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E-LEARNING AS A NEW TECHNOLOGY FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Achieving sustainable development is, without a doubt, the single most critical challenge necessary to ensure the well being of our world and its people. Development is a process fueled by resources and it is imperative that much more be done to make certain that these can equitably meet present needs and also remain available for the development needs of generations to come. There are no easy solutions. There is, however, a considerable amount of consensus that the most successful approach will involve two key elements. The first of these is education. More people at all levels must be empowered to develop the values, attitudes and skills necessary to change behavior in regard to natural resource management. The second component is greater collaboration among key entities working to make a difference. Education and working together are the fundamental principles of the Sustainable Development e-Learning Network. This network has, and is developing and delivering quality online courses that address the priority learning needs of a range of development professionals and help to disseminate key information and knowledge of its members. One of the ways that businesses can manage their climate change risk is through the comprehensive implementation of sustainable development strategies. These strategies require a paradigm shift toward more systems, future and critical thinking skills, by everyone in the company. This will require the re-education of the workforce from the current, largely one dimensional focus on economic value; to a multi-dimensional, interdependent, values-based, focus on environmental, social and economic issues. This transformation will be complex and will evolve over the lifetime of a learner. In this paper we will emphasis on how E-learning to achieve sustainable development.

Keywords: E-learning, sustainable development, technology.

INTRODUCTION

One of the most significant changes in the field of education during the information age is the paradigm shift from teacher-centered to learner-centered education. The emergence of electronic learning (e-learning) has further facilitated the wide adoption of learner-centered education and other changes in educational practices. E-learning has drawn significant attention from educational institutions, educational software developers, and business organizations due to the potential educational and cost benefits. Such benefits are reduced education cost, consistency, timely content, flexible accessibility, and convenience (Cantoni et al., 2004; Kelly and Bauer, 2004). Educational values can be also enhanced by customizing content for the learners' needs (Engelbrecht, 2003).

Nowadays companies, schools, universities, and organizations of all sizes are using e-learning as a tool of training, learning and professional development. An increase in interest is seen through the development of large projects being launched all over the world. However, this development faces a number of challenges related, in particular, to: (1) the multiplicity and the heterogeneity of e-learning models and tools; and (2) the variety of teaching domains, requiring different educational approaches. Therefore there are many problems encountered by actors involved in the development and use of Online Learning Systems (OLS) during the different stages of analysis, design, implementation, utilization and maintenance. Consequently, those actors need to share their experience with each other in order to solve their problems. One solution to those issues is to favor collaboration and exchanges between e-learning actors. (Hart, 2009) argues that the future of e-learning is to move to social learning. Therefore, today's learning environments need to be able to support the different learning approaches: formal and informal, personal and social. The 'social' aspect of the learning relies upon human interaction. It is defined as a learning act guided by the regular contact and the associations with the peers. Social learning is the process in which individuals observe the behavior of others and its consequences, and modify their own behavior accordingly (Bandura, 1977). According to (Wenger, 2000), the success of organizations depends on their ability to design themselves as social learning systems. The author identifies three constitutive elements of these systems: Communities of Practice (CoPs), boundary processes among these communities, and identities as shaped by participation in these systems.

Today education is an important mechanism of sustainable development that educational managers focus on it. In this situation, sustainable development and improvement is depending on having an appropriate thinking and to achieve this, we should proceed with suitable equipments and proper thinking. Educational changes and market necessity shows that proper educational environment should be available everywhere to everyone. It's important attending to significance, necessity and revenue of usage e-learning in obviate

public educational systems. E-learning application creates opportunities to learners and provides decision making chance for learners anytime and everywhere (Miladi, 2009).

Definition

E-Learning is the use of telecommunication technology to deliver information for education and training. With the progress of information and communication technology development, e-Learning is emerging as the paradigm of modern education. The great advantages of e-Learning include liberating interactions between learners and instructors, or learners and learners, from limitations of time and space through the asynchronous and synchronous learning network model (Katz, 2000; Katz, 2002; Trentin, 1997). E-learning's characteristics fulfill the requirements for learning in a modern society and have created great demand for e-Learning from businesses and institutes of higher education (Wu et al., 2006).

