

# The Impact of the Internet and the World Wide Web On Distance and Collaborative Learning

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**Abstract**—The advent of the Internet and the World Wide Web has changed the face of technology especially in the way we communicate and interact. The increasing use of this technology especially in teaching and learning has attracted enormous research efforts particularly in the development of distance and collaborative learning. Even though much gain have been recorded in this direction, there still remains a gap as to how well these highly proliferating web technologies have impacted on the collaboration between students and teachers, students and students, and its overall contribution to distance learning. This paper considered how these web-based technologies contribute to collaborative learning by enabling people to interact with each other from different locations. It identified the factors necessary to optimise the impact of web-based technologies in distance and collaborative learning and concludes by proposing a best-practice guideline that will enhance the impact of the Internet and the World Wide Web for effective distance and collaborative learning.

**Keywords**—Internet; World Wide Web; distance learning; e-learning; collaborative learning.

## I. INTRODUCTION

The last decade has witnessed two major trends in the world of education: the transformation of the Web from a repository of hyper textual documents to a highly interactive communication media, and a shift in learning theory from the traditional educational theory of behaviourism to that of cognitivism and constructivism [1][2]. With this trend, web applications have become important candidates for educational activities, which often include collaborative

sessions. The traditional emphasis on print in the educational system is constantly threatened by technology enhanced learning (TEL) [3]. Over the years, the use of technology in education has witnessed a tremendous growth not only in size, but also in the innovative way it is used.

Distance learning is a way of delivering instructional and educational materials to learners in different places and at different or the same time, on an individual basis [4]. The use of technology in teaching brought about a transformational change in education, especially in distance learning. Distance education has come a long way, but it witnessed a rapid growth in popularity and use with the advent of more advanced technologies. From a humble beginning in 1728, when Caleb Philip taught his students new method of Short Hand through weekly mailed lessons [5], through 1840s, when Isaac Pitman used correspondence to teach shorthand in Great Britain [6], the introduction of technology to education introduced online learning programs at the K-12 level in 2008 [7]. Today, more impact of adopting Internet and web-based technologies have completely transformed the way we learn, play and work. Web applications are now considered very useful in enhancing educational activities, particularly for collaborative sessions [8][9]. A peoples wealth and competitiveness, human competency and social development, is highly dependent on the importance it attaches to education. With the current trend of globalization and rapid technological advancement, there is a need to adopt new methods of teaching and learning in training the population into a knowledge based society through the

adoption of more robust and collaborative web-based groupware technologies such as e-learning.

These new mode of learning (e-learning) has the potential of meeting present day challenges in the acquisition and dissemination of knowledge and skill. The problem however is not in the adoption of the technology, but in its use to achieve the student's learning outcomes. Unlike in the era of audiovisuals where the television played a lasting and remarkable role in distance learning (e.g., Telekolleg in Germany 1967, the Open University in Milton Keynes in Great Britain 1971, and the FernUniversität in Hagen Germany 1975), e-learning tools are yet to record a remarkable impact on learning as these tools are mostly underutilised for the benefit of distance and collaborative learning. This study is therefore convinced that if fully utilized, the Internet and web-based technologies can be used to address these challenges as e-learning is perceived to be a viable resource for teaching and collaborative learning either by synchronous or asynchronous methods.

Section 2 takes a look at the background of the study from two perspectives: historical and educational perspectives. In Section 3, we discuss the role of technology in distance and collaborative learning. In Section 4, we discuss the impact of these technologies on teaching and learning based from the findings of our study and propose a guideline of best practice that will enhance the impact of the Internet and the WWW for effective distance and collaborative learning. Section 5 concludes the paper.

## II. BACKGROUND OF THE STUDY

Recent times have seen a tremendous increase in the application of information and communication technologies (ICT) for educational purposes, resulting to a proliferation of networked technologies and evolution of e-learning methods [10]. As technology advanced, particularly Internet and web-based technologies, the mode and method of delivering educational and instructional materials, otherwise known as distance learning evolved from distance education to e-learning.

