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Virtual Learning: The Emerging of a New University

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Resumen

La mayoría de los sistemas de aprendizaje virtual se limitan a funcionar como medios de entrega de información. Este enfoque es limitado porque invita a sustituir la lectura y memorización desde el libro por la lectura y memorización desde la pantalla. Algunos sistemas implican esquemas de presentación más elaborados que incluyen algún nivel de retroalimentación y mecanismos de interacción. Sin embargo, casi todos carecen de la intención y la capacidad para proponer aprendizajes pseudo-experienciales como los que proveen la simulación y los juegos. Este artículo expone brevemente tales carencias y asoma algunas ideas de cómo llegar a un modelo holístico de campus virtual.

Palabras clave: Aprendizaje virtual, campus virtual, aprendizaje pseudo-experiencial, simulación, holístico.

Abstract

Most current virtual learning systems are limited to perform as information delivery systems. This approach is limited in the sense that it prompts for learning by reading and memorizing from a screen rather than from a textbook. Some systems involve more elaborate presenta-

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tion schemes including some level of feedback and interaction mechanisms. Most, however, lack the intention and power of a pseudo-experiential learning that simulation and gaming provides. This article briefly discusses what is missing and outlines some ideas of how to model a holistic virtual campus.

Key words: Virtual learning, virtual campus, pseudo-experiential learning, simulation, holistic.

Telecommunication and Networking: From the Data Age to the Information Age

During the late sixties, scientists at leading research centers and universities began using the Arpanet (precursor of the Internet) as means of communication to promote and enhance collaborative work by exchanging ideas and discoveries at a faster pace. This marked the birth of a new medium that overcame time and space barriers in unprecedented leaps. In successive years, organizations and people gradually linked to or created new nodes in the "network of networks," creating a communication web that later grew in an unplanned manner and at exponential growth rates.

In the mean time, electronic miniaturization delivered 'computing power' to consumers converting the computer into another office gadget or household appliance. This events fostered unparalleled and revolutionary advances in software engineering, facilitating even more the use and proliferation of computers. But it was only after the advent of integration of telecommunications, networking, and client-server technologies that the 'Data Age' gave way to the Information Age. In the information age, software becomes as valued as or even dearer than hardware. While we can easily conjecture whether software is a product of art, science or both, the fact is that software, a product of human imagination and ingenuity, is without doubt the leading engine that will drive the human race from the Information Age into a Knowledge Era.

Thirty years later, this medium, unlike any other, grew anarchically yet graciously into an ownerless self-organized mesh that allows the sharing of data, information and knowledge. The web, though seemingly chaotic, functions with an invisible yet elegant order, intertwining a worldwide network of computers.

The Globalization of Access to Knowledge

The ease and speed of interconnectivity of the Web brought to light something the leaders of the most powerful nations have not yet achieved. The Web fostered a unique economic system that generated geographically boundless virtual markets where e-cash or e-money became common currency. A bipolar and dynamic flow of goods and services was thus born. This new trading environment hosted information brokers and information seekers alike, programmers and users, software sellers and buyers as the main players of a newly emerging game. Now, however, buyers and sellers of all types exchange a diversity of goods and services in the virtual trading post of the Web.

The development of electronic commerce led to a spontaneous worldwide trade zone far more encompassing than NAFTA and ECC together, without the wait for or need of executive enactment or multinational accords. Furthermore, the Web has already become an actual multibillion-dollar distribution channel for products and services. We now face either a "monetarization of information" or a "virtualization of money". Whichever way we choose to look at it, the marketing world has been transformed as never before, and so have the rules and techniques of access to knowledge, and to education. Thus, this phenomenon of electronic commerce attests not only to the birth of an economy without boundaries but also to the commencement of a ***globalization*** of education ***without barriers***. This marks the dawn of an era of new educational competition in which schools will no longer monopolize the educational franchise [1]. In this new era the odds are much against the current establishment of learning by listening and memorizing, against the boring lecture and the passive classroom, against the one-way TV or media.

Information Technology: Where Does Higher Education Stand?

