 3-4 weeks would greatly aid the learners in reducing their anxiety.

One downside in attempting to accomplish such a feat is that the required subject specific material would be crammed into the remaining weeks of the semester. Such an activity would not necessarily aid in knowledge acquisition and higher-order thinking (Bloom, 1984) because increased memorization would take place. A second downside to modifying online courses for such an extended period is that while learning about important best practices in online education, they are not necessary subject-specific (Cochran, 2015) and thus, some of the important subject specific elements would be missing. And herein lies the potentially unsolvable problem.

A more viable alternative would be to require all students to take a non-graded introductory online class where the online standards and expectations are made known to the learners. The benefit to such a course is that learners would be able to gain valuable knowledge and experience in online learning without the fear of earning a poor grade. Then, armed with the knowledge of what an online course is like, learners who have taken this kind of introductory course could make an intelligent decision as to whether to take a for-credit online course in the future. The downside to having such a course is that it is not subject specific (Cochran, 2015). Additionally, this type of course costs money to design and teach. Given that post-secondary institutions are businesses (Chametzky, 2015b),

offering a free, non-credit course—unless it were (a) designed in such a way so as to accommodate all subject areas and (b) supported by the administration—would generally not fare well.

The final suggestion to address misalignment and anxiety through course design is to have learners interact more with the course material (Chametzky, 2015a). One way to increase engagement, along with the aforementioned suggestions, is to make learning meaningful for the learners. When they see the need to acquire the knowledge, learners are more willing to do it than not (Knowles, 1984; Chametzky, 2014). Bain (2004) in his book, What the best college teachers do, mentioned an educator who told the students to ask him, "Who gives a damn?" when they do not see the relevance of the material to their lives. He would explain the importance regardless of how seemingly trivial the material might be. Online educators must be mindful of this idea when they develop their courses.

For active, meaningful learning to occur, learners must not be passive recipients of the knowledge. Two things must simultaneous happen for active learning to occur. First, with learner-centered cooperative and collaborative activities, learners take responsibility to determine how the learning will occur and how each participant could help one another acquire that knowledge. Such responsibility requires that learners communicate with each other frequently during the course. Second, unlike in a traditional classroom where an educator generally stands in front of the class, an online educator must move away from center stage and give up the chalk, so to speak. He or she no longer holds a monopoly on the knowledge that the learners must acquire.

The conundrum, however, is that often, students are not used to being active learners and do not know how to work actively and collaboratively in an online learning environment. While learners might wonder how they could simultaneously be active and passive learners, educators might wonder whether they could simultaneously guide and pour knowledge. Though scaffolding learners until they are ready to become active learners (Chametzky, 2014; Knowles, 1984) is one option, because of the imposed academic calendar, it might not always be possible to achieve the desired effects. In fact, within the timeframe of a one-semester course, a satisfactory solution to this situation might not be possible.

Subject-specific misalignments and possible solutions

In this section of the paper, I will turn my attention to subject-specific contradictions and possible explanations of these dichotomies. In presenting these misalignments and possible solutions, I will examine two subjects. Though foreign languages and mathematics may initially seem to be widely different, they share some commonalities one with the other.

Online foreign language learners experience anxiety for several reasons. Many students—based on their poor past foreign language learning experiences—believe that learning is done via the grammar-translation method where instruction is typically done in the lingua franca or L1 (short for first or native language) of the learners. Grammatical rules are presented as facts and students apply those rules in examples. Such a method was popular from the "late 19th-early 20th century" (Shrum & Glisan, 2010, p. 481) and is out of fashion. Yet, many (public school) teachers employ this method as speaking about the target language (L2 short for second or foreign language) is easier than using the target language.

The guidelines created by members of the American Council on the Teaching of Foreign Languages (henceforth referred to as ACTFL) (2012) as well as the ACTFL standards (1999) are rather clear that oral communication is vital to foreign language acquisition. Because learners have never taken an online foreign language class with an instructor who is proficient in speaking the language and do not realize that they will need to interact orally with one another—because of misguided expectations about the requirements of such a course—they (a) will feel frequently intimidated, (b) will not want to interact orally with peers, and (c) will become easily disappointed, dissatisfied, and displeased. Thus, the first dichotomy is that students are not used to speaking and making mistakes in a language that is not their L1.

The feeling of embarrassment because of a faux pas or linguistic error is even more crucial when unfamiliar, potentially anxiety-laden elements (like a foreign language [Chametzky, 2013a] or mathematics [O'Leary, 2014; Richardson & Suinn, 1972) come into play. It is possible to bridge the anxiety between having to put oneself "out there" trying to use the new language (and thus making mistakes) and the aforementioned ACTFL guidelines (2012) and standards (1999).

In general, a technique that educators could use to resolve this anxiety is humor. Personal humorous anecdotes help lower the anxiety levels of learners. In turn, when the affective filters of learners are reduced, they are better able to learn more easily. A direct result from the ease at which knowledge acquisition takes place is an increase in confidence. With an increase in confidence, learners become excited about the course material. Such confidence leads greater and deeper learning. Clearly, a cyclic effect takes place, as shown in the following figure.

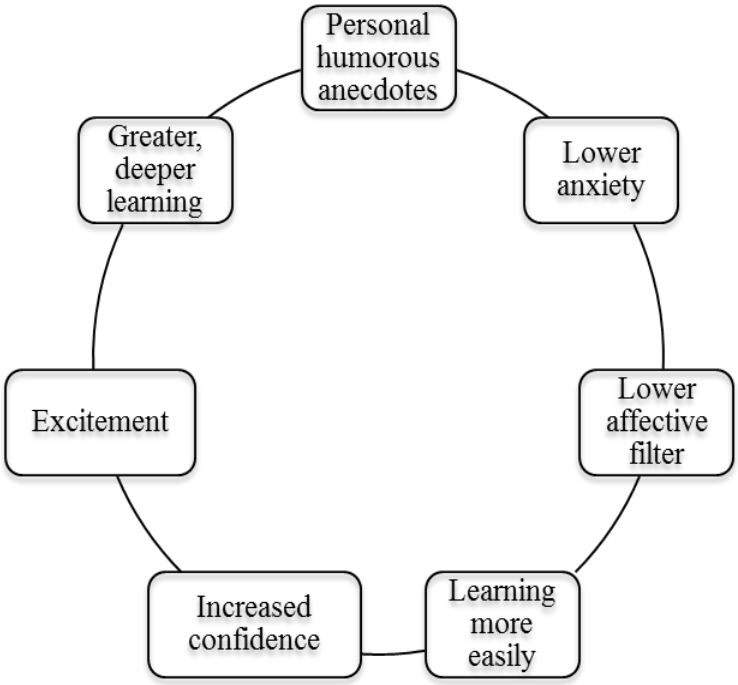

Figure 1. Cyclic effect of humor

A second contradiction or dichotomy that exists in online learning occurs between generalized best practices and what students are simply not able to accomplish in a subject specific class. For example, in a beginning foreign language class, students are not able to communicate in the target language. Further, if the text-based lessons that are needed in an online environment are in the target language—and students are not yet able to read in that language—their affective filters will be so high that they will immediately drop the course (Chametzky, 2013a). Given this very real and understandable shortcoming, as Cochran (2015) commented, it would be valuable to offer online training that is geared to specific non-English subjects. Though valuable for the educators and learners, its possible impracticalness (due to budget constraints, resources, and time availability) is unquestioned. Yet, it would be useful to find a potential intersection of online best practices for native-language and for foreign language and mathematics courses.

The concept of Bloom's Taxonomy (1984) has been well researched (Bush, Daddysman, & Charnigo, 2014; Chametzky, 2014, Krathwohl, 2002). It is in higher-order thinking (i.e., synthesizing, evaluating, analyzing, and the like) where educators ultimately want their students to be. The problem is that in an online beginning foreign language class where learners are more accustomed to a "transmittal model" (King, 1993, p. 30) resulting in memorizing and regurgitating, to attempt linguistic activities involving higher-order thinking is not realistic.

It is possible, though, to attain higher-order thinking in other ways. A good language class must combine linguistic acquisition with cultural acquisition. To that end, in the discussion forum—whatever that technological component is called—the educator should attempt to have a mixture of target language and primary language topics.

For the target language writing (and speaking) activities, the educator should be satisfied with simple, concrete sentences. For example, in a beginning foreign language class, it is very reasonable for students to interact with one another by greeting each other, asking how each is doing, and perhaps ask informational questions—all class-level appropriate skills. In these ways, learners are using the language in meaningful ways. In the case of an ASL

(American Sign Language) course where oral communication is obviously not needed, students would submit videos of their conversations.

On the other hand, in dealing with the cultural elements, educators could easily have learners develop higher-order thinking skills via collaborative activities. For example, depending on the language and specific level taught, it could be reasonable to have students analyze, compare, and contract subject-specific topics in relation to the home culture thereby demonstrating higher-order thinking skills. And, if the students spoke the L1 with each other, the objective for the assignment is not L2 acquisition but cultural development and sensitivity. Thus, a change of focus might help educators realize that their language courses are a combination of linguistic and cultural cquisition. With the aforementioned suggestions, at least for elementary online foreign languages, educators could circumvent the need for subject-specific training proposed by Cochran (2015).

Concerning overall participation in online foreign language classes, it is common knowledge that cramming rarely, if ever, aids learners. With foreign languages, too, cramming is not beneficial. It is recommended, therefore, that students participate in the online course rather frequently. Though admittedly, online classes may be geared to the anywhere anytime mentality, acquisition of a foreign language requires frequent practice. To that end, I recommend that learners participate between three and five times per week. Having students participate "several times per week (Strandberg & Campbell, 2014, p. 6) will not only help reduce anxiety but also aid in linguistic acquisition.

To that end, being fully aware of ACTFL proficiency guidelines and standards (1999, 2012), I propose the following minimum guidelines for what constitutes adequate participation in the areas of writing, reading, speaking, and listening. For writing, the student should accomplish this task three to five times per week by making postings to the discussion board. For reading, the student should accomplish this task at least 15 minutes three to five times per week by reading or studying the lesson, (e-) textbook, or discussion board postings. For speaking (or signing and watching in the case of ASL), the student should accomplish this task three to five times per week by creating a 30-second audio or video file (a total of three to five per week) related to the topic at hand. For foreign languages in which communication is done via speaking, as far as the ACTFL standards for communication go, it may be that—as with the andragogy/pedagogy discussion (Chametzky 2014; Knowles, 1980)—if learners are not ready for communicative activities in the target language, the native language should be used. Or, perhaps conversations should initially be highly restricted to only greetings, then talking about likes and dislikes, and so on. In this manner, learners are gaining experience in the L1 rather than in the L2. For listening, the student should accomplish this task by watching the videos that accompany the lesson. Each lesson should have several videos that relate to the concepts presented. Whenever possible, the dialog should be meaningful rather than abstract.

In order to accomplish these tasks, though, educators will need to be mindful of two things that they will need to do. First, lessons must contain a great deal of multimedia content—at least one video or audio component for each concept taught in each lesson. Ideally, more than one audio and more than one video file would be needed so as to reduce potentially another important issue: "neither body language nor eye contact [is] possible in online environments" (Zheng, Lin, & Romig, 2015, p. 1528). With many audio and video files, learners will be able to hear, read, and see the language in use. Second, educators will need to create numerous activities for each lesson. Because students are required to produce the language frequently, having an activity associated with each grammatical concept would be beneficial.