Historically, the use of technology was first noted when the University of Illinois (in 1960) employed computer terminals to enable students access recorded lectures using remote audio or television devices [11]. From 1963 to date, educational institutions have been taking advantage of these new opportunities as they witnessed these technologies evolve in different and innovative ways. Early e-learning systems began to emerge such as Computer-Based Learning/Training (CBT) in the 1970s and 1980s [12], and Computer Supported Collaborative Learning (CSCL) in the 1980s [13]. The introduction of CSCL coupled with the advance in technology from large low processing and expensive computers to today's handheld computing devices changed the face of learning and gave birth to the first Open University in Britain and University of British Columbia [13][14], which also saw the development of the first Web CT (Blackboard Inc.), thus facilitating the use of Internet to deliver education [15], giving birth to web-based training and online distance learning, and online discussions between students at different locations [16]. The birth of the WWW in

the early 1990s gave rise to the use of hypertext materials and online course websites – virtual learning [17]. Other advances in this regard are mentioned in [18][19][20].

From an educational perspective, the adoption of Internet and web-based technologies in education delivery has led to overthrow of more traditional methods of teaching and learning. From a simple and casual application of ICT to facilitate face-to-face classroom teaching and learning to the intensive use of ICT for educational purpose as in the case of virtual or online learning, e-learning, an end product of this evolution process has brought to light a completely different method of learning [21][22][23][24].

In a simple form, E-learning is the application of information and communication technologies (ICT) and electronic media in education, inclusive of multimedia learning, technology-enhanced learning (TEL), computer-based instruction (CBI), computer-based training (CBT), computer-assisted instruction or computer-aided instruction (CAI), internet-based training (IBT), web-based training (WBT), online education, virtual education, virtual learning environments (VLE) (which are also called learning platforms), m-learning, and digital educational collaboration, and can take place within or outside a conventional classroom, in synchronous or asynchronous ways [25]. E-learning is best tailored for distance and collaborative learning but can also be applied in face-to-face teaching (blended learning).

## III. THE ROLE OF TECHNOLOGY

Various Internet and web-based technologies exist, most of which are used to facilitate distance and collaborative learning, also referred to as e-learning. Today, we have terms like instructional technology, learning technology, Computer Aided Instruction or computer-based training. Online learning or education is however, specific to web-based learning. For learning through mobile applications, M-learning is used. E-learning, which is our focus in this paper, goes beyond the application of technology in learning but also encompasses the actual learning activities enabled by the use of these systems.

### A. *Aligning Educational Theories and Pedagogical Designs With E-Learning Technologies*

Distance learning has witnessed three major pedagogical evolution and many technological changes, yet, no single educational theory has been able to solely provide all the solutions demanded by e-learning designs as each has extended the work of others instead of developing a new prototype (Ireland, 2007). Each evolution demands a different approach to learning, different type of knowledge and contextual application, thereby requiring expertise on the mix of technology and pedagogy to be employed. In all three generations, the major players of teachers, learners, and content remain constant, however, the way in which these three relates vary; increasing from a learner-content interaction for cognitive-behaviourist models to learner-learner interaction in constructivism, and then to the deeply networked learner-content-teacher interrelationship propagated in connectivist pedagogies. In connectivist

theory, the student plays the role of teachers and the teacher plays the role of students through a mediated digital artefact interaction created by all. The scenario is more of where the teacher’s role changes from being a guide to a co-passenger or a role model, but no more as the sole creator or guide in the learning activity.

However, learning management systems (LMS) providers’ tend to focus more on technology without any pedagogical integration and this leaves most of these e-learning tools unusable or being used in a way contrary to pedagogical principles, which negatively affects the learning process let alone the waste of resources used in implementing these e-learning systems. Previous researches reveal that most e-learning solutions lack pedagogical background and present some serious deficiencies regarding teaching strategies [26]. With the evolution of technology, e-learning interfaces get more complex and overloaded with excess information and eye-catching graphics. This most times, has an adverse effect as the learner attention is distracted away from the content to technology. This can be avoided if the design interface is anchored on pedagogical principles, which will improve learner’s efficiency while making the learning activity more flexible. Though many learning theories abound, it is advisable to employ a combination of more than one learning theory in the design of e-learning systems as no one theory is specially tailored to support e-learning environments. Table I below shows a summary of learning theories principles.

