E-LEARNING: FROM A PEDAGOGICAL PERSPECTIVE

M. Siadaty, M.S.
School of Electrical and
Computer Engineering, University of Tehran
Tehran, I. R. of Iran
e-mail: m.siadaty@ece.ut.ac.ir

F. Taghiyareh, Ph.D.
School of Electrical and
Computer Engineering, University of Tehran
Tehran, I. R. of Iran
Corresponding Author: f.taghiyar@ut.ac.ir

Abstract - The steady growing innovations in the area of information and communication technology have raised new concepts and possibilities in different life aspects. In the field of further education and professional training, electronic learning and Web-based education are perhaps the most prominent ones. Proponents of this technology claim that e-learning courses are at least as effective as corresponding traditional ones, and therefore sometimes a very good substitute for it. Although there are so many similarities between traditional and e-learning systems, confronting the extended range of e-learning users -with very different prior knowledge of the domain, backgrounds, learning styles, interests and preferences- is no more possible with the "one-size-fits-all" approach. Hence, creation and management of instructional content would be the major hazard in e-learning industry. Contents should be provided considering social, cultural and pedagogical characteristics of the learners. E-learning covers a wide set of applications and processes. With such an extended scope, covering number of available e-learning tools is extensive. Though, in recent years, features and capabilities of authoring tools have been drastically improved. Concepts such as "adapting to the needs of learners" and "personalized content" make authoring tools play a more prominent role in the process of creating learning contents. In this paper, we propose a new pedagogical perspective in web-based learning environments. This perspective explores the most prominent opportunities of the information technology era, in order to ensure a more meaningful learning. Advantages, limitations and particularly deficiencies of e-learning systems are investigated based on this perspective. Also, in order to cover the importance of authoring tools in the performance of e-learning systems, capabilities and limitations of current available authoring tools are comparatively studied. These comparisons are based on criteria such as compatibility with e-learning standards, the amount of time and cost needed for the instructional design and potential features. Outcomes of the study emphasize on the importance of the learning variables such as cognitive, social and affective learners' characteristics, which play a critical role in the design and implementation of web-based learning systems. These outcomes would certainly be of significant help with enhancing the decision making procedure for managers and presidents of learning areas, which may be overwhelmed by all the technology decisions they have to make, the number of choices available, and the terminology they may not be familiar

with. These outcomes would basically lead to determining basic factors of learner satisfaction and therefore improving educational performance.

Keywords: E-learning, Personalization, Authoring Tool, Social Skills, Student Modeling.

INTRODUCTION

"E-learning" is probably the most buzz term in current learning era. Numerous universities and private institutes have launched this kind of learning in their long term goals and invest mainly enormous capital in it. In early 1990s, e-learning appeared as computer based learning and was proposed mostly by multi media CDs for learning applications[2, 23] [11]. Authoring tools have been in existence since the early days of computer-based learning. By the late of this decade, as internet became a more popular vehicle for delivering online learning courses, learning contents were networked presented to learners in propriety formats and in large sizes. These days, a great number of advertisements on benefits and advantages of online learning solutions, lead college and university presidents to rush for converting their traditional learning system into the online ones. Online learning clearly has a growing presence in higher education, and this bold presence has contributed to the emergence of the new generation of e-learning authoring tools designed specifically for the purpose of e-learning content development.

However, most of the published research in this area, only discuss benefits and prominent properties of "e" enabled learning/training and concept of "learning" along with its personal, behavioral, social and cultural aspects are merely studied [1,4,16]. Following recent trend towards personalization on the World Wide Web, proposing an educational web-based system with the ability to adapt intelligently to the goals, tasks, interests, and other features of individuals and groups of users, is a challenging research goal [18]. Considering limitations such as lack of face-to-face interaction in e-learning basis along with its prominent features -like the extended access facility- makes it even more complicated for the presidents of the learning industry to choose one of these two learning types. Therefore, advantages and disadvantages of both learning systems (e-based and traditional) should be borne in mind along each other. In addition, expectations of e-learning systems and tools as well as their role as a complementary or substitute for traditional ones should be clarified. The aim of this paper is to enhance decision making procedure for managers and presidents of learning areas. Hence, advantages and particularly deficiencies and disadvantages of e-learning systems are discussed from a pedagogical standpoint. The most important authoring tools and their potential features and capabilities are studied as well. Also some paradigms of applying personalization methods in web-based learning environments are provided. These paradigms clearly indicate the need for applying emerging potentials of technology in

e-learning environments, which would have a great impact on the decision-making phase.