E-Learning refers to ''the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services as well as remote exchanges and collaboration'' (Holmes and Gardner, 2006). E-Learning can take place totally online in virtual environments or in a mix of virtual and face-to-face environments; a mode entitled 'blended learning'. E-Learning has the potential to impact positively on education. It provides great opportunities for both educators and learners to enrich their educational experiences (Holmes and Gardner, 2006). Individuals who were disadvantaged for geographic, physical or social circumstances have increasingly better educational chances via e-learning. Furthermore, e-learning supports synchronous and asynchronous communications in various formats ranging from text, voice and audio. In addition, supported by the openness and flexibility of the Internet, e-learning provides the teaching and learning transactions with unfathomable amounts of information independent of the pressure of time and the constraints of distance (Holmes and Gardner, 2006).

E-learning course

An e-learning course is usually composed of:

- A multimedia document, with animations, links, sounds, interactive progression, and so on, that the students have to follow by themselves, in self study.
- Tutoring or follow-up of the students by a team of teachers, to help them in their progression of the course or with some particular points. Tutoring may be carried out via a forum (which may be synchronous-all the students and the teacher have to connect at the same moment-or not), the use of emails, or classical meetings.

E-Learning process

Bahtijarevi-c-Siber (1999) presents a model of an educational process, starting from determining educational needs, which is the basis for performing the other steps.

Those include: selecting those who should attend the education (learners); determining goals of the educational program; selecting criteria and designing assessment techniques; selecting the content and educational programs; conducting a program; selecting teaching methods; program monitoring; and evaluation of learning effects. However, learning excellence can be achieved only by defining competencies, i.e., learning objectives expressing what learners should learn and criteria for their evaluation, which set performance standards for learners and educators (Angelo, 1996).

E-learning system

E-Learning system is an internet based service like the application system or the internet based virtual course study service. This system is able to be interpreted in various ways such as ''computer based, education delivery system which is provided through the Internet'', or ''an educational method that is able to provide opportunities for the needed people, at the right place, with the right contents, and the right time'' (Song, 2000).

The e-Learning system is one of many methods of the education (the teaching and learning procedure) that allows flexible learner-centered education. It is an information system based on the World Wide Web. E-Learning provides an inter-disciplinary approach to information technology and educational engineering, and an assessment of e-Learning effectiveness could also be achieved. As of IT, the end user assessment, the quality of the information system, and the system's user satisfaction could be measured.

As of educational engineering, however, the learner's academic achievement or the degrees of self-study ability could be measured (Lee and Lee, 2008).

Technologies for e-learning

There are numerous technologies that teachers can use as a tool for e-learning or in combination with e-learning: Internet, Intranets, Extranets, satellite broadcast, audio/video tape, interactive TV, and CD-ROM and many others and learning management systems (also called course management systems or courseware). Such systems are widely used in higher education (Jackson, 2007) and as an example, 95 % of all higher education institutions in the United Kingdom were using such systems in 2005 (Browne et al., 2006).

Important points

Meeting the needs of today's learners requires instructors and administrators to rethink delivery strategies and instructional methods. Many organizations are turning to distance education, because of its effectiveness, to help learners develop and improve their knowledge, skills, and abilities. E-learning and E-teaching continue to grow at the tremendous rate. E-learning companies are springing up everywhere. The field is growing at an amazing rate and its standards have yet to be developed or even agreed upon. As it is clear by its name, e-learning can be understood as any type of learning delivered

electronically. Defined broadly, this can encompass learning products delivered by computer, intranet, internet, satellite, or other remote technologies. Brandon Hall, a noted e-learning researcher, defines e-learning as "instruction delivered electronically wholly by a web browser, through the Internet or an intranet, or through CD-ROM or DVD multimedia platforms." Increasingly, the common understanding of e-learning relates exclusively to web-based training or learning products delivered via a web browser over a network. Morgan Keegan's investment analysis team deems e-learning as a technology that fully leverages the distributive power of the Internet and encourages investors to consider the "e" in e-learning to represent "effective" (Williams, 2003).