As good as the idea of having students participate three to five times per week, the dichotomy is that, in general, some students have a 19th century mentality whereby online learning is exclusively an isolated activity; minimal interaction with other course members (learners and the educator) exists. Some students do not want or—because of prior obligations—cannot participate that frequently. Though the choice of priorities falls squarely with the learners, some learners do not make wise decisions because the misalignment of experience and expectation is difficult to address.

The aforementioned "set of challenges for . . . the instructor and students" (Isaacson & MacDonald, 2012, p. 197) are not exclusive to foreign languages; they are equally experienced in other subject areas such as in the STE(A)M (Science, Technology, Engineering, (Arts), and Mathematics) fields. In these fields, too, students must learn how to use the technology (Habre & Grundmeier, 2007), trouble-shoot technical issues, and scaffold learners (Shukla, Hassani, & Casleton, 2014). Yet, based on the STE(A)M subject area, because of the increased need for tactile work (as in the science and technology fields) or for the use of non-English symbols (as in mathematics, statistics, or

some sciences), it is worthwhile to examine several other concerns and contradictions. In these fields, an increased need exists for (a) subject-specific technology, (b) students to have an initial basic vocabulary in order to be able to talk about the concepts even if they do not fully understand the concepts, and (c) authenticity and subjectivity. Each of these issues will be discussed in turn in this section of the paper.

The first need is subject-specific technology. Let us assume that a student is asked to compute the standard deviation or the cumulative or continuous distribution (n.a., 2014). Either task is complicated and requires the use of various Greek and mathematical (more accurately, statistical) symbols. Further, as part of the online class assignment, the student is required to discuss and show how he or she arrived at the final answer. In a traditional class, using a pencil and paper might be an easy solution to the problem, however, that option may not be transferrable in an online environment. While technology exists to help learners use such complicated formulae, it might not be native to or adequately integrated into the LMS.

When third-party technological tools are not integrated or inadequately integrated into the LMS, students and educators will need to adapt and find various potentially sub-par workarounds. Such workarounds may cause undue anxiety for educators and learners when technological issues arise. If technological tools are insufficient for educators and learners, the solution may be that they need to wait for the technology to "catch up" to their needs. Admittedly, this solution is not ideal. However, given Moore's Law, such a wait might hopefully not be too long.

The second need is a very real benefit for students to have some basic vocabulary in order to be able to talk about the concepts even if they do not understand the concepts. If students are struggling in a specific subject area and do not have the vocabulary to express themselves because they cannot describe the root cause of their struggles, great stress will ensue. For example, let us imagine a student is trying to communicate with his or her faculty member and does not understand what the Greek letter sigma is, what it looks like, or what its function is in statistics even in the most basic terms. For that student, stress, anxiety, and confusion will be high. Now imagine that this student, in his or her confusion, talks about e with the professor. Given that no e exists in statistics but does exist in math, additional confusion might ensue. One way to reduce this problem and reduce the unnecessary stress is by creating downloadable resources for students in the LMS. With these resources, whenever students have vocabulary questions or concerns, or need a quick review, they have valuable information at their hands. These resources would also serve another benefit to learners. When learners realize that these resources exist to help facilitate learning, students will have taken the first step to self-efficacy—a vital skill in online learning.

The third need involves authenticity and subjectivity. For online learners—especially for older adults who, intentionally or otherwise, follow the tenets of andragogy, it is important to have useful solutions to problems; this concept is fundamental to the "model of assumptions" (Knowles, 1980, p. 43) often referred to as andragogy (Abu Bakar, 2013; Chametzky, 2014). These real-world answers provide the authenticity that all learners need to acquire the subject material more completely. The common problem—especially in mathematics and to a lesser degree in foreign languages—is that textbooks and software applications from book publishers do not always offer authentic types of questions or assessments. Similarly, educators prefer easier types of testing approaches rather than a more complicated approach involving designing authentic questions. Thus, learners who know and are able to regurgitate facts in order to pass an exam are not as well off as those learners who are able to apply the information to real-world situations. The solution to this potentially serious contradiction would be to have textbook publishers be aware of this inadequacy and address it. Additionally, educators need to refrain from giving easy-to-grade exams and use real-world problems to assess learners' knowledge acquisition.

Tangentially related to the requirement of authenticity is the necessity for subjectivity. In the outside (i.e., real) world, problems can often be solved in a myriad ways; in the online learning environment, though, software applications are not generally designed for subjectivity. Learners will not be able to appreciate fully the authenticity of a particular project or problem if an element of subjectivity is not part of it. To illustrate this point, I offer the following real-world example:

> You go to the local grocery store with 45 units of currency in your hand. Each of the 11 items mentioned below cost 5 units of currency. Which items and how many of those items will you purchase? Bathroom paper, Bread, Cereal, Eggs, Fish, Fruits, Milk, Red Meat, Snacks, Soap, Vegetables

Clearly, numerous solutions exist to this problem. If technological tools do not have the "smarts" to allow subjectivity in students' answers, then students are being cheated on highly valuable, real-world information.

Conclusion

In some educational situations (Boylan, 2002), online learning might not be as effective as traditional, classroom scenarios (Shukla et al., 2014). The aforementioned dichotomies may provide reasons for this reduced effectiveness. Or perhaps, as Capra (2014) stated, "Online courses can be isolating, impersonal, and disengaging" (p. 114). If that were the problem, then the solution would be to have the students be engaged more with the course material (Chametzky, 2015a). However, as Capra (2014) stated, "Many instructors attempt to produce social interactions by creating mandatory discussion boards that require a minimum number of peer responses. However, these boards frequently end up being a detached chore" (Capra, 2014, p. 114). This imposition may be mitigated if educators use the aforementioned techniques to engage learners more actively in their learning. No learning environment will be enjoyable 100% of the time.

From the aforementioned discussion, it should be clear that a successful e-learning environment is extremely complex and requires different elements to work in concert with each other. Having an understanding of how learners might behave in an online environment is a crucial component for the success of an online course. Without understanding learner behaviors, educators tacitly permit some learners to flounder with great anxiety and an increasing sense of overwhelm.

In addition, the relationship between perception of experiences and actual experiences are sometimes not in congruence with each other. Such divergence may affect how much the person is attracted to or interacts with the object or environment (Dineen, Ash, & Noe, 2002). The perception and actual fit that various educational theorists (Dineen, Ash, & Noe, 2002; Wessel, Ryan, & Oswald, 2008) discussed, is, in some sense related to the person's experiences and expectations. It would seem, then, that the root of the numerous contradictions mentioned in this paper is the divergence of experience with expectation.

With understanding this divergence, combined with interaction, engagement, and guidance, educators can help reduce the anxiety thereby allowing learners greater opportunity for deep learning and higher-order cognition on Bloom's (1984) Taxonomy pyramid. Similarly, by understanding the numerous contradictions in the online environment, educators and educational theorists will be able to assist learners as they practice thinking critically and grow as individuals. Ultimately, this growth is the objective of education.

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INVESTIGATING THE EFFECT OF DISTANCE EDUCATION SYSTEM ON THE COMPUTER LITERACY OF MA STUDENTS IN TEHRAN UNIVERSITY

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Abstract-In Distance Education system, students must be equipped with seven skills of computer (ICDL) hence they must have high computer knowledge. This paper aims at investigating the effect of DE system on the computer literacy of MA students in Tehran University**.** The design of this study is quasi-experimental. Pretest and posttest were used in both control and experimental groups to undertake the study. The population of this study was students, those who participate in traditional and online education at university of Tehran. In order to gather required data, researcher-made questionnaires consisting of 59 items were used. The content validity index for the whole items of the questionnaire about computer literacy was 0.55. The reliability index for the whole test was 0.61. Data were analyzed by SPSS 16. In order to analyze data the following features were measured: frequency, percentage, standard deviation, T, covariance analysis, Kolmogorov-Smirnov test. The results of data analysis for computer literacy variable reveal that P value for Concepts of IT =0.010, File Management=0.001, Internet=0.03, Databases (Access) =0.03, and Presentation (power point) =0.001(online & traditional education), all are fewer than α=0.05. Therefore, the null hypothesis is rejected, but not the directional hypothesis. It can be concluded that, regarding computer skills, Concepts of IT, File Management, Internet, Databases (Access), and Presentation (power point), there is a significant difference between control and experimental groups. Regarding word processor and spreadsheets (Excel), P value is 0.11 and 0.75 respectively which are higher than 0.05, so the null hypothesis is rejected, but not the directional one and difference between these groups is not significant. To sum up, it can be stated that DE has a more significant impact on Concepts of IT, Internet and Presentation regarding computer literacy than traditional education. It can be stated that traditional education has a more significant impact on Concepts of File Management and Databases (Access) regarding computer literacy than DE.

Keywords: Distance Education, Computer literacy, Students, Higher education

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Introduction

Distance Education can be defined as "all forms of education in which all or most of the teaching is conducted in a different space than the learning, with the effect that all or most of the communication between teachers and learners is through communication technology" (Moore, 2003), DE refers to the provision of opportunities to and eliminating unnecessary barriers for a diverse range of students in order to assist them to succeed in their education or training according to their specific needs and diverse learning settings (Butcher & Wilson-Strydom, 2008). Distance Education approaches include student- center approaches, resource- based and autonomous learning, indicating the central position of the student. Learning to learn is in itself a goal for students in order to develop critical thinking skills and the ability to learn independently. This philosophy becomes increasingly important for lifelong learning where people become functionally equipped to operate in the knowledge society (Butcher & Wilson-Strydom, 2008). With DE, the culture of learning has shifted from the tradition of students passively listening in a classroom where attendance matters, to the culture of proactive reading, encoding and decoding at anytime, anywhere, indicating DE efficacy (Kurtz, Amichai - Hamburger, & Kantor, 2009; Pena- Bandalaria, 2007). Today, throughout the whole world, computer literacy is the first step for any individual who wants to do anything with computer. From all works of life, there is hardly any area where computer knowledge is not important. This is very correct, especially in the system of distance education where computer literacy plays great roles from the beginning to the end of the educational structure. Today, Computer literacy has really drawn the attentions of millions of student especially in the system of distance education. This is because of the fact that virtually all student now requires the knowledge of the Computer. In fact, it is a very important requirement.

Literacy Computer

Preparing students to information society is considered today as one the basic roles of education. For some researchers, learning can be developed and students effectively prepared to business areas by integration of technologies and learning processes (Butzin, 2000; Hopson, Simms & Knezek, 2002; Reiser, 2001). Information has been increased by using technology, and effective use of technology is correspondingly related to information and information technology. Reaching information and increasing information literacy are directly connected to information and communication technology (ICT) use and computer literacy (CL). Considered increasingly by governments as an important factor in economic growth and development, CL has different descriptions by different researchers and instructors (Luu & Freeman, 2011; Ololube, 2006). The importance of computer literacy and competency in online environments has been discussed in a number of studies (e.g., Atkins & Vasu, 2000; Cunningham, 2000; Johnson, 2002; Lam, 2000; Oh & French, 2007; Park & Son, 2009; Rakes & Casey, 2000; Shin & Son, 2007).For Rochester & Rochester (1991), a person can be considered as computer literate if s/he has information about computer, s/he knows how it works and if s/he is able to operate and use a computer. There are other various definitions of CL going from the simplest to more complicated. For Walsh (2007), CL consists to turn on computer, to know logic of computer work, its components and how to effectively use computer programs to reach information; although CL is viewed as a unique domain but divided into sub-domains such as basic computer literacy, programming literacy. Computer literacy, the ability to use computers to perform a variety of tasks, is becoming fundamental to the learning process.