The paper is organized as follows. In the next section, definitions and concepts related to e-learning are reviewed. After that, the most important advantages and disadvantages of e-learning systems vs. traditional ones are explained. Then, the personalization and adaptivity concepts are described at the outset of the section entitled "A Review on Personalization / Adaptation Concepts", and some different approaches in personalized e-learning systems. The last three parts will deal with definitions and classifications of authoring tools, comparison of the current popular authoring tools based on the most important selection criteria and conclusions and future researches.

E-LEARNING: DEFIMITION AND TERMS

Many universities, institutes and in general learning centers are unsure what e-learning means. The terms and definitions around e-learning can be confusing. Diverse range of existing definitions makes it even more difficult to provide a comprehensive definition. Some definitions are brief such as -"Use of Internet technology for Learning outside of the classroom"[13]- and some stretch to a more detailed extend. The most comprehensive and though brief one, which can be provided, is as follows:

> "E-Learning describes the way new information and communication technologies (ICT) are set to reinvent education and learning in browser-based systems in a digital world".

This diversity is however fueled by the gradual improvement of technology-based training. In each step of this improvement, some new concepts are emerged from which the most notable ones are as follows:

- INSTRUCTOR-LED TRAINING (ILT)

ILT is the instruction in classroom or virtual classroom under the direction of an instructor or facilitator.

- EPSS (ELECTRONIC PERFORMANCE SUPPORT SYSTEM)

This term refers to applications, which provide information, advice, task accelerators, just-in-time training and other tools to support employees in performing their tasks. In other words, EPSS solutions are sophisticated helping applications. Supporting performance is a principal goal of such systems.

- COMPUTER-BASED TRAINING (CBT)

In CBT, learning objects are typically delivered on CD-ROM or from a mainframe and through a local area network, rather than over the Internet. Learning objects exploit multimedia such as audio, video, animation and application simulation.

- WEB-BASED TRAINING (WBT)

In this case, learning materials are delivered over the internet. Distinction between CBT and WBT is rapidly disappearing.

- COLLABORATIVE LEARNING

Collaborative Learning is online learning, based on interaction with others (learners/instructors). Communication can be supported in one of two ways, either asynchronously, or synchronously. Asynchronous collaboration is typically instructor facilitated. Instructor is not available in real-time but interacts with the learners offline via the same e-mails and shared databases. Typically, Synchronous collaboration is instructor led. Instructor guides learners in a virtual classroom environment, through interactive online learning, such as shared whiteboards, shared application software, chat functionality and audio/video over the network.

MOST KNOWN PROS AND CONS OF E-LEARNING

In recent years, e-learning has had a blossoming impact on higher education. Over half of all postsecondary institutions –90 percent of two-year public institutions, 89 percent of four-year public institutions and 40 percent of private ones- have offered some types of e-leaning courses in 2000-2001. Growth rate of online enrollments –from 19.8 percent in 2003 to 24.8 percent in 2004– is climbing up as well [16]. These numbers are not only up, but also clearly indicate increasing popularity of e-learning among students and educators. This pervasive welcome, however, has created sharply different views on web-based learning both among academics and in the corporate world. On the one hand, proponents point to empirical studies and cite that e-learning is at least as effective as traditional learning. Enumerating its advantages, they conclude that e-learning is a proper substitute for traditional learning. On the other hand, opponents point to lack of direct contact between instructors and learners and its adverse effect on students' performance. Identifying the learner, detecting and preventing cheating in computer submitted assignments or exams are also limitations of e-learning systems, which are repeatedly remarked by this group. They deduce that today's e-learning technologies,

are pedagogically much weaker than ideals of higher education.

Arguments on both sides of the e-learning debate have their own merit. The most important ones are discussed in Table 1.

Table 1: Comparison of the most known differences in learning types.

