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# Technological Considerations for Content Management in E-Education/ Online Education

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## Abstract

*This article deals with the definitions and types of e-Learning, e-education with the need for it. The functions and the main issues of e-Learning are discussed with the changing scenario at present. The delivery methods with the design aspects and parameters are explained in detail. The four modules of e-Learning / online learning in a University environment has been explained with the key players for e-education viz. students, faculty, facilitators, support staff and administrators. The two modes of e-Learning have been discussed with the benefits. Some of the software's used for e-education with few examples of the institutions / organizations using e-education for better prospects. The advantages and disadvantages of e-Learning with the requirements of standards have been explained with the efforts made by few organizations are given. It is envisaged that the future will be better for e-education.*

**Keywords :** Content Management, E-Education, Online Education, E-Learning

## 0. Introduction

The most enduring and flexible learning institution is the library, and therefore libraries and librarians should be proactive participants in the evolution of the 21st century educational paradigm. There are many problems associated with traditional education, including students' tardiness, schedule conflicts, unavailable courses, geographical isolation, changes in demographic and economic issues, and other obstructions that preclude students from attending traditional classes. This article stresses towards a need for an alternative education method to complement the traditional system.

Technological advances have changed the way librarians; students and educators can learn and teach in this new environment. Distance learning today can be complete online degree programs or it can be a continuing education class. It can include face-to-face interaction or be done entirely at a distance. e-Learning is an effective way to acquire knowledge quickly to compete in the knowledge-based economy. This article explains the definitions and types of e-learning that are available online. Also provides models of e-learning programs that are currently active at various universities and other organizations, including libraries. Lots of "e-learning" would more appropriately be called "e-copying/Photostatting", "book ware", e-distribution, e-searching, and perhaps e-publishing. e-Learning offers great potential for delivering efficient and effective training that gives learners what they need, when and where they need it with reduced financial and human resource requirements.

## 1. Definitions

e-Education is generally used to describe the delivery of knowledge via an electronic means over the internet, either to replace or augment face-to-face teaching with a computer based virtual learning environment. Other terms commonly used are: e-learning; online-learning and webucation. The distance learning is a planned environment involving the use of technology and its design providing the learners with interaction.

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e-Learning is fundamentally faster; better way to learn the career skills, people need to succeed. It is faster because its modular learning architecture is personalized and is as current and available as the Internet. It is better because it integrates multimedia, instructor-led, and real-time learning techniques into a facilitated, collaborative learning environment.

E-learning is learning that takes place in the context of using the Internet and associated web-based applications as the delivery medium for the learning experience.

“Wide range of electronic learning applications and processes including Web-based learning, computer-based learning, virtual classrooms and digital collaboration. Commonly held to include delivery of content via Internet, intranet/extranet (LAN/WAN), audio/video tape, satellite broadcast, interactive TV, and CD-ROM.” - from the glossary at <http://www.e-learningzone.co.uk/atoz.html>.

## **2. Why E-Education ?**

The traditional community of the university is structured around notions of lectures, tutorials, and labs controlled by teachers who select groupings, the types of interactions that will occur, who interacts, and with whom. e-Education can introduce new teaching paradigms that both enrich and improve the accessibility of education. Many institutions from schools to corporations are increasingly using computers to assist teaching in a wide range of subjects. Although just as with paper, video or any appropriate design for the target audience and subject conveyed, simply being electronic will not make the teaching effective or optimal. New learning technologies suggest new groupings, new communication patterns, new interactions and newer structures. The rise of the “virtual university” will result in greater mobility in the delivery and sourcing of coursework. On the content side, higher education providers with considerable international brand equity, for example, Stanford and Harvard may exploit on-line distribution channels to penetrate overseas markets.

E-Education promises open education for everyone irrespective of geographical location or commitment, otherwise excluded from the more traditional methods of learning. The changing demographics of learners who no longer expect education to be restricted to the beginning of their careers, but wish to integrate it into all stages of lifelong development.