In conjunction with UNESCO, Mayes and Burgess (2010) list the subsequent functions of LC in DE students as;

- An aid to the distribution of materials as a means of affording two-way Electronic communication;
- access to the internet and multi-way communication through networked computers;
- A process of diversifying into resource- based online education.

Distance Education and Trend of generations

Supported open and distance learning improves the potential for teachers to develop better links between new teaching practices, their own subject expertise and the application of the new methods in their own classrooms (Perraton et al., 2002) as well as becoming competent in using emerging technologies for teaching and learning purposes (Shohel & Power, 2010). According to the European Commission (1995): 'Distance education (DL) is concerned with the use of new resources (technical and/or non-technical) for rendering the learning process more flexible in terms of space, time, content, selection, access qualifications and teaching resources and/or for improving distance access to education systems. In this way, educational opportunities are extended to people who, because of their geographical, economic or socio-professional situation or because of a handicap, do not readily have access to the mainstream system of education. Distance education (DL) can help overcome barriers to transnational mobility and develop a kind of virtual mobility.' Open and distance learning involves a conceptual shift from the teacher to the learner and emphasizes the importance of student-centered learning that means a 'shift in research and practitioner interest from teaching and instructional design towards learning and the particularity of individual student response' (Thorpe & Grugeon, 1987). Therefore, Distance education (DL) focuses more on what the learner wants to learn, how the learner approaches learning and the socio-physical conditions for learning than what the learner should learn. To engage individuals in their learning processes, open and distance learning tries to motivate and empower for professional growth of individual teachers. However, supported open and distance learning is also preferable for other reasons such as scalability, sustainability and cost effectiveness compared with the traditional 'face to face' canter-based training approaches (Oliveira & Orivel, 2003). The concept of distance education evolving through generations provides a helpful structure when considering history and heritage. In 1989 Nipper, the first to use a generational framework, suggested three generations of distance education linked to production, distribution, and computer conferencing. Subsequently, these three generations were often labelled correspondence, broadcast, and computer mediated. The first two generations are fairly universally accepted. However, different writers, building on Nipper's work, have constructed subsequent generations somewhat differently. Moore and Kearsley (2005) describe the third generation as developing a systems approach; while Taylor (2001) says it was based on telelearning (audio/video conferencing). Taylor goes on to suggest a fourth generation that is linked to flexible learning based on online teaching, and a fifth generation that exploits additional aspects of "intelligent" digital technologies. Taylor classifies distance education into four distinctive generations and adds a fifth to his models of distance education: a conceptual framework (Taylor, 2001). Computer literacy on the part of students is not essential for the first generation where learning is offered through the paper- based correspondence model. Most of the delivery technologies prevalent in the second generation (the multimedia model) do not require computer literacy either, except computer- based learning. In the third generation (the tele- learning model), none of the delivery technologies requires computer literacy. All of the delivery technologies in the fourth generation (the

flexible learning model) require computer literacy: interactive multimedia online, internet- based access to the World Wide Web resources as well as computer- mediated communication. Taylor's fifth generation, the intelligent flexible learning model, includes all the delivery technologies of the fourth generation, but adds automated response systems to computer - mediated communication and campus portal access to institutional processes and resources. Computer literacy is essential for participating in fourth and fifth generation distance education delivery technologies. This implies that at higher education level, students have to be ICT literate, or alternatively the institutions have to offer programs to develop their ICT proficiency. Electronic learning, in this era, has undoubtedly revolutionized the teaching-learning methods. Based on a recent survey, more than thirty percent of a researcher's time is spent by using IT instruments whose main reason is the development of IT in general and Internet in particular. Therefore, it is essential for the students to have enough knowledge for using computers to retrieve information from the net and other electric sources and increase their ability in permanent and independent learning. Computer literacy is the individual abilities for using computers and information technologies. These seven skills, known as ICDL which is an abbreviation for International Computer Driving License include windows, *Computer Essentials* (Concepts of IT and File Management Combined), *Online Essentials* (previously known as Information and Communication), *Databases Access*, *Word Processing, Power Point, and Excel* (ECDL, 2001). Gaining these skills in university enhanced students' independent learning and permanent learning in next phases. Regarding the importance of computer literacy to its real meaning, it can provide the necessary platform for empowering the researchers to better planning in research process, access to the proper information for any stage of the project and eventually the production of new knowledge. In order to act successfully in this revolutionized world, students need to know how to find and apply the information effectively. Universities not only must prepare students for working in a certain field, but also they have to teach students for permanent learning. This matter is significant because the next century is the era of information and computer society, such knowledge can decrease the economic poverty in the development of information hence it will play an effective and efficient role in the society. Regarding the issues discussed above, this study seeks to investigate the impact of DE system on computer literacy of MA students in Tehran University.

Research Goal:

- Investigating the Effect of Distance Education system on the Computer Literacy of MA Students in Tehran University

Research questions:

- Does Distance Education system have an effect on the *IT skill* of higher education students in Tehran University?
- Does Distance Education system have an effect on the *File Management skill* of higher education students in Tehran University?
- Does Distance Education system have an effect on the *Essentials Online skill (Internet skill)* of higher education students in Tehran University?
- Does Distance Education system have an effect on the Databases Access skill of higher education students in Tehran University?
- Does Distance Education system have an effect on the power point skill of higher education students in Tehran University?
- Does Distance Education system have an effect on the word processing skill of higher education students in Tehran University?
- Does Distance Education system have an effect on the *spreadsheets skill (Excel)* of higher education students in Tehran University?

Instruments and Methods:

This study seeks to investigate the effect of two kinds of Distance Education and Traditional educations on the development of the computer literacy and measure which type has more impact on it. The design of this study is quasi-experimental. In order to undertake the study, pretest and posttest were used in experimental and control groups. Fifty students comprised the control group and fifty students were assigned in experimental group. Considering the design of this study, which is a quasi-experimental, stratified random sampling, was used for this purpose. The syllabus of courses in entrepreneurship faculty, education and extension field and in Management faculty, government management field were compared together both in traditional and distant education (DE) types in winter semester of 93-94. The government management is the field of study in Management faculty and in entrepreneurship faculty, education and extension field from which students who study in attendant and virtual classes was selected as the samples of this study. Twenty six students from traditional students and twenty three from DE students (Management faculty) and Twenty four students from traditional students and twenty seven from DE students (entrepreneurship faculty) in the winter semester comprised the participants. To gather data, a 59-item researcher made questionnaire was used based on ICDL Standard (Appendix 1). The independent variable of this study is the instructional mode of course. There were two categories of the instructional mode: Traditional education and online education. The dependent variable of this study is the computer Literacy as measured by the Computer literacy Scale. In the first semester, computer literacy questionnaire was given to both groups (traditional and online education). Both groups took their courses within the educational system itself. After the end of the semester, computer literacy questionnaire was distributed for both groups (Figure 1). The content validity index for the whole test of 59 items of computer literacy was 0.55 which is an acceptable index compared to similar works. In order to calculate the reliability of computer literacy variable, Cronbach's alpha was used. The reliability index for the total test was 0.61 which showed that most of the referees considered that the items of the questionnaire were necessary for measuring the computer literacy which is in acceptable level in comparison to similar studies. SPSS version 16 was used in all steps of the data analysis. In order to analyze data the following features were measured: frequency, percentage, standard deviation, T, covariance analysis, Kolmogorov-*Smirnov* test. Regarding the aforementioned sections, the main purpose of this study is to investigate the effect of DE system on the computer literacy of higher education students in Tehran University.

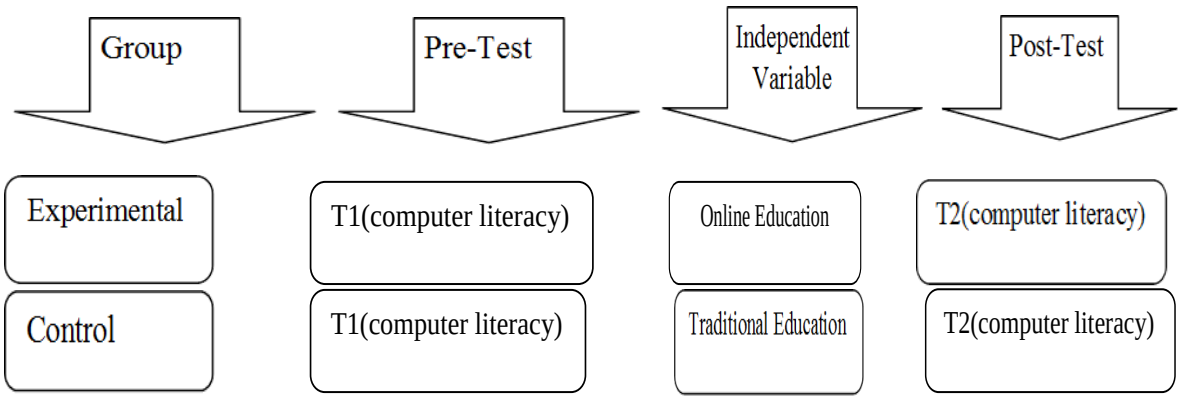


Figure1: Pre-test and post-test with control group without the use of random selection

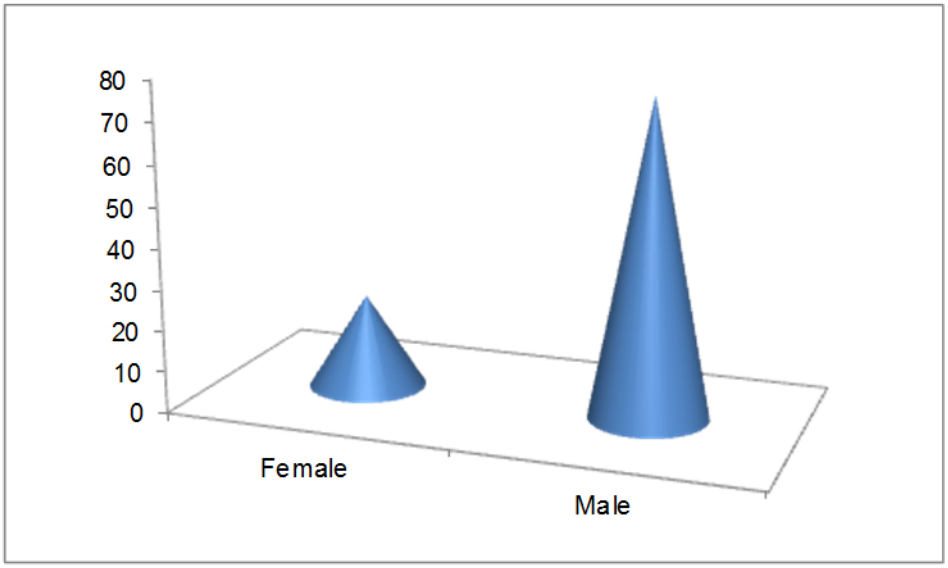
Findings

Findings will be presented in three sections. In the first section, the variables of sampling of the population is described, in the second section, the research variables are explained and in the last section data will be analyzed based on the hypotheses of the study. Regarding the type of university, 49 out of 100 (49%) of the population were MA students of management faculty and 51 out of 100 (51%) were MA students of entrepreneurship of Tehran University. Considering students' age, 40% of the participants were younger than 25 years old and 37% of them were between 25-30 years old, and 23% were elder than 30 years old. As seen in table and graph 1, the distribution of the samples is shown based on the gender of the participants in this study. P value of Chi-square is 0.001 which is fewer than the P=0.05, so there is statistically significant difference between the frequency of the participants regarding their gender. Twenty three out of 100 participants are female (23%) and 77 are male (77%).