Learning Type / Property	Traditional Learning	E-Learning	Ideal -Learning
Flexibility	tied to same time, same place	independent of time, place	independent of time, place
"Hidden" costs	null	too much	null
Work to update	continuously	hard to update	easy to update
Amount of feedback	constrained to class environment	few and delayed	clear and complete
Social skills learning/ Personality growth	high	too low	high
Personalization within syllabus	too low, instructor -oriented	feasible, based on applying personalization/adaptation	pedagogically high

- POSITIVE FEATURES

Traditional classroom instruction is inevitably tied to the same time and same place model for lecture delivery. The main advantage of e-learning is however, that it significantly increases access to advanced learning sources. The great flexibility of e-learning courses allows access to higher education for people whose personal constraints prevent them from enrolling in traditional courses (e.g., part-time students, continuing education students). Also "asynchronous communication" with other instructors/students would be possible.

An additional advantage of online courses and e-learning is the possibility for instructional materials to be shared among different educators and academic institutions. Evidently, sharing of instructional materials can lead to economies of scale and greater dissemination of knowledge. Accordingly, by spending less time and cost, learning objects could be re-targeted and re-used in other domains as well.

The most frequently cited benefit for e-learning in empirical studies is "cost-savings"[23] [4,16]. This misconception is one of the most widely held beliefs among proponents of e-learning. Online courses need high preparation time and also an engaged instructor during course delivery, which would drastically reduce the potential time savings of prerecorded lectures. Furthermore, using electronic media for communication is less direct and more time consuming than direct conversations

between students and instructors. While it is possible that e-learning courses will sometimes cost less than their traditional counterparts, considering all of these "hidden costs", it is highly unlikely that e-learning will significantly reduce the overall costs of higher education.

- LIMITATIONS AND DEFICIENCIES

About 75 percent of online learning contents include Information Technology and software application topics [17]. According to speedy growth of knowledge and technology, such course materials are subject to rapid obsolescence. The need of cost and time to update them is inevitably one of the disadvantages of e-learning systems.

As mentioned earlier, current authentication technologies do not allow practical detection and effective prevention of cheating in final evaluations over the web or computer-submitted assignments. Furthermore, Internet is the best place to be anonymous and uncommitted [7], which makes it even more difficult to authenticate students taking part in final exams and web-based courses. This limitation has obvious adverse effects on the credibility of educational programs relying exclusively on online technologies.

"Lack of direct personal interactions between teachers and students" is evidently the most notable deficiency of current e-learning systems. Many students rely primarily on direct contact with teaching staff and other learners to absorb course materials effectively and moreover, to detect their weak points. Most of instructors adjust pace of course progress and its contents to the feedbacks received from direct interaction with learners. Thereby, the lack of direct contact afforded by today's technology makes e-learning industry pedagogically weaker than traditional instruction.

One of the primary functionalities of educational systems is to prepare learners for social life. This would be performed via teaching them behavioral skills, training how to establish social relationships, how to recognize dominant cultural elements and finally making them both mentally and personally mature. Although these skills are acquired gradually and unintentionally, in e-learning environments, learners confront "virtual space" instead of "society", and have the minimum sociocultural practices of their community. Thereby, since there is a mutual correlation between social participation and educational effectiveness, lack of this correlation would have an adverse effect on both learners' satisfaction and performance of e-learning systems.

E-learning has yet to be "profitable" in any sense. Due to this belief, about thirty percent of e-learning managers are thinking to stop their online learning activities [10]. Perhaps the benefits are not seen, because e-learning applications have for the most part replicated the structures, roles and relationships that existed prior to technology. To

fulfill the potential of technology, there is a strong need to "revision" teaching and learning from the standpoint of affordances of emerging technology. Two prominent approaches in this endeavor are "personalization" and "adaptation", which in spite of the limitations and deficiencies in e-learning environments, would significantly distinct e-learning from its traditional counterparts (Table 1). In this way, learners' satisfaction and therefore, efficiency of learning systems would drastically increase, however, in traditional learning/training systems, it would be almost impossible. These concepts are studied in the following section.

A REVIEW ON PERSONALIZATION / ADAPTATION CONCEPTS

In several application domains, user-adaptive software systems have already proved to be more effective and/or usable than non-adaptive systems. Also, among the "e"-based applications, personalization plays a prominent role. Personalized web-based systems belong to the group of "adaptive hypermedia systems", of which educational hypermedia is the most popular application area [8].

Many definitions are available one of the most comprehensive of which perhaps is as follows [3,5,14]:

> "Personalization is the ability to provide content and services that are tailored to individuals based on knowledge of their preferences and behavior".