E-learning is sometimes classified as synchronous or asynchronous. Both terms refer to "the extent to which a course is bound by place and/or time. Synchronous simply means that two or more events occur at the same time, while Asynchronous means that two or more events occur "not at the same time."For example, when you attend live training -like a class or workshop- then the event is synchronous, because the event and the learning occur simultaneously, or at the same time. Asynchronous learning occurs when you take an online course in which you complete events at different times, and when communication occurs via time-delayed email or in discussion list postings. Both kind of this classification, have special kinds of difficulties and barriers which should be determined before implementation a course of study (Egan and Akdere, 2004).

Designing and developing E-learning

The process of designing and developing e-learning products, which can include courses, Seminars, workshops, Online learning portals, Chat sessions/Discussion groups, and more, involves a careful mixture of personnel resources, hardware and software specifications and applications, standards for interactivity and media, and design parameters based on user capabilities. Developers that produce e-learning products usually have well-defined resources dedicated to design and production, along with standard production schedules and timelines. Organizations considering building their own products should consider these resources as essential to the production and deployment of e-learning as well. Developer should be aware of process of curriculum development, technical pedagogical knowledge, (TPCK), content knowledge, the place for designing and delivering the course, the learners. They should know the characteristics of their learners, their developmental tasks and age. Learner is one of the most important factors in education that should be known clearly and totally (Allen and Seaman, 2004).

Access to computing facilities at home

Before starting the course we have to check the learner's facilities at their home. It is one of the most important factors for learners to help them in their communication. In a research on adult learners in Iran the findings showed that, over eight in ten learners (83 %) had access to a computer at home and they had used it for their college course. This was particularly high amongst those aged fewer than 24 and those with no disability or learning difficulties. The vast majority of learners with a computer at home said that they had access to the internet (84 %) and broadband was the most widespread mode of accessing the internet. Particularly, learners with a computer at home were much more computer confident and likely to be using ICT more extensively at college as well as at home. Those who did not have a computer at home were not necessarily using college computers to compensate for a lack of computer at home; as a third of these learners (36 %) said they never made use of computers at college. [3] So one of the other important factors for learning is access to internet and computer which should be checked before starting the course (Assareh and Hosseini Bidokht, 2010).

Curriculum

The Curriculum of E-Learning Branch should be developed collaboratively and appropriate with technical pedagogical content knowledge (PCK) and pedagogical content knowledge (PCK) and to provide supports to the Learning Sector by:

- Refining and implementing a provincial vision for strengthening the learning program and the use of technology in education;
- Providing a range of consultative and advisory supports;
- Co-ordination systems of people, processes, and infrastructure to provide access, deliver programs, manage projects, and ensure accountability;
- Developing and implementing policy, effective practices, and supports for the Learning Sector;
- Managing provincial networks on behalf of the Learning Sector;
- Promoting an innovative learning environment in the province through strategic professional development using a variety of methods and technologies;
- Developing and implementing exemplary curricula/courses for the guidance of teachers and learners; and,
- Identifying, evaluating, developing, recommending, and distributing resources to support teaching and the achievement of learning outcomes.

Curriculum development for classroom based learning primarily involves the content expert/teacher in tasks that require them to act variously as instructor, author, project manager, designer, desktop publisher, editor and instructional designer. The process is often heavily depend upon the past experience of the participants and is iterated over a number of delivery cycles to an optimum process. The significantly higher resource commitment required by e-Learning demands an expanded and in depth curriculum development phase, which is much more a team effort. Needs analysis must

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take into account the requirements and aspirations of a more diverse learner group and their employers/parents. The curriculum must be planned and documented in sufficient detail for the content to be developed out of sequence and by different members of the team applying their own specialist skills. The project management task is more critical and complex. A typical team will consist of a project manager, the curriculum expert who preferably should have IT skills, web designer with complementary educational skills, IT services representative, administrative support and access to an outside reviewer (Dooley and Lindner, 2003).