Table 1: the Distribution of the Participants Based on their Gender

Sex	Frequency	Relative Frequency	Chi-square Test	
Female	23	%23	Score	Significance level
Male	77	%77	26/16	0.001
Total	100	%100		

P=0.05



Graph 1: the Distribution of the Participants Based on their Gender

Table 2: Descriptive Statistics (Dispersion and Central Index) of Computer Literacy Variable in Control and Experimental Groups

	Group	Mean	Standard deviation	No.	Standard error of the mean
Pre-Test	Control	207/92	23/03	50	3/61
	Experimental	204/74	27/69	50	3/61
Post-Test	Control	211/30	24/10	50	4/12
	Experimental	210/82	33/41	50	4/12

Table 2 displays the basic information and distribution of computer literacy variable which shows that the mean score of pretest in both experimental and control groups do not vary drastically, and the mean score of posttest of these groups do not have a significant difference either. Standard error of measurement of computer literacy variable in two groups is almost in the same level. In such a design, the scores obtained from pretest are used to control the possible differences at the beginning of the experiment. There is no statistically significant difference between the pretest of these groups before commencing the experiment.

To study the homogeneity of error of variance, **Levene** Test, homogeneity of error of variance was used (Table 3).

Table 3: the Results of Levene Test for Homogeneity of Variance Error

variable	Df_w	df_b	F	Significance level
Computer literacy	98	1	1/12	0.12

P=0.05

The results of Table 3 reveals the homogeneity of error of variance which does not reject the null hypothesis in computer literacy variable, so it is concluded that error of variance in these variables are very close or identical. It can be generally stated that the error of variance of the variable is homogeneous. It is also shown in the Tables above that error of variance of the variable is homogeneous.

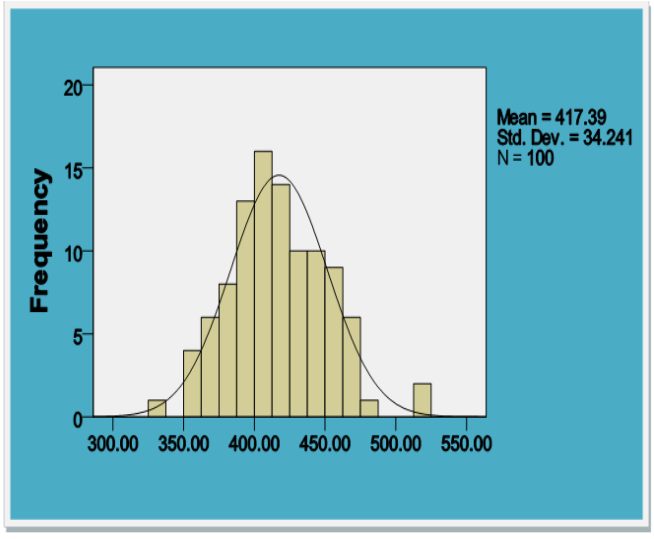
Keeping the distribution normal; Kolmogorov-*Smirnov* test was used. The analysis of the data is shown in Table 4.

Table 4: Kolmogorov-Smirnov test

variable	Significance level
computer literacy	0.316

P=0.05

Data analysis of Kolmogorov-*Smirnov* test with α=0.05 revealed that there is no significant difference for computer literacy variable P=0.316, so the null hypothesis (normal distribution) is not rejected, but the directional hypothesis (abnormal distribution) is rejected. Based on the information presented above, it can be claimed that the distribution of variables is normal. Keeping in mind that no distribution is exactly as normal as what we see in normal curve, the distribution in this study is similar to normal curve distribution and scores are scattered between -2 to +2 SD. Therefore, the rules of a parametric test are obeyed and analysis is possible in these conditions. The distribution of the variable is compared with the normal distribution below:



Graph 2: The Distribution of Computer Literacy Variable

As seen in the graph above, the distribution of the variable in this study is almost normal and has little deviation from normal distribution. So the primary requirements for covariance analysis exist and the condition for covariance analysis is convenient and parametric test can be administered. In the following, the main hypothesis of this study (there is a significant effect of studying DE on computer literacy) will be studied. Table 5

demonstrates the results of covariance analysis in four different types. Table 5 demonstrates the results of covariance analysis in four different types:

Table 5: the results of covariance analysis in four different types in Control and Experimental Groups

	Source of variance	Value	**F**	Degrees of freedom	Error of Df	Significance level
Interactive	Pillai's Trace	0.99	7421/61	2	97	0.001
	Wilks' Lambda	0.006	7421/61	2	97	0.001
	Hotelling's Trace	153/02	7421/61	2	97	0.001
	Roy's Largest Root	153/02	7421/61	2	97	0.001
Inter-group	Pillai's Trace	0.004	0.217	2	97	0.805
	Wilks' Lambda	0.99	0.217	2	97	0.805
	Hotelling's Trace	0.004	0.217	2	97	0.805
	Roy's Largest Root	0.004	0.217	2	97	0.805

Data analysis in Table 5 shows that the P=0.001<0.05, so the null hypothesis is rejected, but the directional hypothesis is not rejected. But in group effect section (P=0.805) so the directional hypothesis is rejected, but not the null hypothesis. It is concluded that there is not a significant difference between the computer literacy of control (traditional) and experimental (DE) groups. In the other words, the finding reveal that the mean scores of two groups are not different therefore, the impact of variable is not statistically significant. To make sure, other analyses will be presented below.

Table 6: The Test of the Effect of Within Variables

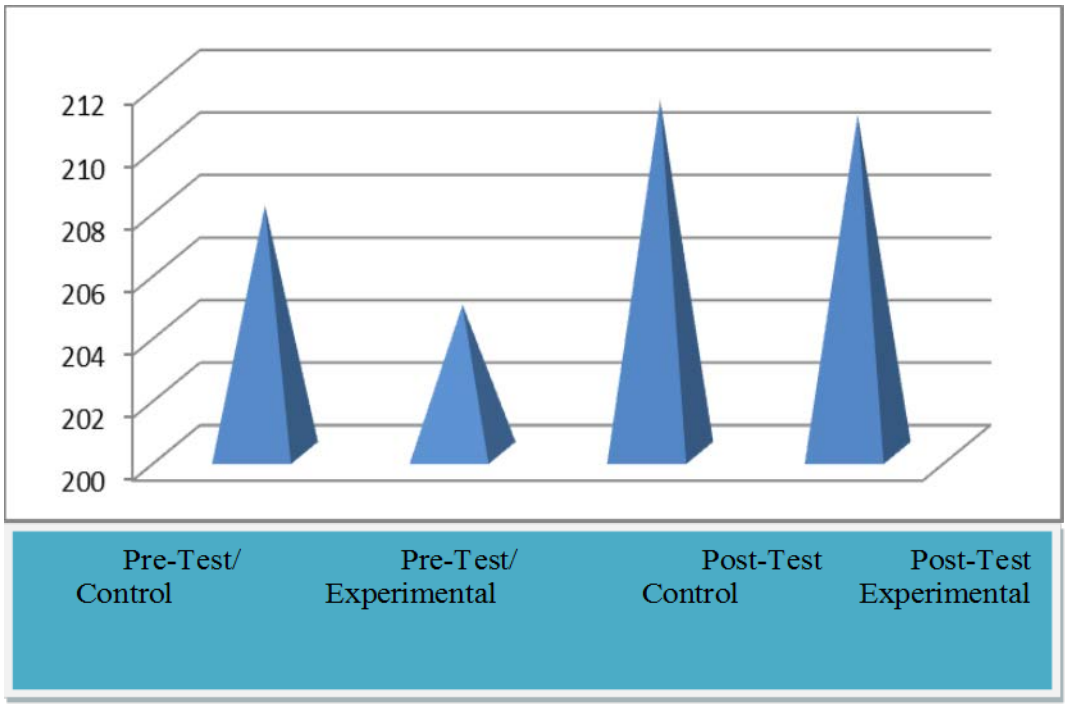
Dependent variable	Sum of squares Iv3	Df	Mean Squares	F	Significance level	Source
Post-Test	252/81	1	252/81	0.390	0.534	Correctional model
Pre-Test	5/46	1	5/46	0.007	0.935	
Post-Test	4257206	1	425706	6554/67	0.061	Interactive/ Inter-group
Pre-Test	4454632	1	4454632	5250/21	0.095	
Post-Test	252/81	1	252/81	0.390	0.534	group
Pre-Test	5/76	1	5/76	0.007	0.935	
Post-Test	65553/3	98	648/51	…….	……..	Error
Pre-Test	83149/88	98	848/468	…….	……	
Post-Test	4321013	100	……	……	…….	Total
Pre-Test	4537788	100	……	……	……	
Post-Test	63806/11	99	……	……	……	Correctional Total
Pre-Test	83155/64	99	…….	……..	……	

The results of Table 6 depict that the interactive impact of computer literacy variable between experimental and control groups is not significant. This means that two types of education (DE and traditional) have no significant effect on computer literacy. Though this is not a significant, it does not mean that there is no effect, but it is possible to affect the groups similarly which is discussed in more details in the following.

Table 7: The Results of Analysis for T-Test

Variable	Mean difference	Standard deviation	T	Significance level	Degree of Freedom
Pre-Test	3/18	5/19	0.624	0.221	98
Post-Test	0.480	5/83	0.082	0.068	98

Table 7 shows that P=0.221 and 0.68>0.05 regarding the computer literacy variable, so the directional hypothesis is rejected, but the null hypothesis is not refuted. Therefore, it can be concluded that there is no significant difference between the pretest of control and experimental groups. The other results reveal that there is not a statistically significant difference (P=0.68<0.05) in the posttest of computer literacy between control and experimental groups, so and this change has been similar in both groups.



Graph 3: The Comparison of Pretest and Posttest for computer Literacy in Control and Experimental Groups

As seen in graph 3, in experimental group which has received DE and in control group which receives traditional education, computer literacy does not differ significantly. Therefore, it can be claimed that neither DE nor traditional education has a significant impact on the computer literacy. As a result, it can be claimed that both DE and traditional education have a effect on computer literacy but they did not have any significant difference with each other and both of them affect computer literacy in the same level.