Nowadays, confronting the broad range of e-learning users -with very different prior knowledge of the domain, backgrounds, learning styles, interests and preferences- is no more possible with the "one-size-fits-all" approach. Accordingly, it would be of significant importance to propose an educational web-based system with the ability to adapt intelligently to the goals, tasks, interests, and other features of individuals and groups of users. In such a system, learners would only receive the content, which is particularly created for them based on the above mentioned criteria. User modeling can play an important role in this endeavor. The aim of user modeling phase is to capture information concerning user characteristics that are considered significant for a particular application. For example in the case of educational hyper media, being able to predict future behavior and also recognizing learning preferences of the learners are such valuable information. There are different methods for modeling users [13] the most popular ones of which are discussed briefly in the following section.

- OVERLAY MODEL

This model is based on the structural model of the subject domain. The structural domain model is represented as a network of domain concepts, which are related with each other and form a kind of semantic network. Semantic network represents the

structure of the subject domain. Some systems use a simplified version of the domain model without any links between the concepts, but the majority of adaptive hypermedia systems use a more advanced domain model with several types of concepts representing different kinds of knowledge elements and several kinds of links representing different kinds of relationships between concepts. In this model, for each concept, some estimated value of the user's knowledge level of that concept is stored. This value might be just a binary value (known–not known), a qualitative measure (good/average/poor), or a quantitative measure (probability that the user knows the concept). An overlay model of the user knowledge can also be represented as a set of pairs "concept – value". This model is often used for modeling the user in adaptive educational systems.

- STEREOTYPE MODEL

In this model, a set of possible stereotypes exist for each dimension of the user modeling. A particular user is usually modeled by being assigned to one of these stereotypes. This model can also be represented as a set of pairs "stereotype-value", where the value can be not only "T/F", but also has some probabilistic value; representing the probability that the user belongs to the stereotype.

- HYBRID MODEL

However, the best known model is the combination of the two above models. At the beginning, the stereotype modeling is used to classify a new user and to set initial values for overlay model, and then the overlay model will be applied.

Personalization systems often require a huge amount of data in order to apply personalization methods and algorithms. Some of these data can be observed by the system directly. However, the others may require one or more additional acquisition steps. The following sub-sections deal with the most important kinds of such data [9, 19].

- USER DATA

User data include information about personal characteristics of the user, which might be: record data (e.g., name, address, and phone number), geographic data (area code, city, state and country), user characteristics (e.g., age, sex, education, and disposable income), registration for information offerings and some other personal data.

- USER KNOWLEDGE

User knowledge is in the meaning of assumptions on users' knowledge about concepts

and relationships between concepts with regard to the domain of the application system. These kinds of data have always been among the most important sources for personalization algorithms.

USER INTERESTS AND PREFERENCES

Interests and preferences among the users of the same application may vary enormously. Sometimes information offered to a group of users may not only be of no interest to another group but may even also be in conflict with their preferences. Bearing the scope of interests and preferences of the users in mind, particularly in learning environments, would lead to a smoother interaction with and thereby, increased learning motivations for the learners. In educational systems, these preferences may vary from personality traits such as learning styles to some technology-based elements such as type of the delivery of the learning content.

Production of the most current e-learning systems which cover the above concepts in a way is mainly performed as university projects in research laboratories. In such environments, paradigms used for applying personalization and/or user modeling methods vary interestingly based on the application field of the educational system and the learning approaches. The most important paradigms are shown in Table 2.

Table 2: Most important paradigms in research personalized e-learning systems.

System	Applied Paradigm	Date/Place of production
AES-CS	Pedagogical Sciences (Cognitive Styles)	Spain/2002
-	Information Fusion	USA/2002
ELENA	Semantic Web	USA/2002

- EXPLOITING COGNITIVE STYLES

Cognitive Style is often described as a personality dimension which influences attitudes and social interaction. In this educational system research [20], Group Embedded Figures Test (GEFT) is used to identify two distinct groups of learners, one group includes learners with Field dependent cognitive style and the other one includes Field independent ones. Personalized learning contents based on the preferences related to the type of the cognitive style are then delivered to the learner.