The telecommunication and networking revolution that initially began on university campuses and research centers prompts now for new delivery paradigms. These rapidly evolving information technologies assist pioneering academic communities to devise new ways of doing business. The myriad books and articles on the impact of information technology attest to the importance of this issue. Some futurists even claim that most, if not all, institutions will need to experience radical transformations to be competitive in the third millennium. Or as Dolence and Morris assert,

> "Those who realign their practices most effectively to Information Age standards will reap substantial benefits. Those who do not will be replaced or diminished by more nimble competitors."[1]

The speed at which information is transferred and shared and the rate at which new knowledge is generated leads us to think that the Information Age will be rather short in comparison to the Industrial Age. It should not surprise us if, within three decades, we see the fall of the information age and the rise of what can be referred as the Knowledge Age. If the Information Age is characterized by the synthesis of information from data, the defining characteristic of the Knowledge Age will be the development and use of software systems that assist learning and synthesize knowledge from information. In this regard, Dolence and Morris assert:

> "The information age is being driven by learning and knowledge. The rate of knowledge generation and the corresponding demand for its use are exponentially larger than in the Industrial Age. The life cycle of information will continuously shrink. Demand for effective learning opportunities will also increase dramatically. By our reckoning the 1990s mark the first decade of the Information Age. These early transition stages of the Information Age present extraordinary opportunities to higher education. So the time is right to develop a compelling vision for learning in the 21st century."[1]

Other characteristics of the new era will be a propagation of the use of knowledge-based systems, pattern recognition systems, and "evolutionary" software.

Information Technology in Higher Education: Envisioning the Future

Technology integration is rapidly changing traditional operating procedures at colleges and universities. Ubiquitous individualized and interactive learning environments, intelligent tutoring systems, on-line registration, on-line kiosks, group-ware-based student interactions, and decision support systems are just some of the approaches that are increasingly gaining acceptance due to their unsurpassed flexibility.

In the future, students will have the freedom to design personalized "timeless and classroomless" schedules from courses kept on Intranet servers. Students will access these servers at their convenience. This virtual campus will provide interactive access to knowledge and instruction on demand because the new learning environments will be just a "keyboard" away from students: anytime, anywhere.

Telecommunications technologies are enabling and facilitating the sharing of ***multiple media*** including text, voice, data, graphics and video, all packaged into a single stream of integrated, interactive, ***multimedia*** courseware. Access to campus as well as worldwide networks, is providing faculty and students with virtually boundless access to information and knowledge.

On the other hand, the swiftness at which telecommunication, computer and video technologies change often surpasses budget cycles. TV sets, for example, will soon be just like any other PC peripheral. The PC/TV will be a ubiquitous learning device. These rapidly changing scenarios call for creative strategies to plan for obsolescence as well as for growth, as they will require the upgrading and enhancement of infrastructure.

Adoption of alternate technologies poses many conjectures. For example, under what conditions could an institution achieve substantial savings by switching to a wireless network? Is this a wise or a senseless undertaking? What financial gain could the wireless approach entail if all campus buildings are already wired? What horizon can we assume for obsolescence of existing cabling infrastructure? What impact would the wireless approach have on the ***quality of instruction?***

To provide answers, we need to develop models to stimulate and explore alternate scenarios, reflecting variables such as infrastructure financing, computer and telecommunication technologies, market competition, demand, enrollment levels, clientele profile and student attrition/retention patterns. Simulation of these complex scenarios may lead to the development of a diversified research and decision making agenda for higher education administrators. At the 14th Annual Research Forum, held at the Catholic University of America in 1996, researchers pondered how much more critical than technology itself was the human factor in the successful deployment of technology in higher education.

> "The venture of integrating technologies to respond to the needs of the academic community will not rest solely on the successful deployment of servers, clients, media, data, protocols, wiring and other 'technicalia.' This endeavor will depend more on the human system than on technology itself. Success in implementing information technology in higher education must rely more on the managerial ability to build and maintain multidisciplinary teams that deliver a service that is pertinent and customer-focused."[2]

Educational planners will need to rely more on the human aspects of technological adoption, implementation, maintenance, operation, training and utilization. These human aspects will become the critical success factors. Access to technology will always be readily available on college campuses, but its successful utilization entails far more than hardware and software. Users will need to attain increasing levels of technological literacy. Otherwise, it would be as if technology was never available, or if available, never accessible.

A Holistic Approach in the Design of Virtual Learning Environments

The Virtual Campus

The virtual campus is a system that models and simulates the *environment* and *processes* involved in a campus college. The campus environment is modeled via virtual classrooms, which present instructional content. The interaction processes are simulated using electronic mes-

saging systems (e.g. e-mail) to interact with a distant instructor. A virtual campus is independent of time and space.

The primary purpose of a virtual campus focuses on the needs of a clientele that demands improvements in learning systems, without regard to where and when the customer needs or wishes to initiate a learning session. A subsidiary but important purpose is to broaden the educational reach. In this fashion, a simulated environment provides asynchronous access to information and instruction on demand enabling the distant learner to receive services regardless of time and place. An additional purpose of these systems is to render a competitive advantage in the educational market. This market has expanded itself beyond the classic college environment to corporate colleges and training centers, therefore increasing the pressure to compete in a truly global learning marketplace without exclusive franchises.