## **3. Why E-Learning ?**

- Learning is self-paced and gives students a chance to speed up or slow down as necessary
- Learning is self-directed, allowing students to choose content and tools appropriate to their differing interests, needs, and skill levels
- Accommodates multiple learning styles using a variety of delivery methods geared to different learners; more effective for certain learners
- Designed around the learner
- Geographical barriers are eliminated, opening up broader education options
- 24/7 accessibility makes scheduling easy and allows a greater number of people to attend classes
- On-demand access means learning can happen precisely when needed
- Travel time is reduced or eliminated

- Overall student costs are frequently less (tuition, residence, food)
- Potentially lower costs for companies needing training and for the providers
- Fosters greater student interaction and collaboration
- Fosters greater student/instructor contact
- Enhances computer and Internet skills
- Draws upon hundreds of years of established pedagogical principles
- Has the attention of every major university in the world, most with their own online degrees, certificates, and individual courses

#### 4. Major Issues

The main issues today in e-Learning are:

- How the learning could encompass large numbers (scalability)?
- How the learner can gain more insight into the Knowledgebase interactively?
- How easily one can offer the same course on different platforms (Inter-operability)?
- What security mechanisms are built-in? What level of ease that exists while moving from one tool to another (interchangeability)?

Though it is universally accepted that e-Learning is the best vehicle for supplementing the knowledge beyond the classroom, still whether it is more of a *supplementary, complementary or comprehensive* learning mechanism is a question.

The Internet not only provides e-learning where questions are answered by the most proficient people of the field, it also gives an enormous scope for discussions, exchange of views, resulting into multi-dimensional research on the subject. If on the one hand teachers and students can come together, study and collaborate with the rest of the world, it also gives teaching community the opportunity to share learning technologies and strategies that can be integrated across curricula. Internet-based pedagogy is different from the traditional classroom variety. The combination of text, sound, and images produces much better result than the education through mono logic communication technologies. It has resulted in the emergence of new breed of educators who call themselves "Instructional Technologist". This community is focusing a great deal on how to deliver education through web education.

#### 5. Technology Consideration

While streaming audio, video and animations can add interest to an online course, there are technological barriers to accessing them. Russ Williams (1998) addresses three technological challenges that must be considered when designing training programs for delivery over the Web:

1. Connectivity speeds : He reports that 60% or more of Internet users connect at slower modem speeds (less than 33.6 kbps), which brings into question the use of video files and Java applications.
2. Web page response times : The literature reveals important limits in computer response times. 1.0 second is about the limit for the user's flow of thought to stay uninterrupted, and 10 seconds is about the limit for keeping the user's attention focused on the dialogue. Unless instruction is being designed for a specific audience with high bandwidth, response times may negatively impact a training program.

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In order to design instruction for slower user connection speeds, instructional designers should avoid using video files and graphics should be small and kept to a minimum.

3. Re-purposed training materials. Content developed in one medium, for example computer based training (CBT) programs, may be reformatted to be delivered over the Web. The materials are usually less effective delivered over the Web because they are optimized for another medium and can't take advantage of online communication tools and interactive features.

### 5.1 Use of Effective Teaching Skills

One has to pay special attention to the following:

- Realistically assess the amount of content that can be effectively delivered in the course. Because of the logistics involved, presenting content at a distance is usually more time consuming than presenting the same content in a traditional classroom.
- Be aware that student participants will have different learning styles. Some will learn easily in group settings, while others will excel when working independently.
- Diversify and pace course activities and avoid long lectures. Intersperse content presentations with discussions and student-centered exercises.
- Humanize the course by focusing on the students, not the delivery system.
- Consider using a print component to supplement non-print material.
- Use locally relevant case studies and examples.
- Be concise. Use short, cohesive statements and ask direct questions, realizing that technical linkages might increase the time it takes for students to respond.
- Develop strategies for student reinforcement, review, repetition, and remediation. Towards this end, one-on-one phone discussions and e-mail communication can be especially effective.