- INFORMATION FUSION PARADIGM

In this research e-learning system [14], multiple feedback measures are combined in

order to identify user preferences. To achieve more accurate results, the combination is performed via a feedback extractor with fusion capability. Personalized information is delivered to the learners based on collaborative filtering algorithm.

- SEMANTIC WEB TECHNOLOGIES

The main component of the personalization service architecture in this research [6] is the Personal Learning Assistant Service. This assistant integrates and uses the other various web services -providing personalization functionality- to find learning resources, courses, or complete learning paths suitable for a user. The integration is performed via exploiting semantic web capabilities.

A REVIEW ON AUTHORING TOOLS: DEFINITIONS AND TYPES[12]

The term "authoring tool" is misleading. It can be easily confused with specialized form of word-processing software for professional writers. Indeed, authoring tools go far beyond writing and word processing. Among the extended available range of definitions[2, 13, 21] [12], perhaps the most comprehensive one is as follows: "E-learning authoring tools enable trainers to integrate an array of media to create professional, engaging, interactive training content, and some make it possible to re-purpose elements or learning objects from an existing course for re-use in a new one." Due to different approaches in applying authoring tools in e-learning environments, classification of these tools varies widely in the e-learning industry[6, 11, 21] [11,12]. The most widely used one includes the following three categories:

- WEB AUTHORING TOOLS

Any e-learning course can be considered a type of website or web page. Thereby, any tool able to be used for creating a website can be used to create an e-learning course. HTML Editors such as FrontPage and Dreamweaver[10] and Media and Application Tools such as Flash[1] and Director[9] are sub-types of Web Authoring Tools [15]. The majority of packages on the market fall into this category, and they are used to create most of the e-learning courses currently used.

- COURSE AUTHORING TOOLS - END USER

These programs require practically no knowledge of programming and computer-based training. These systems are often template or form-based and very easy for someone to learn and use. Examples include Lectora Publisher[26], Tactic[4] and Web Course Builder[20].

- COURSE AUTHORING TOOLS - ADVANCED

Such authoring tools are specifically designed to create e-learning courses and have great design flexibility. Tools in this category include Authorware[15], ToolBook[24] and Quest[18]. Courses created with these tools rival computer games with their intricate and complex sound and animation sequences.

Table 3 breaks down features and limitations of each of the above categories. There are also two other types of authoring tools, which are not as powerful as the mentioned ones, but however promise the new generation of e-learning authoring tools.

POWERPOINT CONVERSION TOOLS

These tools convert documents created in common software such as Microsoft's Word or PowerPoint into an online course. Some of these conversion tools simply the PowerPoint document conversion to a Flash file or other web-enabled formats[7]. Examples include Impatica for PowerPoint[14], PowerConverter[17], and Viewlet Presenter[25]. Another example is Articulate Presenter[3], which allows adding e-learning elements such as quizzing and tracking. This is done via an additional menu added to the PowerPoint software with all the e-learning and conversion features.

These tools have the shortest learning curve and development time. The downside is that the final product may really take more the form of an online presentation than online learning.

SIMULATION AUTHORING TOOLS

Simulation software is not new, but what is new is the application of simulation technology to the area of e-learning. It has been estimated that by the end of 2006, 70 percent of all off-the-shelf as well as custom e-learning content will include some application of simulations [4,8]. About 75 percent of e-learning content covers IT or software application topics. Such training is best served by simulation programs, which can capture screenshots and then play them back to replicate the behaviors of particular software. Dazzlermax[8], RoboDemo[16] (the last version is called Captivate), Rapidbuilder[19] and Camtasia[5] represent examples of this type of authoring tools.

Table 3: Comparison table for different classes of authoring tools.

Class of Authoring Tool	Disadvantages	Advantages
Web Authoring	multi – purpose, not designed specifically for e-learning	widely used, stable marketplace
Course Authoring – End User	locked into its limited features	easy to use and learn, rapid proto-typing
Course Authoring - Advanced	need of programming knowledge, steep learning curve	extended creativity latitude, high flexibility

COMPARISON OF THE CURRENT MOST POPULAR AUTHORING TOOLS

Currently available e-learning authoring tools offer a variety of features and make it even more complicated for the presidents of the learning industry, to make the most proper decision in such an extended spectrum. One constraint on those decisions will be what the authoring tool can do. Even before evaluating the available tools, the context of the training/learning should be considered: why, how, and in what circumstances will it be provided? Some tools will match this context better than others. The current authoring tools support a variety of media and file types such as text, graphics, video, and audio. Most include assessment and test creation features. To find the authoring tool that works best for the organization and fits best into its pedagogical approaches, the functionality which is very important to the organization should be determined. By considering carefully the available resources and the goals of the specific learning event of the organization, the right tool(s) could be chosen. The current most popular authoring tools can be comparatively studied based on features and properties of each type of authoring tools, considering the most common important criteria in choosing between them (Table 4) .The following sub-sections are intended to discuss these comparison criteria .