School or place of delivering E-course

Designing, developing, and delivering e-learning products requires a mixture of hardware. Components and software applications, along with an strong infrastructure capable of sustaining multiple users and networked applications. For users, though, the required resources are much more minimal. We have to exact what is typically required to create e-learning. The personnel listed above must have hardware resources and software applications to utilize in the design and development effort. These needs typically include development workstations along with a networked server to support collaborative development. Additionally, if hosting services are offered, then a hosting infrastructure must exist, containing primary and backup servers and the requisite connections to host both online courses and the management applications used to manage and track usage. Software resources include authoring applications; web editing tools, graphic production tools, and multiple browsers, scripting applications, and learning management systems (Levine, 2009).

E-learning is differing from traditional classroom

E-learning differs from traditional classroom learning in the process of learning and teaching. For instance, cooperative learning is a pedagogical technique that has students work together in small, fixed groups on a structured learning task with the aim of maximizing their own and each other's learning (Johnson, Johnson, and Holubec, 1998; Johnson and Johnson, 1986). The theoretical advantages of cooperative instruction have long been acknowledged and have been extensively practiced in the classroom. While cooperative learning promises many benefits for students in academic achievement, self-esteem, active learning, social skill development, and equity achievement (Cohen, 1994; Johnson and Johnson, 1989; Kagan, 1992; Slavin, 1995) in traditional classroom learning, executing cooperative learning is limited in time and place. However, the collaborative learning activities, such as knowledge articulation, explanations, argumentation and other demanding epistemic activities can be supported in different ways using communication tools and shared workspaces in E-learning environments (e.g., Hakkinen, Arvaja, and Makitalo, 2004; Strijbos, Kirschner, and Martens, 2004).

Impact on E-learning stakeholders

E-learning is a radical innovation for E-learners and E-instructors because the traditional learning core components (e.g., technological infrastructures, contents) and learning models are overturned. They need to learn about Internet technology, E-learning platforms, the integrated devices, and the mechanisms embedded. They need to be aware of diverse content types and learn how to create, package and distribute course material in the E-learning environment. They also need to use different strategy, method or model to achieve the effectiveness of E-learning (Collison, Elbaum, Haavind, and Tinker, 2000; Palloff and Pratt, 1999). Therefore, E-learners need to understand and/or install the new technology, learn the mechanisms embedded and perform the learning activity in the E-learning environment.

With respect to educational institutions, the E-learning environment has a fundamental core component change, while the learning model they support is reinforced. The influences on the educational institution may include institution's vision, the core concepts of school operation and management, and technological infrastructure, the interaction and support between instructors, and learners and administrative units. An incumbent educational institution would need to learn the characteristics of the new ICTs, the potential economic opportunity it may provide, and the needed organization innovation adopting the technological component, and the potential value-added to its E-learners and E-instructors (Jen-Her WU *et al.*, 2008).

Education for sustainable development (ESD)

Education is held to be central to sustainability (McKeowyn 2002). Indeed, education and sustainability are inextricably linked, but it has to be noted that education for sustainability is a specific concept which differs from education as we know it. ESD carries with it the inherent idea of implementing programs that are locally relevant and culturally appropriate. All sustainable development programs including ESD must take into consideration the local environmental, economic, and societal conditions. As a result, ESD will take specific forms depending on the local, regional or national implementation concept (United Nations Department of Public Information, 1997).