Current State of Virtual Learning Systems

Most current virtual learning systems are limited to perform as ***information delivery*** systems. Typically, the approach is to simply convert from a printed medium (textbook) to an electronic format (web page) using hypertext as a random access navigation tool. This approach is limited in the sense that it prompts for learning by reading and memorizing from a screen rather than from a textbook. Some systems involve more elaborate presentation schemes including some level of feedback and interaction mechanisms. Most, however, lack the intention and power of a 'learning by failing' or pseudo-experiential learning that simulation and gaming provides.

What is Missing?

Although some models incorporate interaction mechanisms, important strategies are still lacking among them: Student Socialization Support, Authoring tools, Assessment Strategies, and pseudo-experiential learning. Other important elements such as integration of student information systems and executive information systems also lack but will not be part of our discussions in this article.

Student Socialization Support

Socialization is a very significant factor of the student experience if we realize that only about 13% of student daily life is devoted to the classroom. The rest of the time is devoted to recreation, study and rest. Out-of-classroom activities on campus include advising, counseling, and mentoring options for the student. These classic processes assist students in coping with normal life circumstances beyond the classroom and are part of the whole campus experience. In addition, they are powerful retention agents in the survival of entering learners beyond the first year.

An essential element of student daily life experience is ***entertainment***. Virtual systems must therefore include games and other activities that complement advising and counseling. This option maintains student involvement in that it promotes a fuller relationship with and keeps them coming back to the institution. In a sense this generates what in marketing jargon is called 'brand loyalty'.

Assessment Strategies

Conventional models see the evaluation of student performance as a way of measuring the level of attainment or mastery of learning objectives. These models rarely include the necessary tools for continuous monitoring of the entire range of processes involved in knowledge acquisition and learning. This entails the collection of pertinent data about the planning, design, production, delivery, and evaluation and feedback mechanisms. Assessment strategies should include surveys to enable customers to emit evaluative opinions about all products and services that they received.

Learning by Doing

Current conventional pedagogical strategies teach under the assumption that learning occurs by listening and memorization. The old but revolutionary approach of apprenticeship, however, is a more robust method that assumes that the natural way to learn is by doing, by repeated failure and by trial and error. Learning systems of the future will focus

on learning-by-doing strategies such as simulation and scenario role playing in virtual interaction environments.[3]

Virtual Learning

The term 'virtual learning' is actually a misnomer because it conveys a 'close-to-but-not-quite' the real experience. The connotation we give here is similar in the sense that it models and resembles reality by way of simulation, it then becomes a 'virtual reality'. This virtual reality goes beyond the usual conception of 3-D look of objects in space. It is a 'resembled reality' that mirrors the look, touch and feel of the 'real thing'.

The most common example is how pilots learn to fly without risk to human lives or loss of costly equipment. After entering the simulated cockpit the apprentice soon forgets that he/she is in a simulated environment. So much so, that adrenaline, perspiration, eyeball dilatation, blood pressure, heart beat rate and other bodily reactions to external stimuli respond as they would under the real situation. In this scenario, the apprentice learns by doing, by trial and error, by failing-in-private without risk or shame. Learning is achieved consciously and unconsciously creating a kind of 'firmware' that will condition future behavior of the learner.

The utilization of virtual learning environments is needed for many reasons. The most important factor, however, is that learning-by-doing strategies mirror what actually happens when learning occurs in real world experiences.

Modeling a holistic virtual campus

Architecture of the virtual Campus

A holistic virtual learning environment has to be far more than a mere electronic courier. Its architecture must include:

a) Multimedia authoring tools

b) Simulation tools that provide learning-by-doing (virtual experiences)

c) Messaging systems that enable individual and group interaction

d) Web access to integrated information systems; and finally

e) Entertainment for the customer.

A Virtual campus that is built based on the aforementioned strategy will guarantee the success of the learning experience particularly if it adopts the 'learning by failure' paradigm.

The new VISION

A system that conforms to the aforementioned prescription for a virtual learning environment is being developed at New Jersey City University. This system has been called VISION which stands for 'Virtual Institution-Student Interaction Online Network'.

The VISION system developed at NJCU foresees a set of strategies and techniques to emulate the virtual campus of the future. It is a powerful tool that enables and enhance faculty student interaction. While the VISION system covers all of the features of current virtual campuses, it has not yet been developed to its fullest in relation to what we discussed above about necessary features in a virtual learning environment. Simulation systems, student support services, and entertainment are features under development.

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Notes

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