From the findings of Mayes and de Freitas [27], we can cluster these pedagogical theories into three broad perspectives from the assumptions they make about learning: the associationist/empiricist perspective (learning as activity), the cognitive perspective (learning as achieving understanding), and the situative perspective (learning as social practice), as presented in Table II.

TABLE I. SUMMARY OF LEARNING THEORY PRINCIPLES

Learning Theories	Core Principles
Behaviourism	Brain is a black box
	External stimuli provoke reaction
	Observation of behaviours
Cognitive	Involvement of different kinds of memories
	Learning is an internal process
	Use of node patterns
Constructivism	Attribution of a personal meaning to information
	Building of personal understanding
	Active process of information
Active Learning	Active involvement
	Combining previous involvement and dialogue

TABLE II. MAPPING LEARNING THEORIES TO LEARNING OUTCOMES, ADOPTED FROM [27]

Learning Theory	Learning Outcome
Associative perspective	emphasises task analysis, defining sequences of component-to-composite skills. It provides a highly focused set of objectives, described as learning competencies.
Cognitive perspective	emphasises conceptual development, stressing the importance of achieving understanding of the broad unifying principles of a domain. This view also encourages us to frame learning outcomes in meta-cognitive terms, with the educational aim of achieving learning how to learn, and encouraging the development of autonomous learners.
Situative perspective	encourages the definition of learning objectives in terms of the development of disciplinary practices of discourse and representation. It also focuses on learning outcomes that are dependent upon the establishment of collaborative learning outcomes, and on learning relationships with peers. This perspective also encourages us to formulate learning outcomes in terms of authentic practices of formulating and solving realistic problems.

*B. Internet and Web-Based Groupware Technologies*

The first generation of complex groupware technologies was based on private networks and proprietary communication protocols and clients. Such technologies provided users within a limited area with rich user interfaces and customized functions. With the advent of the Internet, access to these groupware systems was extended to users in different areas, countries or even continents. The WWW in a weak sense can be regarded as a collaborative technology [28][29]. Actually, the Web provides a global platform for information sharing across what looks like a unique large file system [30]. This distinguishing feature of the WWW encouraged an increasing use of web-based collaborative tools especially in the field of project teams support [31]. Other reasons for this fast proliferation of the web-based technologies are the open network client standards characterizing Internet and the WWW [32][29]. Such standards enable any-place-any-time interaction, and make it possible to use standard browsers as clients (in the case of Web-based tools), freeing new users from the necessity to install new software. This interoperability is very useful to widely dispersed working groups, where the localization of people in different organizations and countries used to make deploying existing groupware technologies very hard [33]. Other positive consequences to the use of standard browsers are a reduction in the users’ need for training and set-up costs, and the Web’s suitability to be used as an interface as it combines platform independence and rapid distribution, two factors that are highly appreciated as interface characteristics. Despite all these assets, Internet-based and Web-based groupware tools also encounter a series of new problems and challenges. Among the disadvantages associated with Internet-based and Web-based groupware tools are slowness and unreliability, uncertainty and perceived insecurity. Advanced Web-based groupware has

now partially overcome these last limitations, thanks to relatively new technologies such as Java, XML and CORBA [34].

C. The Future of Distance and Collaborative Learning

E-learning is being increasingly viewed as an important activity in the field of distance and continuing education. Web-based courses offer obvious advantages for learners by making access to educational resource very fast, just-in-time and relevant, at any time or place. Increasingly, the WWW is used to support and facilitate the delivery of teaching and learning materials. This use has progressed from the augmentation of conventional courses through web-based training and distance learning to the web-based and e-learning education. E-learning is not just concerned with providing easy access to learning resources, anytime, anywhere, via a repository of learning resources, but is also concerned with supporting such features as the personal definition of learning goals and the synchronous and asynchronous communication and collaboration, between learners and between learners and instructors. One of the hottest topics in recent years in the Artificial Intelligence (AI) community, as well as in the Internet community, is the semantic web. It is about making the web more understandable by machines. It is also about building an appropriate infrastructure for intelligent agents to run around the web performing complex actions for their users. Furthermore, semantic web is about explicitly declaring the knowledge embedded in many web-based applications, integrating information in an intelligent way, providing semantic-based access to the Internet and extracting information from texts [35]. Figure 1 presents a simple knowledge-based e-learning system architectural framework, Figure 2 shows a wider integrated view of the learning model, while Figure 3 shows a typical e-learning system.