Table 4: Comparison table for the most current popular e-learning authoring tools.

Criteria / Tool	Learning curve	Standard compliance	Assessment options	extensibility	PlatForm	cost *	other
Articulate	very easy	AICC, SCORM	one question in each page	_	IBM	A	_
Authorware	high	AICC, SCORM IMS, ADL	multiple choice, T/F drag & drop, matching	_	IBM /MAC	A/B	9
Dazzlermax (Standard & Deluxe)	easy	AICC, SCORM IMS	Question Wizard	_	IBM	A/B	9
Dreamweaver MX (+Course Builder)	easy	AICC, SCORM IMS, ADL	multiple choice, T/F fill-in-the blank,matching Drag&drop	_	IBM /MAC	A	9
Flash	moderate	_	multiple choice, T/F Drag&drop	_	IBM/ MAC	B	_
Lectora	easy/ moderate	AICC, SCORM	multiple choice, matching drag&drop, HotSpot question weighting Bulk importing	_	IBM	B	_
Quest	easy	AICC	multiple choice	9	IBM	B	9
RoboDemo	easy	AICC, SCORM	multiple choice, T/F fill-in-the blank, matching	_	IBM	B	_
Toolbook (Instructor & Assistant)	moderate/ high	AICC, SCORM IMS, ADL, IEEE	multiple choice, T/F fill-in-the blank, matching Drag&drop	9	IBM	A/B	9
Web Course Builder	easier than Power Point	AICC, SCORM 508	multiple choice, T/F fill-in-the blank	_	IBM	A	9

(*: A: up to approximately 1000 US$ B: from US$ 1000 to US$ 5000)

- EASE-OF-USE VS. CREATIVE FREEDOM

After reviewing examples of courses built by several authoring tools, obvious differences might be noticed. Although the differences often reflect the skill of the

course developer, they are also the result of limitations in the authoring tool. Hence, the trade-off should be set and achieved carefully.

As the authoring tool becomes more advanced and powerful, it would need more programming and computer knowledge as well (Table 4). The level of required knowledge may vary from clicking a button (Articulate) to programming skills (Authorware, ToolBook and Quest).

- INTEROPERABILITY AND STANDARDS

The ability of an authoring tool to work with other e-learning software and systems is referred to as "interoperability". Successful interoperability is the result of software compliance to technology standards. E-learning community has several sets of technology standards which are currently being developed. The ultimate vision is to have interoperability throughout the entire e-learning market. Until then, the e-learning community is fragmented into different systems adhering to various standards. The four most common standards are Aviation Industry Computer-based Training Committee (AICC), Sharable Content Object Reference Model (SCORM), IMS Global Learning Consortium, and Microsoft LRN[22] [5,21]. Authoring tools differ in the standards they support. If the organization currently uses a learning management system (LMS), the selected authoring tool should be compatible with the LMS. Although almost all of the studied tools support some types of standards (Table 4), the only tool which supports "Section 508", is Web Course Builder. Section 508, is a federal law for accessibility of electronic communications to people with disabilities. If a course is Section 508 compliant, it meets the guidelines for people with visual, auditory, or motor disabilities.

- ASSESSMENT AND QUESTION TYPES

The trainers developing courses are always interested in the different types of assessment questions that could be created with an authoring tool. These types include fill-in-the-blank, matching, true or false, drag and drop or other interactive options. Considering the favorite question type of the developer in selection of the authoring tool would certainly result in a more comprehensive and effective course.