To improve interaction and feedback, consider the following:

- Use pre-class study questions and advance organizers to encourage critical thinking and informed participation on the part of all learners.
- Early in the course, require students to contact and interact among themselves via electronic mail, so they become comfortable with the process. Maintaining and sharing electronic journal entries can be very effective toward this end.
- Arrange telephone office hours using a toll-free number.
- Integrate a variety of delivery systems for interaction and feedback, including one-on-one and conference calls, fax, E-mail, video, and computer conferencing.
- Take note of students who don't participate during the first session, and contact them individually after class.
- Use an on-site facilitator to stimulate interaction when distant students are hesitant to ask questions or participate.
- Make detailed comments on written assignments, referring to additional sources for supplementary information. Return assignments without delay, using fax or electronic mail, if practical.

## 6. Changing Scenario

The aim of learning is to explore and to accumulate useful knowledge – over and above faster copying, searching and distribution. This might be called e-linking, e-relationships and networks and e-enhanced strategy. The trend in the market would show that the on-line education is fast catching up. As per a report by UNESCO, there are approximately 80 million students enrolled in higher education programmes world-wide in 1999, of which 6,150,000 are on-line. Australia alone enrolled 690,000 students in higher education courses. In the US, which is coming up as a big base for on-line education, 710,000 students were enrolled during 2001 and estimated to touch 2.2 million for 2002. According to IDC, a whopping 90 percent of the on-line learning market is still untapped.

### 6.1 e-Learning requires a shift in

- methodology from teacher centered to student centered
- resource based teaching to resource based learning
- assessment from solely product, to include process

### 6.2 The characteristics of a modern university

In addition to the disaggregating of teaching, universities in the years ahead will do the following:

- they will be challenged to remain intellectually free places seeking truth, defending those who tell it, and promoting the free flow of information and ideas
- a continuing distinction between them and competency-based vocational education institutions
- they will be institutions of both research and teaching
- they will be accessible 24x7x365
- greater diversity of student background, staff/student ratios in some disciplines
- relatively less government funding
- more internationalization, more entry pathways, more credit transfer
- more flexibility of enrolment, delivery and academic progress
- more technological opportunities to disaggregate teaching and learning
- continuing shifts in notions of curriculum ownership
- more local, national and global partnerships

### 6.3 How is e-Education Delivered ?

A wide range of technological options are available to the distance educator. They fall into four major categories:

- Voice - Instructional audio tools include the interactive technologies of telephone, audio conferencing, and short-wave radio. Passive (i.e., one-way) audio tools include tapes and radio.
- Video - Instructional video tools include still images such as slides, pre-produced moving images (e.g., film, videotape), and real-time moving images combined with audio conferencing (one-way or two-way video with two-way audio).

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- Data - Computers send and receive information electronically. For this reason, the term “data” is used to describe this broad category of instructional tools. Computer applications for distance education are varied and include:
  - Computer-assisted instruction (CAI) - uses the computer as a self-contained teaching machine to present individual lessons.
  - Computer-managed instruction (CMI) - uses the computer to organize instruction and track student records and progress. The instruction itself need not be delivered via a computer, although CAI is often combined with CMI.
  - Computer-mediated education (CME) - describes computer applications that facilitate the delivery of instruction. Examples include e-mail, fax, real-time computer conferencing, and World-Wide Web applications.
  - Print - is a foundational element of distance education programs and the basis from which all other delivery systems have evolved. Various print formats are available including: textbooks, study guides, workbooks, course syllabi, and case studies.

## 7. Designing Aspects of E-Learning

The basic design parameters are:

Linking, analysing and synthesising at a conceptual level helps to facilitate learning, and to capture and manage the knowledge that results from learning. Relationships require interaction, including both intellectual and personal relationships. And strategy requires a synthesis of information about procedures and context, and the experience and knowledge against which to measure and evaluate them. Knowledge includes content, context, and relationships; that learning requires exploration, and links at the conceptual level, as well as personal and intellectual interaction, and the ability to manage information about procedures and contexts against the template of experience.

Exploring includes finding out what is out there just as much as putting out your “feelers” – physically and intellectually, to see what happens. So in a digitised world of distributed learning, the use of all the digital and analogue media, particularly as they become cheaper and more user friendly – email, websites, web logs, digital video and web cams, digital photography, and so on. Links at the conceptual level need to be more than just linear-embedded “threads”, elegantly “woven” by e-moderators. However interactive these are, and they do enable valuable virtual communities or virtual “classes” to flourish, they are no more than *stacked lists*.