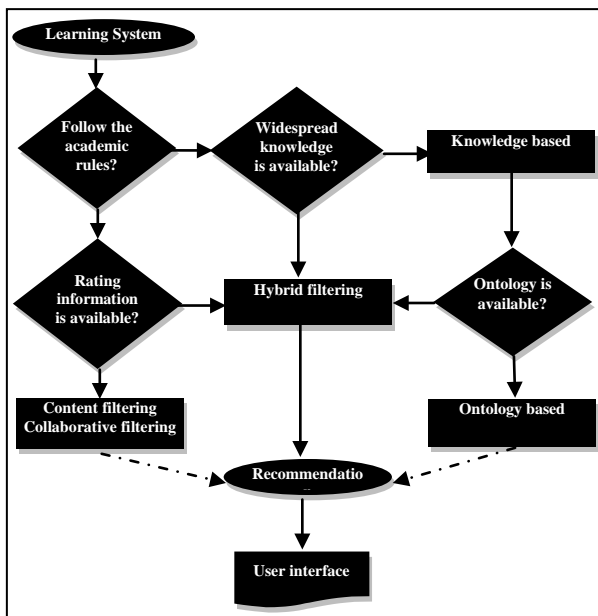


Figure 1. A simple Knowledge based e-learning systems framework. Adapted from [36]

From Figure 1 above, the learning system serves as the input to the system and its output is communicated to the learner through the user interface which may be in a blended learning, distance learning or traditional learning environments respectively (as shown in Figure 2). What the knowledge-based e-learning system in Figure 1 simply does is to extract user-specific information from a vast collection of available information in the learning system by subjecting the content to a set of decision rules. The output from the ontology based and content/collaborative filtering processes are then streamlined and recommended to the user based on those criteria. This process ensures that only user-specific content reaches the learner. Ultimately, semantic web is about how to implement reliable, large-scale interoperation of web services, to make such services computer interpretable – to create a web of machine-understandable and interoperable services that intelligent agents can discover, execute and compose automatically. The problem is that the web is huge, but not smart enough to easily integrate all of those numerous pieces of information from the web that a user really needs. Such integration at a high, user-oriented level is desirable in nearly all uses of the web. Unfortunately, the web was built for human consumption, not for machine consumption - although everything on the web is machine-readable, it is not machine-understandable.

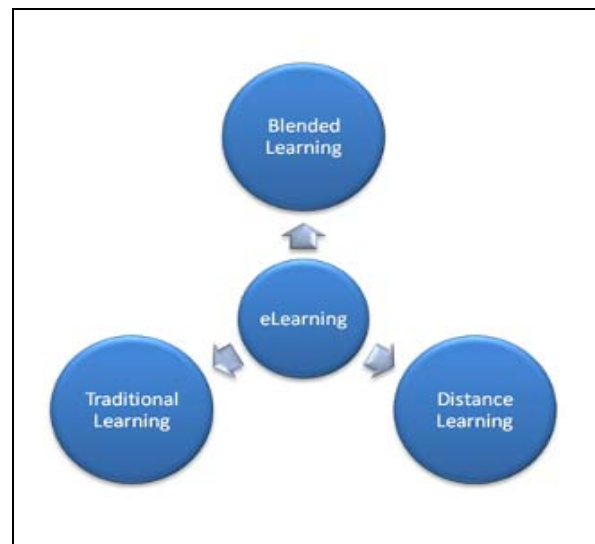


Figure 2. A Typical E-learning Model

D. Connecting for Lifelong Learning

Several studies abound in the field of Web-based technology application in learning [37][36]. Rokou et al. [38] distinguished three basic levels in every web-based application: the Web character of the program, the pedagogical background and the personalized management of the learning material. They defined a web-based program as an information system that contains a Web server, a network, HTTP and a browser in which data supplied by users act on the system's status and cause changes. The pedagogical background means the educational model that is

used in combination with pedagogical goals set by the instructor. The personalized management of the learning materials means the set of rules and mechanisms that are used to select learning materials based on the student's characteristics, the educational objectives, the teaching model and the available media.