Table 8: The Analysis of Factors of Computer Literacy Variable

variables	Group	Test	Mean	Standard deviation	Standard Error	T	Significance level
Concept of (IT)	Experimental	Pre- Test	3/37	0.77	0.25	2/64	0/010
		Post- Test	4/03	0.52			
	Control	Pre- Test	3/45	0.66			
		Post- Test	3/78	0.43			
File Management	Experimental	Pre- Test	3/49	0.62	0.17	5/99	0/001
		Post- Test	3/52	0.37			
	Control	Pre- Test	3/56	0.37			
		Post- Test	3/95	0.56			
Microsoft Word	Experimental	Pre- Test	3/57	0.64	0.19	1/61	0.11
		Post- Test	3/71	0.67			
	Control	Pre- Test	3/41	0.61			
		Post- Test	3/90	0.47			
Essential Internet	Experimental	Pre- Test	3/39	0.58	0.03	2/02	0.03
		Post- Test	3/95	0.62			
	Control	Pre- Test	3/52	0.63			
		Post- Test	3/78	0.49			
Excel	Experimental	Pre- Test	3/27	0.55	0.03	0/32	0.75
		Post- Test	3/89	0.63			
	Control	Pre- Test	3/23	0.64			
		Post- Test	3/92	0.39			
Access	Experimental	Pre- Test	3/34	0.78	0.29	2/20	0.03
		Post- Test	3/85	0.61			
	Control	Pre- Test	3/05	0.51			
		Post- Test	3/89	0.53			
Power Point	Experimental	Pre- Test	3/32	0.49	0.03	5/90	0.001
		Post- Test	4/05	0.39			
	Control	Pre- Test	3/35	0.71			
		Post- Test	3/59	0.43			

The results of data analysis of Table 8 for computer literacy variable reveal that P value for Concepts of IT =0.010, File Management=0.001, Internet=0.03, Databases (Access) =0.03, and Presentation (power point) =0.001(online & traditional education), all are fewer than α=0.05. Therefore, the null hypothesis is rejected, but not the directional hypothesis. It can be concluded that, regarding computer skills, Concepts of IT, File Management, Internet, Databases (Access), and Presentation (power point), there is a significant difference between control and experimental groups. The mean scores of Concepts of IT, Internet and Presentation (power point) are increased after the experiment in DE and traditional education has a low impact on their computer literacy (Concepts of IT, Internet and power point). The mean scores of Concepts of File Management and Databases (Access) are increased after the experiment in traditional education and DE has a low impact on their computer literacy (File Management and Databases Access). Regarding word processor and spreadsheets (Excel), P value is 0.11 and 0.75 respectively which are higher than 0.05, so the null hypothesis is rejected, but not the directional one and difference between these groups is not significant. To sum up, it can be stated that DE has a more significant impact on Concepts of IT, Internet and Presentation regarding computer literacy than traditional education. It can be stated that traditional education has a more significant impact on Concepts of File Management and Databases (Access) regarding computer literacy than DE.

Conclusion and Discussion

According to Table 8, P value for Concepts of IT =0.010, File Management=0.001, Internet=0.03, Databases (Access) =0.03, and Presentation (power point) = 0.001, all are fewer than α=0.05. Therefore, the null hypothesis is rejected, but not the directional hypothesis. Regarding word processor and spreadsheets (Excel), P values are 0.11 and 0.75 respectively which are higher than 0.05, so the null hypothesis is rejected, but not the directional one. So DE has a more significant impact than traditional education on the following factors: Concepts of IT, File Management, Internet, Databases (Access), Presentation (power point) regarding computer

literacy. But no significant effect of DE and traditional education was observed on the word processor and spreadsheets (Excel). Nowadays, it is essential for students to have comprehensive computer knowledge and skills, specifically in DE system which is considered as one of the factors influencing development. Having ITC knowledge and skills resulted in the enhancement of students' confidence in digital societies.

In the contemporary era, doing university tasks requires computer knowledge, so developing such abilities ends in students' better performance in and consequently the more efficiency of universities will be reported. Furthermore, it can increase the value of individuals in his office since it results in more independency and increases the motivation and the feeling of job success and decreases the costs germane to providing services from technical sections of universities. Some studies have been done in the country and abroad germane to the topic of this paper which presented below. Hiss, in a study entitled "the effective factors on the computer literacy of Taiwanese students", concluded that male students have more computer literacy than female. Moreover, students in private universities have the same advantage over the students in state universities (Hiss & Yeong,2000) Wallace and Clariana, in their study entitled: "understandings versus facts: determining students' computer literacy skills and their need to teaching concepts and technology, investigated the computer skills regarding spreadsheets (Excel) and computer knowledge of newcomers by means of web-based tests. The findings revealed that the mean score of students is significantly lower than α=0.05(Wallace and Clariana, 2005). Heysung, in a study entitled: "the effective factors on accepting IT by teachers", concluded that teachers' attitudes towards IT have a significant relationship with using IT (Heysun, 2004). The findings of Zareeizavaraki revealed that there is a significant relationship between using computer and Internet by university lecturers and the period of students' learning. Students who are in contact with professors using web-based connections have more information about word processor, power point, Excel, Internet and also apply them than other students who are in contact the professors who cannot take advantage of computer skills (Zareeizavaraki, 2003). Conducting a research by Lotfinejad et al, entitled: "computer and informational literacy of students of Orumiyeh medical university", they concluded that most of the students having access to computer at home but they hadn't passed any educational course germane to computer yet. They also have the ability of sending, receiving and attaching the file but they do not have the ability to use modern facilities for searching and search functions (Lotfinejad et al,2006). Sharifi, in his study, concluded that there is a significant relationship among features such as individual, educational, teaching experience and the amount of using information technology but no significant relationship between university degrees with amount of using information technology in university fields was observed (Sharifi,2004). Alishan et al, in a study entitled: "the study of information literacy of Bandar Abbas medical students "concluded that the mean score of knowledge of Internet use and amount of using this element is higher than the mean score but generally students ' computer literacy is lower than the mean(Alishan et al,2007). One of the reasons why students need to have the knowledge of IT, Word, and Internet is that these skills are applicable in their everyday life. The findings of his research revealed that, in most of the variables, students who receive DE in experiment group outperformed the students who receive traditional education in control group. The findings of this study also showed that DE had a more significant impact on students' computer literacy than traditional education. The enhancement of students' computer literacy plays a basic role in developing independent learning skills and permanent learning. As it is necessary for an individual to monitor his/her own learning in order to be successful in E-learning and be self-guide in this active process, s/he must have a high level of computer literacy. At the end, regarding the importance of the computer literacy, it is suggested that the educational managers, designers, and planners pay attention to the enhancement of computer literacy in selecting the goals and contents and teachers consider this type of literacy in choosing teaching methods. Finally, it is suggested to the researchers to conduct more research germane to computer literacy in the application of these skills in DE settings. Generally, considering the research findings and policies of Distance University based on high education for all, everywhere, every time, it is essential for the university policy makers and planners to have a special look at Open University and DE to the development and improvement of students' computer literacy. To this end, the following are suggested:

- Holding practical sessions to improve and increase students' computer literacy in universities.
- Students' access to the magazines and brochures relevant to the computer literacy.
- Conducting research projects germane to students' computer literacy.
- Taking IT courses which are the bases for computer literacy for university newcomers.

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Appendix 1
Computer Literacy Questionnaire
COMPUTER LITERACY QUESTIONNAIRE
We are grateful for your participation and assistance in answering this questionnaire. We would like to know something about your computer experience, knowledge and skills. Please answer all questions as accurately as you can.
SECTION I
➢ For each question, please mark your response with a tick (√), unless otherwise indicated. For 'Other' responses, provide a brief response.

Q1. Sex
Male Female
Q2. Age
25 years old between 25 to 30 years old More than 30 years old
Q3. Faculty
Management Entrepreneurship

SECTION IV
➢ The following questions cover general areas of computer knowledge. You may not know the answers to all questions, but please attempt to answer them without asking others or referring to books.
Q18. Please choose the best answer for each question and put a tick (√) in the box at the appropriate spot: '1', '2', '3', '4' or '5'
1= A Great Deal
2= Much
3=Somewhat
4= Litter
5= Never

row	Concepts of Information Technology	1	2	3	4	5
1	Can you recognize the major components of CPU?					
2	Can you recognize the difference between Bit and MB?					
3	Can you install the Windows operating system?					
4	Can you recognize the difference between LAN and WAN CPU?					
5	Do you know the terms of ADSL, ISDN, and PSTN?					
	File Management					
1	Can you lock the Windows operating system?					
2	Can you change the format of the screen?					
3	Are you familiar with the terms of DOC, MDB, and XLS?					
4	Can you retrieve the deleted data?					
5	Are you familiar with The file compression program (WinZip)?					
6	Can you perform the file management including creating, coping, cutting, deleting and renaming files, etc.?					
7	Can you search the various folders and files on a computer drive?					
	Microsoft Word					
1	Do you know the Application of all the commands in the Word menu?					
2	Can you work with icons of Bold, Italic, under line?					
3	Can you apply the effect of superscript and subscript in a text?					
4	Can you convert the Lowercase to uppercase in a text?					
5	Can you apply the symbols and special characters in a text?					
6	Can you change the Color, font and size of a text?					
7	Can you set the line spacing and paragraph?					
8	Can you create a table in the text and add its Rows and columns?					
9	Can you work with other formats except word such as RTF?					
	Essential Internet					
1	Can you use a search engine (such as Yahoo, Google, etc.)?					
2	Do you know the deference between the terms of forward and reply?					
3	Are you familiar with terms of URL, WWW, and ISP?					
4	Can you recognize the internet sites from the blogs?					
5	Can you work with Microsoft Outlook for emailing?					
6	Can you send an email for others?					
7	Can you use of text and voice chat?					
8	Can you open a file attached to an e-mail?					
9	Can you use of video conference on the internet?					
10	Can you participate in online virtual classes?					
	Excel					
1	Are you familiar with concepts of worksheet, workbook, cell, row, column in Excel?					
2	Can you create a worksheet in excel?					
3	Can you delete the information in the cells of a worksheet?					
4	Can you change the name of a worksheet?					
5	Can you work with the computational functions in Excel?					
6	Can you change the Width and height of a cell?					
7	Can you draw different types of bar charts, column chart, line charts, and pie charts in Excel?					
8	Can you add the titles and labels to a chart?					
	Access					
1	Can you open the Access database?					
2	Can you work with the tabs report, forms, queries and tables In the Database window?					

3	Can you delete the information in the cells of a worksheet?					
4	Can you change the name of a worksheet?					
5	Can you work with the computational functions in Excel?					
6	Can you change the Width and height of a cell?					
7	Can you draw different types of bar charts, column chart, line charts, and pie charts in Excel?					
8	Can you add the titles and labels to a chart?					
	Access					
1	Can you open the Access database?					
2	Can you work with the tabs report, forms, queries and tables In the Database window?					
3	Do you know the difference between operation and issues options?					
4	Do you know how to work with records and fields?					
5	Can you work with table wizard?					
6	Can you save & copy a record?					
7	Can you freeze and unfreeze a particular column in the Access?					
8	Can you create a table in design view?					
9	Do you know the application of difference type of data (Number, Currency, and Auto Number) in Access?					
10	Can you add a new field to table in access?					
	Power Point					
1	Can you insert a text into a slide?					
2	Can you edit a slide text?					
3	Can you add a new slide to a show file?					
4	Can you insert graphics as a sign into slides?					
5	Can you show and hide the slides?					
6	Can you change the slides appear by using special effects to in the background?					
7	Can you change the slides design?					
8	Can you insert a picture into slide?					
9	Can you create an organizational chart in a slide?					
10	Do you know how to work with the icon of slide transition?					

MOOC IN THE PARADIGM OF SYSTEMIC MODELLING OF COMPLEXITY: SOME EMERGING PROPERTIES

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ABSTRACT - With the emergence of social networks, MOOC, informal learning through networks and connectivist approaches to learning, *Digital Learning Environment* (DLE) analysis is becoming more and more complex. The models which were previously used to account for the activity instrumented with cognitive purposes, are now showing their limits (Vygotsky, Leontiev, Kuutti, Engestrom, Rabardel...).The massive aspect of a MOOC is difficult to represent in such models. Its « open » character is no less difficult to model. The evolution of these environments is chaotic and their effects appear unpredictable. But chaotic does not mean hazardous. A complex system is naturally chaotic and it is not possible to predict the outcome of the process directly, by calculation. But it is possible, from systemic modelling to develop plausible scenarios based on the analysis of available data (training trace, trends, emerging properties, etc.). As Paul Valéry once said, "We are only reasoning on models », whether or not the models correspond to reality. The models are constructed from perceived realities, but enable one to assess emerging properties in a projective fashion; their counter-intuitive effects, for example. We hypothesize in this contribution, that the paradigm of systemic modelling of complexity (Edgar Morin, Le Moigne) appears more than ever as a framework which is suitable for the representation and analysis of a DLE of the last generation. In fact, by applying the theory of complex systems to the modelling of a MOOC taken as a case study and considered as a last generation DLE, we will report, in a projective manner, some of the emerging properties.