Sustainability defined

Sustainability, a term often used interchangeably with the term sustainable development, has been commonly defined as "…development that meets the needs of the present without compromising the ability of future generations to meet their own needs." (WCED, 1987). The Brundtland Report (WCED, 1987) identified two key concepts within this term: 1) the concept of 'needs', in particular the essential needs of the world's poor, to which overriding priority should be given; and 2) the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs (WCED, 1987). Although

the concept of sustainable development has been around since 1970, the Brundtland report legitimized it as a template for global decision-making. The idea that there should be a balance between economic, social and environmental priorities in the decision making process was born.

Since the notion of sustainable development is centered in the use of new "thinking processes" to realize new values and attitudes; learning and reinforcement of learning must occur continuously and should be part of a lifelong learning process (Ehlers, 2007).

Education and sustainable development

Numerous researchers have identified that education for sustainable development requires the building of skills in systems thinking, critical thinking, futures thinking, visioning, problem solving and participatory decision-making (Springett and Kearins, 2005; Springett, 2005; Carew and Mitchell, 2008; Wheeler, Zohar and Hart, 2005; Vann, Pacheco and Motloch, 2006; Galea, 2004 as cited in Tillbury, 2002). In addition, researchers have identified that specific professional groups such as professional managers, engineers and accountants require reorientation to incorporate sustainability into their professional standard bodies of knowledge (Bebbington, 1997; Carew and Mitchell, 2006; Baas *et al*., 2000).

Pedagogical approaches for sustainability must be experiential, inter-disciplinary, based on action-learning and provide "just in time", real world learning and application opportunities (Wheeler, Zohar, and Hart, 2005; Siebenhuner and Arnold, 2007; Dieleman and Huisingh, 2005; Bebbington, 1997; Springett, 2005). Instructional techniques such as the inquiry method lend themselves to the reflective nature of sustainability concepts, where learners "increase their competency as learners" and focus on the learning process rather than a final predetermined answer.

E-learning and blended learning can be designed to meet many of these requirements. For instance, games and simulations have been used as experiential learning tools for sustainability (Dieleman and Huisingh, 2006). Given the wide variety of learners in business (front line employees to professionals), it is necessary to use a number of educational techniques to establish and provide long term reinforcement of sustainability attitudes, knowledge and skills. E-learning or computer based training can play a role in this evolving activity.

Sustainable development and e-learning

Achieving sustainable development is, without a doubt, the single most critical challenge necessary to ensure the well being of our world and its people. Development is a process fueled by resources and it is imperative that much more be done to make certain that these can equitably meet present needs and also remain available for the development needs of generations to come.

There are no easy solutions. There is, however, a considerable amount of consensus that the most successful approach will involve two key elements. The first of these is education. More people at all levels must be empowered to develop the values, attitudes and skills necessary to change behavior in regard to natural resource management. The second component is greater collaboration among key entities working to make a difference. Change cannot be brought about by any single organization - no matter how large or well resourced.

Education and working together are the fundamental principles of the nonprofit Sustainable Development e-Learning Network. This network has, and is developing and delivering quality online courses that address the priority learning needs of a range of development professionals and help to disseminate key information and knowledge of its members (Kofi Annan, 2001).

CONCLUSIONS

The first steps of e-learning in agriculture are being taken in just about every country. The United States, Europe, and Australia are leading the adoption of e-learning in agriculture, and they are also greatly assisting developing countries to do the same. While much of the available funding and interest has been geared toward specialized programs in agribusiness, and agricultural management, a large number of organizations have been producing agricultural e-learning training of varying quality. The challenge is to fully exploit electronic media, maximizing its usefulness and the realm of possible resources; E-learning must not be Power Point presentations modified into online modules, but rather well designed training that draws on the best electronic resources available. The recent online programs developed and made available by the FAO and a few other organizations are instilling smaller organizations, which could otherwise not afford the time or money to develop them, with high quality e-learning training resources. An effect similar to the cell phone epidemic that swept across most of the developing world is helping to promote e-learning. Many communities are skipping traditional training delivery methods and are going straight to using e-learning. Extension agents will continue to play a critical role in agricultural extension, bridging the gap between e-learning methods and implementation in the field.

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