Many works have combined and integrated these three factors in e-learning systems, leading to several standardization projects [39][9]. Some projects have focused on determining the standard architecture and format for learning environments, such as IEEE Learning Technology Systems Architecture (LTSC), Instructional Management Systems (IMS) and Sharable Content Object Reference Model (SCORM). IMS and SCORM define and deliver XML-based interoperable specifications for exchanging and sequencing learning contents, i.e., learning objects, among many heterogeneous e-learning systems. They mainly focus on the standardization of learning and teaching methods as well as on the modelling of how the systems manage interoperating educational data relevant to the educational process. IMS and SCORM have announced their content packaging model and sequencing model, respectively. The key technologies behind these models are the content package, activity tree, learning activities, sequencing rules and navigation model.

Their sequencing models define a method for representing the intended behaviour of an authored learning experience and their navigation models describe how the learner and system initiated navigation events can be triggered and processed. Quemanda and Simon [40] have also presented a model for educational activities and educational materials. Their model for educational activities denotes educational events that identify the instructor(s) involved and take place in a virtual meeting according to a specific schedule. Also [38] described the introduction of stereotypes to the pedagogical design of educational systems and appropriate modifications of the existing package diagrams of UML (Unified Modelling Language). The IMS and SCORM models describe well the educational activities and system implementation, but not the educational contents knowledge in educational activities. Most e-learning models add more pedagogical background by emphasizing educational contents and sequences using the taxonomy of learning resources and stereotypes of teaching models. But the educational contents and their sequencing in these models are dependent on the system and lack standardization and reusability. Thus, we believe that if an educational contents frame of learning resources can be introduced into an e-learning system, including ontology-based properties and hierarchical semantic associations, then this e-learning system will have the capabilities of providing adaptable and intelligent learning to learners.

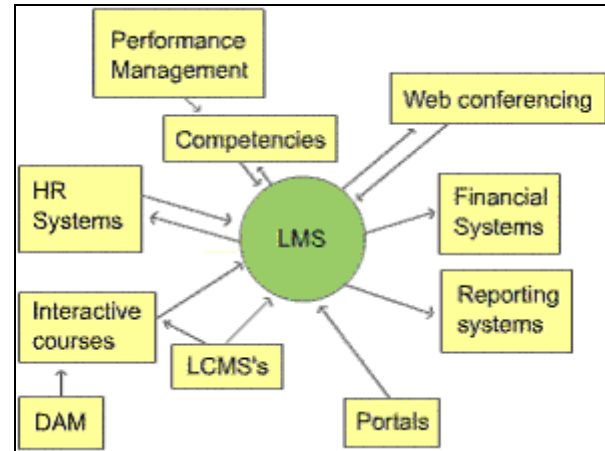


Figure 3. A Typical E-learning System

#### IV. THE IMPACT OF INTERNET AND WEB-BASED TECHNOLOGIES ON LEARNING

With the increasing importance of education for social development and improvement of human competencies, especially in the face of a rapidly changing technological advanced world that affects the living and working environment, the demands posed by e-learning on educational institutions, teachers and students is new and different from the traditional. This calls for new means of knowledge dissemination and skills acquisition, especially for the socially challenged and people with disabilities. The traditional way of learning has come short of meeting the needs of a society as new media and communication services and the ever busy demands placed by working, learning and family life schedules poses new challenges. To properly harness the impact of these Internet and web-based technological tools on distance and collaborative learning, we have decided to look at it from four perspectives:

- Applications of e-learning.
- Implications of e-learning.
- Benefits of e-learning.
- Guidelines for best practices of e-learning.

##### A. Applications

Positive effects have been recorded in all major subject areas, from preschool to higher learning, and for both regular students and those with special needs through the application of e-learning in education. Educational institutions must adopt new ways of disseminating information and acquiring skills and knowledge via e-learning in order to meet these challenges faced by today's advanced and knowledge-based society. Some of the ways in which e-learning is applied to impact on education are mentioned below.