INTRODUCTION

« Education has always used teaching aids, the media, various instruments and processes to facilitate the transfer of knowledge to learners » (Baron, 2011, P. 109). The so-called educational technologies, which generally use that set of resources, never ceased to fuel the debate and controversy during the second half of the twentieth century and especially since the sixties, at which time they represented a Renewal of Education with the emergence of school radio and television educational programs. This integration in the education system continued with the introduction of computers in the classroom in the nineties and started expanding in the year 2000 with the use of computer networks connected to each other in schools and universities (MOOC, EAD, flipped classroom, etc.). The most recent ones like MOOC or DWE (Digital Work Environment) or the open and distance learning (ODL) devices will be considered here as the latest generation of Digital Learning Environment (DLE) that « as empirical objects, are most often of a composite nature, articulating digital and non-digital elements (Peraya, Bonfils, 2014, p. 5). As objects of research, they are generally considered instrumented activity systems that refer to the theories of activity (Vygotsky, Leontiev, Rabardel) and to the analytical models associated with them. The famous model of Engestrom is one of them. It is this model that is typically used by researchers in educational science to model these environments in order to study their behavior. It has the advantage of being simple and showing all the components of a DLE. And to evaluate a digital environment, we must compare it to a model. "We are reasoning only on models », Paul Valery said, as quoted by Le Moigne (1999). But we will see in this article that the choice of model is crucial. This is especially true when the DLE that is being studied becomes complex, which is what we hypothesize for the latest generation of DLE subjects and therefore a fortiori for the MOOC. It is also to avoid the abusive and sometimes risky simplification for analytical modeling that we opt for a more systemic modeling complexity (Moigne, 1999) to represent the latest generation of DLE. Indeed, « the simplification of something complicated applied to complex results worsens its complexity » (ibid.). Furthermore, the evolution of these environments is chaotic and the effects are unpredictable. It is not possible to predict the outcome of the processes, directly by calculation. But it is possible, from systemic modeling, to develop plausible scenarios based on the analysis of available data (traces of activity, trends, the emergences of phenomena, etc.). Models are constructed from perceived realities but enable the assessment and projection of emerging properties; the counter-intuitive effects for example. We hypothesize in this contribution, that the systemic modeling paradigm of complexity (Le Moigne, 1999) appears more than ever as a framework which is suitable for the representation and analysis of the latest generation DLE.

In fact, by applying the theory of complex systems modeling to a MOOC, taken as a case study and considered as a last generation DLE, we can realize in a projective way, some of the emerging properties.

THE MODELING OF A DLE CONSIDERED AS A COMPLEX SYSTEM

We explained in the introduction that it is because we perceive a last generation DLE as a complex phenomenon (e.g. MOOC) that it must, in our view, be represented as a complex system. Therefore, it is time to move on to the instrumentation of systemic modeling and the description of the different stages. We shall justify the choices we make, remembering each time to quote the theoretical fundamentals of the approach.

Epistemological foundations

According to the systemic modeling theory, modeling a complex system is first the modeling of : a synchronic action system (that works), a diachronic system (which changes during working), a teleological system (which has a purpose, a goal) and a recursive system (it implies empowerment) in an active environment. Systemic modeling also requires compliance with a conjunctive logic that aims to join and not separate the concepts of « Active Environment » and « Project or Teleology » or those of synchronic operation « the Making » and diachronic transformation « the Becoming ». The cybernetic procedure characterizes the conjunction of the first two concepts; the structuralist procedure is the combination of the last two. The combination of these two concepts led to the concept of the General System.

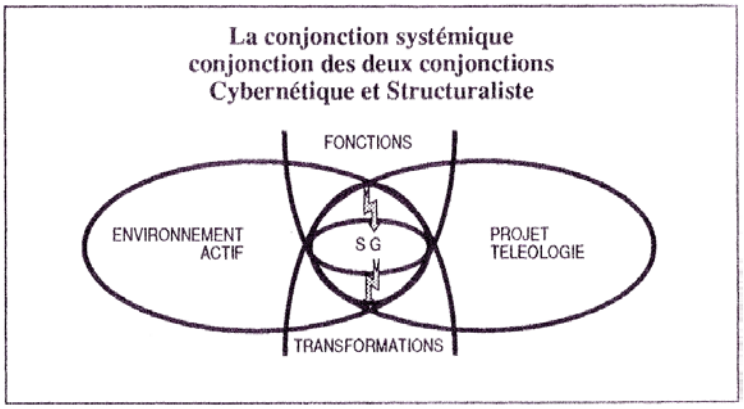

Figure 1 : The systemic conjunction of two conjunctions Cybernetic and Structuralist (Le Moigne, 1999, p.40)

Systemic conjunction proposes « to consider the operation and transformation of a phenomenon as inseparable from the active environments in which it is carried out and from the projects for which it is identifiable» (Ibid. p.40).

Identification and representation of processes

We therefore do not begin to represent things, objects, individuals, organs as was done in Analytical Modeling (AM) but the actions or complex actions that are systematically represented by the black box or a Symbolic Processor that accounts for this action or that series of actions.

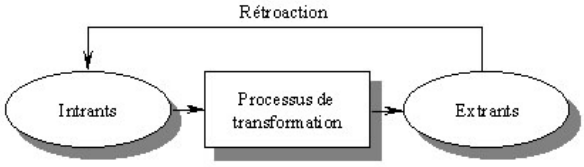

Figure 2: Process identification

This is the basic concept of systemic modeling (SM) to start from what the system does, otherwise known as its projects. It is then up to the modeler to search for functions and transformations (or operations) which are insured or which are to be insured. First, the modeler has a rough perception of the world to model. This stage features the *first level of the archetype model* for the articulation of a complex system of nine levels (Moigne, 1999, p.58). Its perception, first syncretism, only allows him to perceive the overall function of the phenomenon to model and make out its outline. Thenit can be fitted into its environment. Its perimeter can be drawn; the project becomes identifiable, distinguishable from its environment. Concretely, this can be represented by a closed contour, a little like a mathematical empty set: a « potato » in some way. This activity will result from the project description and recognition of the main functions and secondary functions as that are nested within each other and interrelated. They gradually will fill up the empty shell that represents the outline of the project. For example, if one recognizes in the remote tutoring, one of the essential functions of a DLE, it also considers that the main function consists in a number of nested functions: technological assistance, content expertise, methodological consulting, facilitation and evaluation (Develotte and Mangenot, 2010, p.3).
This set of multiple actions (or processes) that the modeler will have identified, may take place within a conceptual map created for this purpose by the modeler (see fig. 3). It will be necessary to clarify the traits of the perceived phenomenon to model. « For the families' project, we will associate the hypothesis of subsystems that we seek to articulate … referring to the global modeling system project" (Ibid. p. 54).
To facilitate the representation of these processors, we agree to denote « Pr » processor symbolizing « the black box » or the process and by « t(i) » the period during which values are assigned as the values of its inputs and its outputs. The processes characterizing the active phenomenon are now seen in their actions, that is to say, acting within the system. Their function is to « do »something.

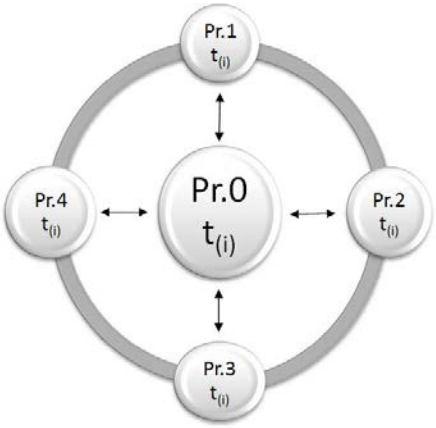

Figure 3: Blank example of concept map of a system.

Peraya (2003) and Peraya Meunier (2004) and Charlier et al. (2006) were interested in the « approach by constituent functions of any mediatized training environment » without the modeling of complex systems theory having been explicitly mentioned (to our knowledge). The framework for these constitutive functions of any mediatized training environment provides a reference framework today. It highlights and connects eight functions. These functions are a) awareness, remote social presence, and interaction ; b) social interaction that includes : cooperation, communication and sharing current files and resources ; c) information management ; d) production (individual or collective) ; e) management and planning ; f) Support and guidance; g) emergence and systematization of metareflexive activity ; h) evaluation » (Peraya, D., Charlier B., et Deschryver, N., 2008 , p.20)

In addition, each of these functions has relationships with others and among all these, the information management function appears central. A study based on this framework is given here as an example. It covers a PLE analysis work (Personal Learning Environment) led by Peraya and Bonfils (2014). In this work subjects instantiate five of the eight constituent functions of any given mediatized training environment. These functions are the following: a) sharing current files and resources, b) information management, c) awareness, remote social presence, d) the production of print and multimedia documents and finally e) the function of communication and interaction. Each of these functions is associated with one or more specific device (ibid. p. 13). These functions, which are recognized and made explicit by the modeler (or project team), illustrate the first step of modeling presented here. They take place in a concept map built by modelers for this purpose (see Figure 3of Article of Peraya and Bonfils, 2014, p. 26).

In some cases, the modeler can see that the number of processors is rapidly increasing. This should lead him to make processor groupings in « super-class processor » and « processor » classes which are respectively represented by « parent processors » and « children processors », which are connected to each other.The recognition of actions or complex actions (processors).allows one to reach the construction of more or less specific classes used to group these processors in subsets, in view of their properties or attributes. « We can then differentiate the system in as many subsystems or LEVELS. Each level can be modeled by its network and interpreted relatively independently once the inter-level coupling inter-relationships have been carefully identified "(ibid, p.54). The graph theory provides a variety of useful representations for systemic modeling. Here (cf. figure 4) are two others as examples that complete the representation proposed above.

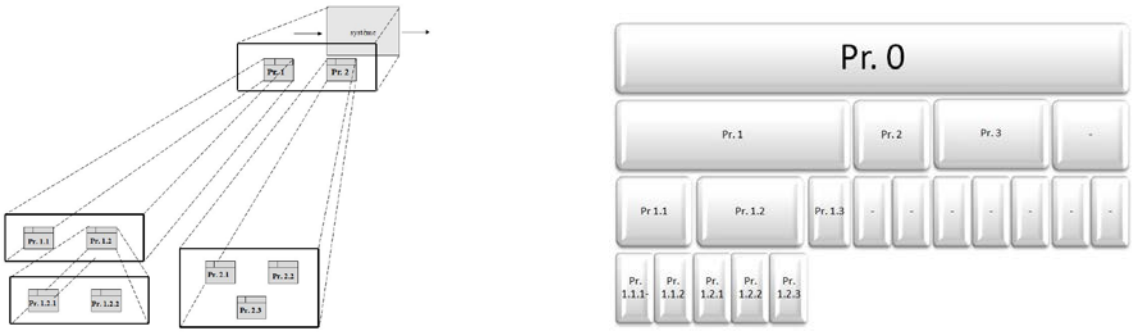

Figure 4: Examples of hierarchical representation

Active processors in an active environment (the system does)

The processors entered in the heart of the conceptual map will now be operated alternately taking into account the actions they produce, that is to say, in explaining how the input values (inputs) of each processor are transformed to become the output values (outputs). Modeling a working environment is modeling the activity which it carries out by the accomplishment of actions, of transactions and interactions. This step corresponds to the *second level of complexity of the archetype model* (which owns nine levels). Let's add one more level of complexification that the modeler can perceive and represent simultaneously: the autoregulation of processes is also recognized. It constitutes the third level of complexification of the archetype model. To account for the complexity of this regulation, it seems appropriate to propose to the modeler to sketch a data flow diagram resulting from the object oriented modeling approach, such a diagram graphically represents the data flow through the processes of a system. Note that this diagram « is interested in data processing but doesn't take into account the order, the decisions or the structure of the objects » (Rumbaugh et al., 1995, p. 178). It is in its interest to show how the output values are obtained from the input values, how these values are treated and how the system will behave. As we have said, it is during this relation between processors that new behaviors can emerge within the system.