There is a need for a two-dimensional plane on which learners and teachers can explore, elaborate, rearrange and restructure, link and question, the relations between concepts and contexts, with dynamic granularity and navigation [which just means that you need to be able to navigate “free-hand” and zoom in on any point of the plane just as you would when using a digital photography cropping facility]. A facility to establish icons alongside and/or related to objects on this plane is also needed. Behind this (in XML format) there needs to be a data base, linked to the metadata on this plane. And this needs to be available in a collaborative workspace format.

This could be developed further, based on some of the available software. It would start to deliver some of the dynamic metadata links that are the basis for any non-digital, non-technical learning and knowledge, in those rather sophisticated “neural network processors” called humans

University requires an e-learning environment that integrates four elements of on-line learning:

1. Creation of course modules : The quality of the e-learning experience follows from the quality of the course modules and of the interactions among students and instructors that make up on-line courses. The faculty members, students, and instructional staff who design and produce on-line course modules need access to powerful, easy-to-use authoring tools and reliable pedagogical strategies. Responsibility for this element is distributed among all levels of the University, from individual employees and students to departments, colleges, and central university support facilities.
2. Management of course modules: Innovative database management practices are required to facilitate efficient revision and re-purposing of course modules and to foster sharing of modules among course authors and programs. Responsibility for this element is shared among departments, colleges, and central university support facilities.
3. Delivery of courses: At the core of the common e-learning environment is a delivery system that makes course modules available on-line, mediates interactions between instructors and students, and helps the university to efficiently manage student records. Primary responsibility for this element resides with central university support facilities.
4. Delivery of support services: All Penn State students - on campus or off -deserve access to technical support, library resources, advising services, and other key aspects of the university experience. A common e-learning environment will help facilitate this access. Primary responsibility for this element resides with central university support facilities.

### 7.1 Key Players in Distance Education

The roles of key players in the distance education enterprise and the challenges they face are as follows:

- Students : The primary role of the student is to learn. They require motivation, planning, and an ability to analyze and apply the instructional content being taught.
- Faculty : The success rests squarely on the shoulders of the faculty. Special challenges confront those teaching at a distance. The faculty must:
  - Develop an understanding of the characteristics and needs of distant students.
  - Adapt teaching styles taking into consideration the needs and expectations of multiple, often diverse, audiences.
  - Develop a working understanding of delivery technology, while remaining focused on their teaching role.
  - Function effectively as a skilled facilitator as well as content provider.
- Facilitators : Act as a bridge between the students and the instructor. To be effective, he must understand the students being served and the instructor's expectations. He must be willing to follow the directive established by the teacher.
- Support Staff : The silent heroes who supports service functions to include student registration, materials duplication and distribution, textbook ordering, securing of copyright clearances, facilities scheduling, processing grade reports, managing technical resources, etc.
- Administrators : Influential in planning an institution's distance education program. They are consensus builders, decision makers, and referees. They work closely with technical and support service personnel and maintain the academic focus.

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## 8. Different Modes of E-Learning

At present the online courses can be offered in following modes:

- Online Mode
- e-Correspondence Mode

Under Online Mode, the learners are entitled to the following benefits:

- Access to Virtual classroom in the website for collaborative learning experience via a host of interactive tools including Chat, Discussion Forum, Electronic White Board and e-mail.
- Semester wise Interactive courseware CD.
- Optional short duration contact program in each semester.
- Facility to order the courseware books (optional).
- Access to their Account section to obtain the latest information about the Admission Status, Courseware, Payment Details, Examination & Certification Details and any other Correspondence with concerned University.
- Access to Online Library providing links to Digital Libraries of Colleges and Universities across the world.
- Access to Infotainment section providing links to latest News Channels, Book Publishers providing facility to order Books Online, Online Games, Greetings, Music, Software Downloads and Certification.
- Facility to create a personal web page.

Under e-Correspondence Mode, the learners are entitled to the following benefits:

- Semester wise Interactive courseware CD
- Courseware Books
- Email facility for interacting with the faculty members
- Optional short duration Contact program.

There are a number of e-learning opportunities that need to be explored within the context of an overall national strategy.