1) *Preschool*: Different types of learning now take place among pupils even before they enroll into formal education. [41] posits that the impact of such e-learning is yet to be ascertained, however, parents are of the opinion exposing children to handheld devices or computers at an early age is a positive experience for the kids as it exposes them to

information that aids them when they enroll into schools. This claim is in agreement with [42][43].

2) *K-12*: Virtual schools, which make use of synchronous or asynchronous learning are e-learning applications adopted by public K-12 school. Classes can be attended either in conventional classrooms or from home or both. Students are provided computers and printers and other technological tools while in the school and reimbursed for home use. These cyber schools enable learners study at their own pace, select their courses, and create their schedules, thereby making learning very flexible and convenient. K-12 schools often make use of with innovative course delivery technology and administrative models [44].

3) *Higher Education*: In most developed and developing country, the application of e-learning in post-secondary education is predominantly on the increase [45]. With an increase in online education, some research universities now offer online doctoral programs [46]. Even though some of the massively-open online courses have limitations, research institutions like MTT, Stanford and Princeton University now offer non-credit courses to a wide range of global audience [46]. University course programs and a wide variety of courses can also be found on YouTube. Other such online higher education courses embarked by Universities include Udacity (which offers free computer classes), Coursera (an online-enrollment platforms that offers education for millions around the world) and several free online course websites in almost every field and discipline.

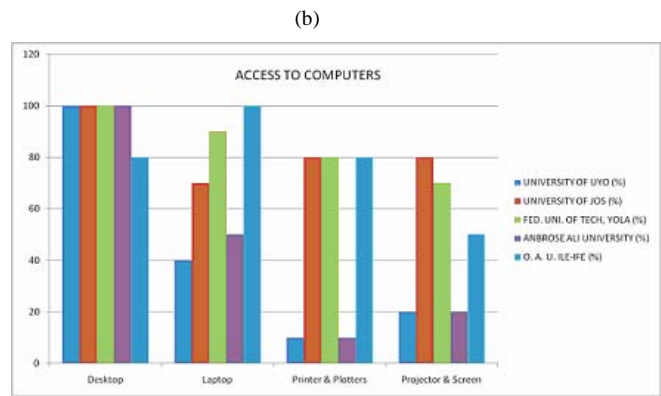
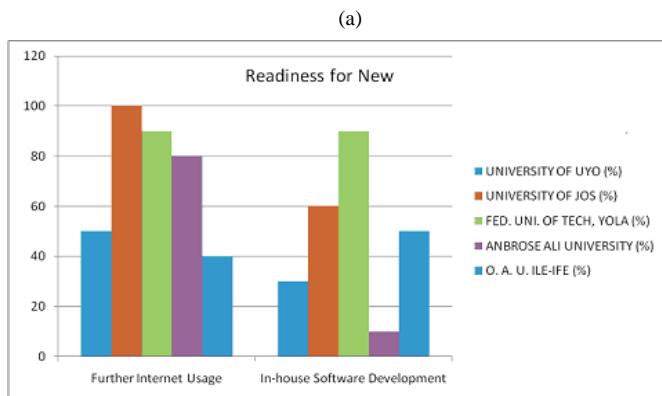
4) *Corporate and Professional*: The shift toward a Knowledge (K-economy) has affected the work setting, and created a need for knowledge workers with high intuition and ability to solve detailed and genuine problems confronted in the work environment. E-learning can adequately meet these requirement because employees can take advantage of online learning and online training, from their homes or offices, and at their pace and convenience. E-

learning has been adopted and used by various corporations and companies to overcome this challenge.

*B. Implications*

The difficulty in understanding the future implication of new technologies in society is seen in the growth of the Internet throughout the world, and in particular, in educational institutions. Despite the achievements recorded by e-learning systems and its considerable impact on education and training, it is still not presently utilised to its full capacity for the benefit of distance and collaborative learning. The high hopes raised by the application of these Internet and web-based technologies in learning are yet to be fulfilled.