Practically speaking, the data flow chart is generally built in successive layers which refine non trivial treatments. Any non trivial treatment must be described in a sub diagram. "The highest-level layer can be a single treatment or perhaps a single treatment to collect the entries, another one to process the data and another to produce final outputs » (Ibid., p.180). Figure 5 shows as an example, the diagram at its highest level of MOOC interface as an example and considered here as a DLE of the latest generation. The *third level f the archetype model* takes into account that we have self-regulating processes.

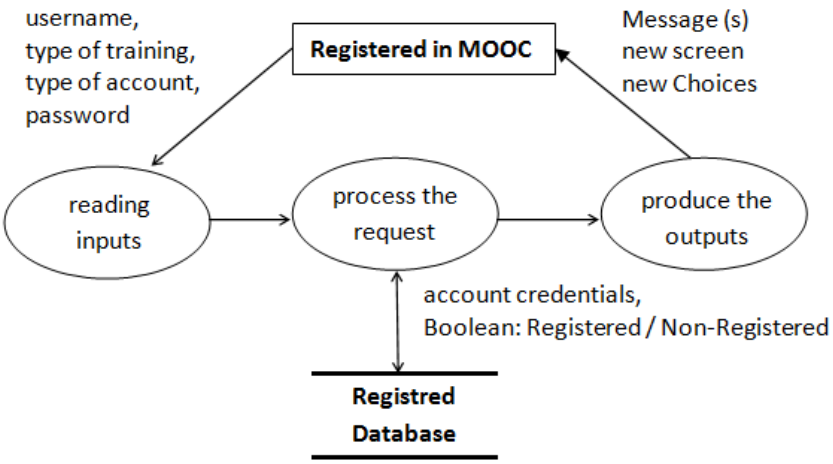

Figure 5: Data flow diagram of the highest level of the interface MOOC

Dynamic Perception processes (a system that evolves)

We have represented an active process in an active environment, i.e. a system "that works". This allowed us to locate the *fourth level of complexity of the archetype model*, highlighting the inter-relationships between processes at a specific moment in time. But the canonical model of the process (ibid., p. 47) shows that it is also suitable to represent the system which changes while "working" and to do this through time. Rumbaugh et al. (1995, p.87) notes that "these aspects of the system, time-dependent and change-dependent, are grouped in the dynamic model…" of the object-oriented modeling. We therefore propose the modeler to adopt this model to explain this action jointly, the transformation over time. One is thus encouraged to describe the typical sequences, highlighting the events which provoked the actions. The traces left by these events will be useful for elaborating the diagrams of states which currently reflect the changes in the system's state which are expected at this level of complexity (Ibid. p.60).

A system to decide

A *fifth level* is added on to the stages of complexity of systemic modeling. The system becomes capable of deciding its own activity, of processing the information it produces and of making decisions about its own behavior. This level marks a milestone in the gradual process of complexity of the archetypal nine-level model. The first four levels characterize an active process which works in an active medium. It exists, it does, it informs itself and it transforms itself. The levels which follow show first a capacity to generate, treat and memorize information (*level 5 and 6*). Next they are capable of coordinating (*level 7*) and of developing new projects as well as showing imagination (*level 8*). Finally, the active process of developing a capacity of autofinalisation which allows it to decide its future, to make choices about its own orientation (*level 9*).

CONCLUSION

Since it is considered as a complex phenomenon and as an object of study, a latest generation digital learning environment such as a MOOC can advantageously be represented and studied in the paradigm of systemic modeling of complexity, this is the hypothesis we put forth in this contribution. We apply the constructivist approach to better understand this emerging phenomenon.

Considered also as an intelligible and finalized tangle of interrelated actions, the system usually produces a result which is greater than the sum of what would have been produced if each of its parts had been taken independently of each other. Hence, the concept of emergence which « rejects the possibility that the overall knowledge of a phenomenon can only result from the mere knowledge of its fundamental components » (Wikipedia) is introduced. We therefore propose to extend the modeling approach by identifying emerging phenomenon which is unique to digital learning environments by strengthening the link between the two. Le Moigne (1999, p.41) recalls : « The incompleteness of a model will not be a regrettable imperfection, but a

necessary condition for anticipation, simulation and the possible emergence of new behaviors in this complex system ».

This comprehensive and systemic approach is currently being implemented by the Lisec research team (Strasbourg, France) and their findings will be published shortly. This contribution focuses on the relevance of the application of «complex systems modeling » for the modeling and study of a latest generation of digital learning environment as a MOOC for example.

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REQUIRE OF COOPERATIVE LEARNING NETWORK THROUGH VIRTUAL COURSE AND GENERAL EDIFICATION PLATFORM FOR OPEN EDUCATION IN INDIA

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Abstract-Human Resource Development is the prime aim behind government funding for higher education and the same should not be restricted to the student getting admission to regular conventional University. In this era of globalizations, the educational needs of an Individual were not correctly catered in form of the conventional form of education. Now, knowledge modules are based on the personalized needs of the learner and need to be delivered at right time with right content. In conventional form of education, the knowledge and capability profile of individual learner is not given any importance. The larger size of class room has also made it impossible for an educator to keep a record of the same. As such, we need a system that would fill these gaps. Here comes the need of the Virtual Classroom. In this work, the authors tried to give a brief account of virtual classroom and its components. The paper is organized into four parts, the first part describe about majors' forms of educational activities due to globalization. In second part, we define Transnational Education; Glocals; Online Education. The third part describes about need of Collaborative Education Network and common education platform for Open education and its benefits. In fourth part, we will discuss the need of virtual class room for better learning modules.

Keywords: *Globalization; Transnational Education; Glocals; Online Education; Collaborative Education Network; Convention Systems; Emerging Systems; Information Industries*

Introduction

According to David Woodhouse [1], the globalization has its impact of education. Now, the following majors' forms of educational activities get manifest in a globalised world. These forms:

- Transnational education
  - Branch Campus
  - Franchises
  - Twining
  - Corporate University
- Online education: The 'Virtual University'
- Distance Education-online
- Collaborative education

These are some of the futuristic forms of education in era of globalization. We need to implement them in our higher education system [2] to cater the learning needs of more than 50 crore Indians (working population) in a cost effective manner.

Transnational education [3] is a system where the education provider and the students opting for education are located in different countries. In this system, the interactions among educational providers [4] and students are carried out through emails, computer network, teleconferencing etc. In table 1 few example of transnational education is given. To serve a student better, the educational providers go for the following schemes:

- They open Branch campus in the country where student seek admission to its programmes.
- Education providers in one country approve education providers (Franchises) in other countries to provide one or more programmes to students of the host countries
- Two institutions in two countries agree to offer joint education programmes (twining) to students.
- Multinational companies offer staff development programmes to their own staff across the globe where the programmes are linked to some formal universities (Corporate Universities) so that employees of the multinational companies get credits for their studies.
- Distance education programmes are offered by leading Open and Distance Learning Institutions to students across the world through Computer Networking, private educational broadcast etc.

Table 1: Examples of Transnational Education

Institution Name	Host Country	Home Country
Baruch College, City University of New York	China	USA
Florida International University	China	USA
Johns Hopkins University	China	USA
Lancaster University - Partner with Sunway University	China	Malaysia
Missouri State University	China	USA
New York Institute of Technology	China	USA
University of Nottingham	China	United Kingdom
University of Surrey	China	United Kingdom
Webster University [2 campuses]	China	USA
Bharati Vidyapeeth University	Dubai International Academic City/Dubai Knowledge Village (Free Zone)	India
Birla Institute of Technology and Science	Dubai International Academic City/Dubai Knowledge Village (Free Zone)	India

Source (http://www.globalhighered.org/branchcampuses.php)

Benefits to learners from Transnational Education:

Institutions should take the opportunity to engage with those who seek an international education but want to stay local **such student are also called** 'glocal' students *(*Rahul Choudaha, director of research and advisory services, World Education Services, New York) [5]. Glocals represent the segment of students who typically seek transnational education (TNE) including international branch campuses, twinning arrangements and online education. It can help to intake large learners' across the world and help to cater the domestic needs of developing countries that require high-level expertise. It may provide the students and academicians opportunity of achieving the international standards of education.

Online Education:

It is product of information Technology also called Learning Management System (LMS). Now, they are termed as Virtual University [6] ,examples of virtual university is given in Table 2. They do not have physical manifestation of the university[7]. Student and teachers from different demographical area may be part of it. Educational discourses between them take place through internet or online connectivity.

Table 2:Example of virtual University

Western Governors University www.wgu.edu/wgu/index.html	Consortium	United States
Yashwantrao Chavan Maharashtra Open University www.ycmou.com/	Evolution of an Existing University	India

(Source: http://www.unesco.org/iiep/virtualuniversity/linksliste.php)

Distance Education Online Mode (DEOM):

Many face-to-face universities around the globe prefer to provide distance education in e-learning mode through a well managed websites using LMS (Table 3). Once a course is created, it can be repeated to indefinite number of students with minimal staff intervention. Moreover, these courses provide wider students' access and help to facilitate globalization [8] of good academic programmes.

Table 3: Examples of Distance Education in Online

Overall Rank	Name of the Institution	Location	Resources & Reach	Learning & Experience	Result & Efficiency	Total*
1	Indira Gandhi National Open University	New Delhi	208.40	258.12	198.00	665
2	Yashwantrao C Maharashtra Open University	Nasik	145.81	239.54	233.16	619
3	Sikkim Manipal University	Gangtok	73.64	284.96	257.15	616
4	IMT Distance and Open Learning Institute	Ghaziabad	43.41	285.00	249.22	578
5	University of Mumbai	Mumbai	17.04	262.35	256.32	536

(Source: http://www.careers360.com/news/4596-30-Best-Distance-Education-Institute)

Collaborative Education:

Here many college and university come together to offer different courses together using a single platform. In such system, Candidates who have already obtained any UG/PG Degree from any recognized University are eligible to enroll for an additional degree. The students complete additional degree in one year. Examples: The Australian Collaborative Education Network (ACEN) is the professional association for practitioners and researchers from the higher education sector, industry, community and government representatives, involved in work integrated learning (WIL) in Australia.

With implementation of these emerging systems of education, Universities are becoming more and more financially efficient, generating more and more resources, but in the process may lose sight of their main academic goals and objectives. The table 4 given below gives a brief difference between conventional systems and emerging systems of education.