Among the studied tools, Lectora places in the first rank of supporting various question types. Lectora includes the ability to easily build "hot spot" questions which enable an author to tie a question to an object. This question type is ideal for identifying product parts, finding locations, and much more. Using Lectora, authors can also add weight to questions. Bulk importing of questions as an already existing file stored in access databases, excel spreadsheets, or flat files is also supported by Lectora. Also,

Dazzlermax -classified as a simulation authoring tool- provides question wizard. This wizard facilitates rapid production of standard questions. However, other tools based on the level of their performance cover different range of questions (Table 4).

- EXTENSIBILITY

Some trainers need to customize the software for specific purposes. The ability to customize software is called "extensibility". If the organization requires some customization to the authoring software, certainly an open-source code tool should be chosen, which allows a skilled computer programmer to customize software to meet the trainer's needs.

According to Table 4, only Quest and Toolbook Instructor have the ability to be extended. Quest builds a script called Quest C which provides a powerful interfacing capability to the C language and to Windows DLLs. Also it includes an interactive debugger that traces all objects and C programs used within a course and helps developers isolate and correct bugs. Toolbook Instructor has a powerful programming language called OpenScript which provides considerable flexibility. It also includes an Actions Editor which is a visual programming tool. It allows developers to add sophisticated functionality to their courseware without using a programming language.

- COST

Prices of authoring tools vary from a few hundred dollars to tens of thousands of dollars. On average, a cost between US$ 1,500 and US$ 2,500 might be paid. Cost is another trade-off which should be considered along with needs of the organization and expectations of the authoring tool. The more powerful an authoring tool is, the higher its price would be (Table 4). Notable in this case is that, Authorware is presented lower than US$1000 for educational users. CourseBuilder is also downloadable for free as an extension for users of Dreamweaver[2].

- REQUIRED PLATFORM

Due to word wide welcome to IBM PC platforms, courses which are created by any of the above mentioned tools could be run and delivered on IMP compatible PCs. Dreamweaver and Authorware -and also Flash, with limited features- are the only tools which supporting course creation on Macintosh PCs as well. This would significantly distinguish these tools from their counterparts.

- OTHER FEATURES AND CAPABILITIES

Some of these authoring tools have other outstanding features. Both Quest and Toolbook Instructor provide a variety of techniques for analyzing answers to questions, scoring and providing feedbacks. "Media Library" is one of the prominent features of Authorware, which would be of great help in producing multilingual courses. Using "predictive pre-load" option included in DazzlerMax Deluxe, the performance of the training would not unnecessarily be degraded by delays in loading, rather DazzlerMax would work it out that which files should be pre-loaded as the course progresses.

CONCLUSIONS AND FUTURE STUDY

After years of grandiose enthusiasm for E-learning, it seems that now students are much more likely to focus on "learning" than "e-learning". "E" is just an enabler which is supposed to improve the quality, increase access and enhance the flexibility of learning programs. In addition, different personality traits, learning motivations and even cultural beliefs obviously exist among the wide range of e-learning users. These characteristics could simply be in conflict with each other. Fulfilling the needs of all these users would only be possible by invoking potentials of new technologies such as personalization and adaptation approaches along with mentioned parameters. However, realization of such a thing would practically be impossible in traditional learning environments. In this way, e-learning would be a suitable substitution for traditional learning, only when personal and individual needs are to be fulfilled. Accordingly, in the span of education, the focus is not only on "learning", but also on social, behavioral and pedagogical aspects. Sociocultural practice with the community is one of the major functionalities of learning systems. However, in web-based learning environments such social skills are hardly realized. Thereby, it would be better to accompany e-learning systems with traditional ones. In other words, e-learning would play a complimentary role rather than substitution for traditional learning environments. Whichever the tool or combination of tools is chosen, it should be borne in mind that the right tool can make the organization efficient and productive. The wrong tool could cost countless hours on a project and leaving with little or nothing to show the effort. As long as e-learning is based on good instructional design, the interactivity that authoring tools are capable of producing, can enhance the learner's experience and though improve the educational performance … Future work will involve exploring further the role of personalization/ adaptation in learning environments, particularly "localized" ones. It will involve determining the major cultural, social, and pedagogical factors and learning motivations among Iranian learners. More research will also be conducted to explore what influences learners'

satisfaction and which properties should be considered as the most effective ones in the modeling of the users. Only in the case of implementation and evaluation, the actual value of these new opportunities would be verified. Also, studying "Blended learning" as a new paradigm in this field would contribute to further suggestive understandings.

ENDNOTES

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