1) *Misappropriation of Use*: The existence of any technological artefact is no guarantee that it will be used for its intended purpose, and even if computers are found in classrooms, they may not be used to their full potential [47]. To this effect, a survey of five selected faculties in different Nigerian Universities was conducted to show the readiness for new computerized functions and total integration of ICT in education. The survey reveals that the purpose for which these computers are being used were primarily for word processing, spread sheet, and power point presentations outside the leading role of using computers for e-learning. While all the universities investigated had Internet access, only a few percent of them use the Internet for the primary purpose of e-learning as most use the Internet mostly for emails and which has no direct impact on learning or teaching. Figure 4 below depict the findings of the survey. Such results are not surprising. [48][49] argued that previous classroom technologies such as television have not been widely adopted because teachers need to be convinced that challenges to the rituals of everyday classroom life are in their interests. Educational systems are inherently conservative and resistant to change. Departure from conventional practices and continuity are justified only if the intended innovation is simple, durable and reliable.



(c)

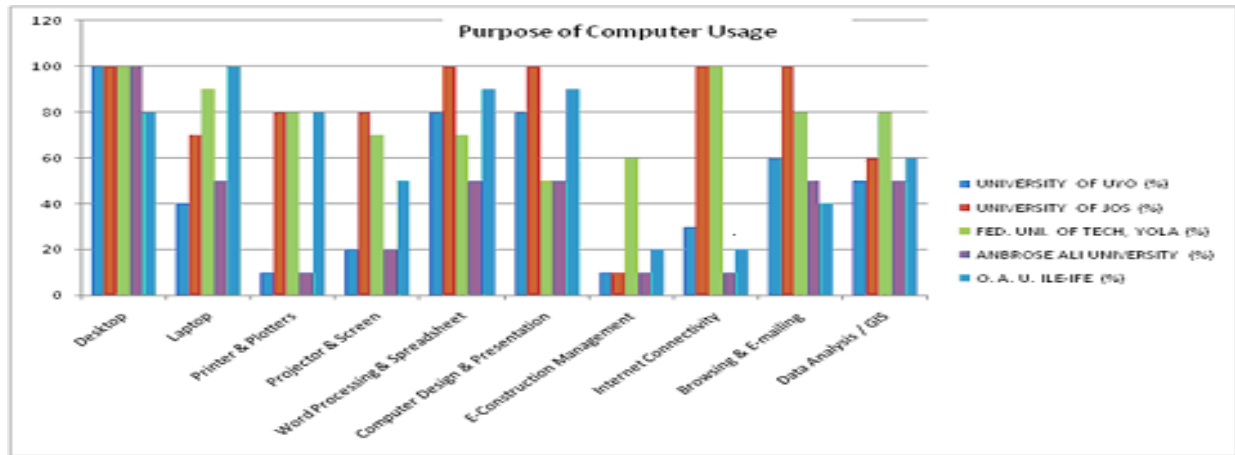


Figure 4. (a) Readiness for New Technology, (b) Access to Computers, and (c) Purpose of Computer Usage in 5 Different Nigerian Universities.

2) *Lack of timely access to user tailored information:* Nowadays, emphasis is not laid on accessibility to knowledge, but on its timeliness, relevance and usefulness to the user. Most e-learning systems tend to overload users with irrelevant information without giving attention to the user's specific needs. The true measure of e-learning is not in training and accessibility, but its ability to use this feature to train the right individual to obtain the required knowledge/skill when needed.

3) *Lack of Standards:* There is a need for users, vendors and developers of e-learning systems to adopt standards in order to facilitate interoperability and increase information sharing between different e-learning platforms. This can be achieved through an international body comprising of major stakeholders in the field of e-learning, by obtaining information on user requirements and drawing specifications from these collected data for standard definition and e-learning content architecture and protocol development. Cooperation among the e-learning community is beginning to be witnessed as user requirements are being validated and the approved specifications converted into standards.

4) *Lack of Interoperability Among E-learning Systems:* Another divergent problem arising from lack of standards is the lack of interoperability among various e-learning systems as noted by [50]. Whole and parts of different e-learning systems must co-operate and interoperate to facilitate full integration and wider accessibility. Institutions of learning should adopt the use of standards that cover every area of learning. Developers of e-learning tools must incorporate standards in their design, and any customised protocol or standards should be resisted in order to forstall the chaos presently witnessed by multimedia technologies.