Table 4: Conventional Vs. Emerging Systems of Education

Conventional systems	Emerging systems
Welfare approach	Market approach
Public higher education	Private higher education
No fees/low fee	Introduction of fees/ High fees
Emphasis on formal/full time education for all sections.	Open/distance/part-time education for economically weaker section and formal/full time education for better-off sections
Scholarly/academic discipline of study	Self-financing, commercially viable/profitable disciplines of study
Heads of Institutions selected for academic background	Heads of Institutions selected for expertise in financial / money management and resource generation.

Virtual Library:

Traditionally, University or Institute Libraries are collections of books, manuscripts, journals, and other sources of recorded information. For many years libraries have participated in cooperative ventures with other libraries exploiting information technologies[9]. They have shared catalogue and information about what each has in its collection. They have well-develop mechanism for borrowing and lending of materials ***(e-journal, eBooks)*** among themselves through [10] Library Consortiums (e.g. UGC-INFONET Digital Library Consortium) and Library Network (such as INFLIBNET, DELNET). Library professional are expert in finding information from on-line and CD-ROM databases (***e.g. SOUL, KOHA, LIBSYS***). Now, society has begun to value information more highly, the so-called information industry has developed out of the greater library networks. This industry or networks encompasses publishers, software developers, on-line information services, and other businesses that package and sell information products.

Some Benefits of Information Industry:

(i) Libraries no longer have to own an article or a certain piece of statistical information.
(ii) A student with her own computer can now go directly to an on-line service to locate, order, and receive a copy of an article without ever leaving her home.
(iii) People do not have to go to a building for some kinds of information, users do not need help to locate the information they want. In a traditional library building, a user has access to a catalog that will help locate a book.
(iv) Usage of standard ways (e.g. HTML, Metadata, SGML and Selective Dissemination of Information) to identify pieces of information used by Library professional helped to develop good digital libraries.
(v) Increased availability of electronic information has led libraries, particularly universities, to develop important relationships to their institutions' computer centres. In most educational institutions librarians have assumed responsibility for both the library collection and computer services (e.g. Information Hubs).
(vi) With Internet connections in Peking (Beijing), Moscow, and across the globe, people who did not have access to traditional library services now have the opportunity to get information about all types of subjects, free of political censorship.

Some Drawbacks of Information Industry:

(i) For many years libraries have bought books and periodicals that people can borrow or photocopy for personal use. Publishers of electronic databases, however, do not usually sell their product, but instead they license it to libraries (or sites) for specific uses. They usually charge libraries a per-user fee or a per-unit fee for the specific amount of information the library uses. When libraries do not own these resources, they have less control over whether older information is saved for future use.

Virtual Library to Virtual Class Room:

The word "library" does not refer to the same institution it did 10 years ago. Since 2002, the purpose of libraries has changed dramatically, from what they buy, to how they use their space, to what users read and where they read it. Due to change in technology for from manual to digital, there is lot of scope of development new methods of creating, storing, organizing, and providing information using Digital Library Platform (E. g DSPACE, JOOMLA, Greenstone). Expectation of teacher as well as students has increased a lot from Academic libraries. Based on these expectations, Libraries have responded by developing more sophisticated on-line catalogs (e.g. OPAC, Virtual Library). The changes in libraries outlined above originated in the United States and other English-speaking countries. But electronic networks do not have geographic boundaries, and their influence has spread rapidly. With these changes, libraries have changed, so, too, has the role of the librarian. Now, librarians have assumed the role of

educator to teach their users how to find information both in the library and over electronic networks. Now, library professional has to expertise himself about computers and computer software. A lot of work in the field of computer technology has to be done to preserve the human cultural records of the past or assure that library collections on crumbling paper or in old computer files can still be used by people many centuries in the future. Now, in scenario of emerging form of education, the work of library professional has also moved outside library walls. They have begun to work in the information industry as designers of new information systems, researchers, and information analysts. The success of institution to provide modern education solely depends on the capability of library professional of an institute to develop such information systems.

Figure 1: Use of ICT in Education (Source AICTE Website)

Virtual Class Room and its need:

A virtual classroom is concept in which learning environment is created using IT Tools. The learning environment may be of two type (i) Web-based or (ii) Software Based. The web-based can be accessed through a portal. The software-based require downloadable executable-files. The main concept of Virtual Classroom is that a student in a virtual classroom participates in synchronous instruction Figure 2 give a layout of the virtual classroom as per NIC specification.

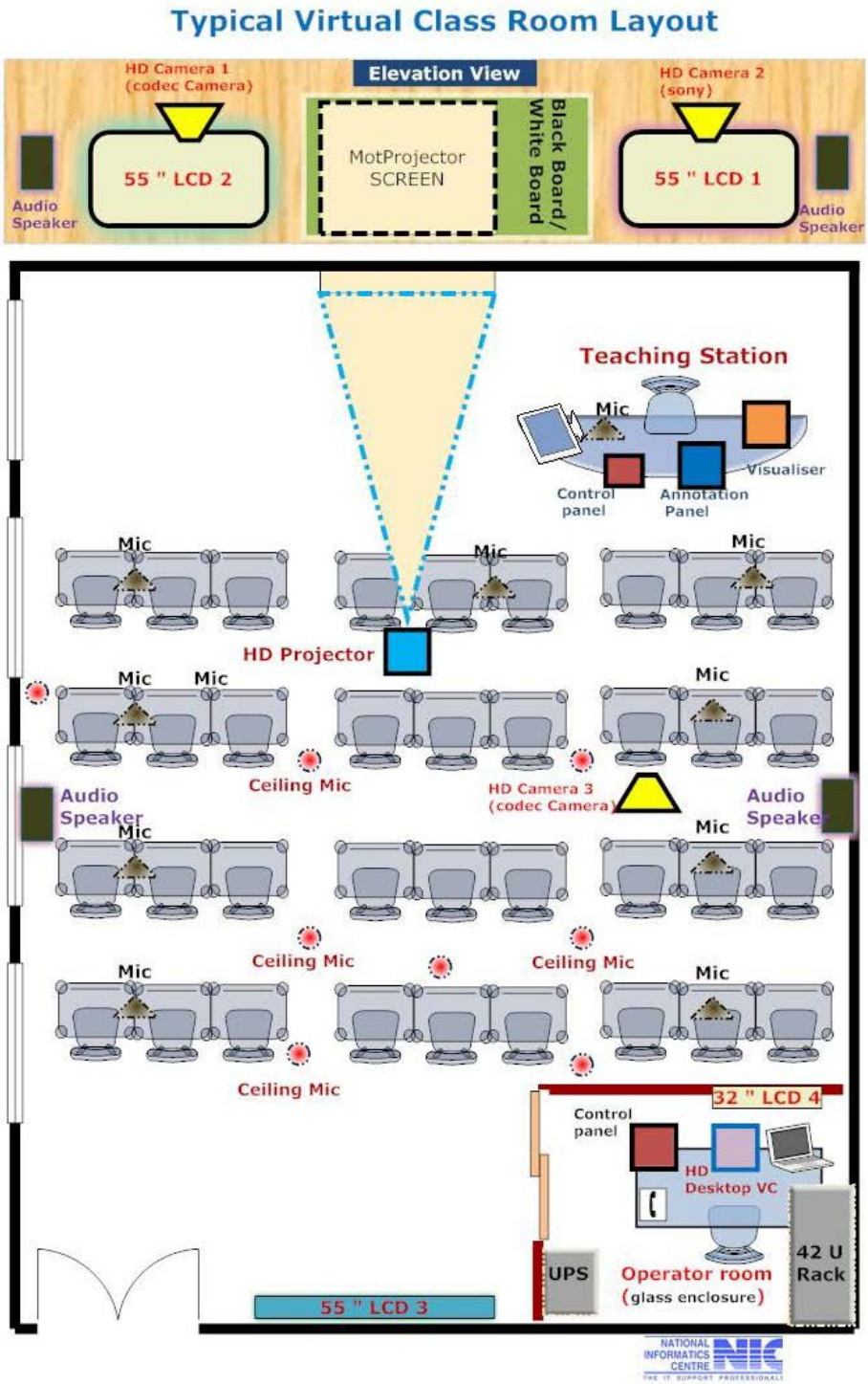

Figure 2: Layout of Virtual classroom (Source: http://nkn.in/nkn-workshop2013/images/presentation/NKN-BLR%20Interactive%20class%20Room.pdf)

Now days, a large number of educational Agencies and institutes have rolled out virtual classrooms to provide synchonrous distance education. Virtual classroom software applications generally employ technologies, such as web conferencing, video conferencing, live-streaming, and web-based VoIP to provide remote students with the ability to collaborate in real time [11]. To enhance the educational process, applications may also provide students

with asynchronous communication tools, such as message boards and chatting capabilities which act as remedial classes for weak students.

Table 5 Examples of Software for Virtual Class Room

Vendors/ Institute	Website	Name of the software
NIC	http://www.nic.in/	Virtual Class room
WiZIQ Education. Online	http:://www.wiziq.com	WizIQ
Excelsoft	http://www.excelindia.com/	SARAS
Blackboard Inc	http://www.blackboard.com/	Blackboard Collaborate
Commelius Solutions	http://www.commelius.com/cloudrooms/	Cloudrooms
IIT, Kharagpur	http://www.iitkgp.ac.in/cet/	Virtual Classroom Software
Amrita University & IIT Bombay	http://aview.in/	A-VIEW

The concept of virtual classroom is very new in India and very few educational institutes (e.g. IIT Kharagpur, IIT Bombay, Amrita University) are working and doing research in the field of educational technology. A lot of effort has been given by Ministry of Human Resource Development (MHRD), India to develop an online –platform through project NMEICT- Sakshat [12] that can be used by the learner through-out the country and from different field of studies (Table 6).

Table 6 Examples portal develop under NMEICT- Sakshat

Name of the Portal	**Website**
Amrita Virtual Interactive e-Learning World	http://aview.in/
	http://www.co-learn.in/
Consortium for Educational Communication	http://cec.nic.in/Pages/Home.aspx
e-PG Pathshala	http://epgp.inflibnet.ac.in/about.php
e-Yantra	http://www.e-yantra.org/
Free and Open Source Software for Education	http://fossee.in/
Pedagogy Project	http://www.ide.iitkgp.ernet.in/Pedagogy1/pedagogy_main.jsp
National Programme on Technology Enhanced Learning	http://nptel.ac.in/
Spoken Tutorial	http://spoken-tutorial.org/
Virtual Labs	http://www.vlab.co.in/index.php

Need of Virtual Classroom to enhance the quality of Open Mode of Learning:-

- Economize on the time of teaching staff, and the cost of instruction.
- Facilitate the presentation of online learning by instructors without web authoring experience.
- Provide instruction to students in a flexible manner to students with varying time and location constraints.
- Provide instruction in a manner familiar to the current web-oriented generation of students.
- Facilitate the networking of instruction between different campuses or even colleges.
- Provide for the reuse of common material among different courses.
- Provide automatic integration of the results of student learning into campus information systems.

Conclusions:

Through on-line technologies and virtual classrooms, it is possible to cater the learning needs of working population in a cost effective manner. Now, education has turned into a tradable commodity from "public good" but the MHRD initiatives may change the situation and student will be more dependent on Government educational institutes. India can no longer remain complacent to the situation and Indian higher education institute need to respond and implement the new e-tools for education. The capability of library as well as Computer Centre of University should be utilized properly to implement this emerging form of education. There is need of collaboration among college and university to at offer different courses together using a single platform.

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