## 9. Some of the Software's/Company Involved for E-Education

Many large companies are now using on-line technology to support development of employees. The market for corporate web-based training is exploding, with International Data Corporation (IDC) projecting this to grow at a 111% cumulative annual growth rate to US\$11.5 billion by 2003. Gates commented on the popularity of on-line training at Microsoft. "In 1998 online participation increased five times faster than classroom participation and total on-line participation was more than double our physical class attendance. This increase indicates to us that people want to improve their knowledge and job skills but simply haven't had time-efficient ways to get training before".

WBT Systems, <http://www.wbtsystems.com/>, offers TopClass Server, a high-end software package used by both major corporations (e.g., Dow Chemical) and universities (e.g., State University of New York) to deliver Web-based training. TopClass Server delivers courses and tests to any user connected through Intranets or the Internet. The Server also supports the entire range of collaboration methods, and integrates



a complete discussion group facility. The pricing structure is based on either the number of concurrent users or the number of registered users for the institution.

Another software package used by colleges and universities is WebCT, <http://www.webct.com>, built by educators at the University of British Columbia as a tool to allow other educators without a lot of time, resources or technical expertise to build sophisticated web-based learning environments. WebCT is free to download, install and create courses on. License fees only apply when the courses are made available to students. License fees are based on number of accounts on the server and vary.

JonesKnowledge.com, <http://www.jonesknowledge.com/>, offers e-education software, an affordable option for the creation, delivery and management of online courses. It can be used as stand-alone software or run on the Jones server, with full support services for students and instructors. Costs are reasonable.

Macromedia's Dream weaver and Fireworks have been in the e-learning market for more than 10 years with its Authorware product, a desktop application that creates rich media e-learning content for distribution on the web, intranets or CDs.

At Cisco the on-line learning model distinguishes between "structured learning" and "emergency learning". There are no required classes or minimum training hours. Employees take assessments that determine their competency and how much training they may need. They can chart a long-term, structured learning plan, get all relevant short-term updates, and automatically receive necessary time-critical information for emergency learning situations.

Distance learning at Fort Yukon supplements face-to-face teaching activities. The mix of technology-enabled approaches range from audio conferencing to web based instruction. But in this remote area, nothing can be taken for granted. Satellite transmissions are prone to delays as signals link up and down several times to reach the Internet point of presence.

OmniUpdate e-Education Solutions for web content management help educational institutions maintain better web sites and give educators and students the tools they need to teach and learn.

Jones Knowledge, Inc., a pioneer in Web-based learning solutions, today announced that its e-education software is now available to the corporate market. e-education empowers corporations to deliver training and continuing education online, with a comprehensive, end-to-end online learning solution that is simple to implement and backed by proven academic experience. To date, the Jones companies have served over 120 schools and universities, and more than 30,000 students around the world.

## **10. Indian Scenario**

E-education is taking roots for Indian students as well. e-education is education and training delivered and accessed via the Internet.

### **10.1 Kerala Plans Major Forays on e-Education Front**

Keeping its tradition up to spread education for its citizens the Kerala government has decided to use IT for the purpose. The government has launched project Akshaya, an e-literacy venture that aims to make Kerala the first e-literate state in the country by the year 2005. The Akshaya project promises to educate one person from each family to use computers for routine communication and information requirements. This will include information access from the Internet and the use of online services for other public utilities. The scheme that has received a substantial support from the leading software firm, Microsoft,

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will begin from Malappuram district and the entire state will be using the e-benefits for education by next year. Initially, the candidates undergoing Akshaya e-literacy programme were using CD lessons on Windows platform. The new CD, based on Linux OS, will feature Malayalam language-based games, literacy software and video classes.

### 10.2 E-seva in Andhra Pradesh Attracts Citizens

Continuing with its drive to provide e-services to the citizens, Andhra Pradesh government proclaims a resounding success. In less than two years - ending March 2003 - its government-citizen interfaces, e-seva, has handled 7 million transactions. Now these services are available at 30 centers at Hyderabad and Secunderabad, where people could interact with various government departments online for tasks such as registration of births and deaths, vehicle registration, passport application processing, and so on.