### C. Benefits of E-learning

The use of Internet and web-based technology tools in learning enables disabled people carry out tasks, which prior to e-learning, was seen as difficult or impossible. These include the use of chat programs for the deaf, text-to-speech software for the blind, and diction software for the armless who cannot write [51]. Online courses are not limited by distance, location, or time as they can be easily accessed by learners from anywhere and at anytime.

Technology allows real-time modifications, accreditation of a continuously updated tool in accordance with the research literature. Foremost, the WWW can be used to dynamically transfer knowledge in real time around the globe. This will lead to higher-education opportunities for foreign students. Countries without "mass" university education can access universities in other countries through the Web. Finally, this technology is able to track use and activity, provide reports, and record information about every learner's performance. This feedback could be included in continuing education courses. Demand for individualized services, tools, interactive experiences, and open access to knowledge is growing. Learning is no longer expected to be paced so much by the teacher as it is by the student's capacity to grasp the material (student-focused learning). The speed at which students can progress through a course of instruction varies by factors of three to seven, even in classes of carefully selected students. In traditional training models, it is impossible to deliver individually customized learning solutions because of cost. The capacity of e-learning for real-time, on-demand adaptation can provide individualized learning at affordable cost. Technologies that allow collaboration, interactivity, simulation, and self-testing can help students acquire the skills being taught effectively and efficiently. It is thus possible to create a learning environment in which students become active participants, fully engaged in the learning process. Additionally, the educational topic selection can cater to a student's particular needs. Any given student may be studying any given topic at

any time, and progressing through that material at a pace appropriate to his or her learning ability.

These benefits mentioned above can be summarized into five key points in agreement with past research findings in this field:

- Wider access to education [52].
- Increased integration for disabled, part-time, and working students, especially in continuing education [52].
- Enhanced student-student and student-teacher interaction and collaboration [53].
- Promotes self-paced learning and independent problem solving by learners [53].
- Promotes the acquisition of ICT knowledge and development of ICT skills through usage of computers and web-based tools [43].

#### D. Guidelines for Best Practices

We have discussed in this paper the various evolution that has taken place in learning, particularly, distant and collaborative learning, in the face of changing technologies. It is clear that we are in a stage of rapid technological development and profound new discoveries of life and learning in connected contexts. The emergence of collective understanding formed by the selective use and analysis of the networks, sets, behaviours and activities within which we engage promises much deeper understanding of our knowledge construction and application.

However, to achieve an educational semantic web, and maximize the potentials of Internet and web-based technologies in distance and collaborative learning, two main issues must be addressed: interoperability among different e-learning systems, and the use of learning objects for content generation. While the earlier is subject to the standardization of these e-learning tools, the later can be achieved by using structured, unified and automated authoring tools to generate content. Thus in realizing the Semantic Web dream, it is necessary to consider the use of common standards in communication syntax, semantic concepts and ontologies, full integration/unification of educational content and authoring tools.

Below is a summarized set of best-practice guideline, which this paper proposes:

- 1) *Identify the current processes involved in designing an e-learning system.*
- 2) *Provide a proper definition of learners' competency.*
- 3) *Integrate the different design components.*
- 4) *Identify the nature of interaction among the various components of the e-learning framework:*
  - a) *the collaboration between student-student and student-teacher,*
  - b) *the physical components of the e-learning system,*
  - c) *the pedagogical framework, and*
  - d) *the educational setting; learning (activity, tasks, outcome, environment, and relationships).*

## V. CONCLUSION

The Information and communication technologies act as a catalyst for innovation in learning, providing access to contextualized high-quality content. With the development of e-learning and its ability to provide rich animated content rapidly to a wide audience, new methods for teaching have evolved. The authors of e-learning material can use multiple media to present ideas and concepts, combining traditional educational content (text, images, graphs, and diagrams) with interactive computer-based resources (sound, video, animation, image series) and over an inter-networked environment made possible by web-based technologies. Among all the "e" movements in computer sciences, e-learning is one of the fastest growing. However, its full impact is yet to be felt. Therefore, this paper has attempted to present a guideline for best practice which it believes will help enhance the efficiency and impact of these Internet and web-based technologies employed in distance and collaborative learning.

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