### 10.3 The Reality of Virtual Classrooms

The Sikkim Manipal University (SMU) has successfully applied IT tools to promote distance education in India. Recently it has launched its virtual classrooms covering around 250 study centers across the country. The VSAT technology based classrooms will help the students in remote areas to interact with the teachers any time during the day. Offering two-way communication facility, the teachers will take classes in a centralized studio from where the lectures will be disseminated in the virtual classrooms.

The initial concept was implemented at pilot sites including IIT, Kozhikode and IIT, Mumbai. The VSAT technology that facilitates satellite-based communication is highly reliable and is currently being used by SMU to teach 20 courses covering 45 subjects. Since VSATs obliterate the need for conventional telephone lines for communication, they are being used to spread education even in remote villages in Dimapur and Nagaland. And students across the study centers get same quality of education.

### 10.4 Egurucool.com

A pioneer of eLearning in India. One of the key strengths of egurucool is its ability to adapt quickly to changing environment, described in terms of three Cs - customer, capital markets and competition. Moved quickly from being an online destination for students to an online education company to an educational institution using technology, with both online and offline models.

## 11. Advantages of E-Learning

Increased quality and value of learning achieved through greater student access and combination of appropriate supporting content, learner collaboration and interaction, and on-line support

- Increased reach and flexibility enabling learners to engage in the learning process anytime, anyplace and on a just-in-time basis
- Decreased cost of learning delivery, and reduced travel, subsistence costs and time away from the job
- Increased flexibility and ability to respond to evolving business requirements with rapid roll-out of new and organisational-specific learning to a distributed audience.

## 12. Disadvantages

The major disadvantages are:

- Connectivity to the Internet.

- Hardware malfunctions, difficulty in setting up software and accessing sites.
- Staff and support availability to help throughout for any IT or set-up problems.
- Online providers will place time limits for studies on a regular basis, but student may need more time to study.
- No teacher is available online, need a help desk and isolation of students.
- Sometimes the material is poorly designed; sometimes the instructors are inaccessible.
- The importance of online instruction to an older student population with no computer skills.

### **13. The Promise of Standards**

Interoperability standards are needed to address the issues for e-Learning. For learning content, not only technical standards like graphics interchange formats are needed, but also formats for the way in which the packaging, sequencing, and other management of the software is handled, so that it can be transferred between platforms and environments. Likewise standard ways of describing educational materials are needed so that they can be easily searched for and located. Administrative systems need to agree on what information and how they save it so that it can be transferred to other suppliers' systems, and between systems wanting to use this information, like virtual learning environments. If agreement could be reached between those supplying systems and those buying and using systems on these matters, e-Learning would be freed from the constraints of lack of information exchange. Getting this agreement is however easier said than done.

The IMS project was launched in 1997 by Educom (now Educause) in the USA. It set out to tackle the problem of interoperability at the time when learning management systems were emerging as a new type of learning technology. Later relaunched as a non profit organisation, the "IMS Global Learning Consortium", and has been releasing new specifications addressing different areas regularly.

Other bodies have become involved in Learning Technology Standardisation are IEEE, ISO and the European CEN/ISSS and Prometheus. There are also other user led bodies that are driving the development of specifications, including the American Aircraft Industry (AICC), and the Department of Defence's Advanced Distributed Learning programme (ADL). All of these are committed to collaboration to achieve the prize of establishing learning technology interoperability standards.

### **14. Conclusion**

Education and society are effectively being re-engineered and are in turmoil because of economic and social forces, both heavily influenced by technology. On-line education is here to stay and the success of it is critical since it will decide how another communication revolution in the form of satellite providers will impact education. The future has a lot in store. If this technology becomes economically viable, a new way of education and training will emerge. This has already started in some parts of the world. Academic libraries must continue to redefine their role within the teaching and research missions of their universities. Nonetheless the transformation to web-based education approximates the competence and reflexes involved in making internet-based education a healthy, viable transformation. If the organizing and managing intelligence guiding online endeavors can rid itself of technician-myopia and if web-based education expands beyond narrow paycheck skills to educate the whole human being, including those lacking ready access to higher education, and if all other skills are good, institutions can become competent online surfers surfing the waves of change.

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