Virtual Education - the progression by Driving Forces and Technical Challenge issues in Access Control

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Abstract- Enabling technologies have led to the transformation from Traditional Education systems to a new methodology of virtual education incorporating: Electronic collections, Virtual reference services, Virtual libraries and online education. During the last decade, many universities serving academic communities have witnessed the emergence of new service paradigms in areas of information access and delivery, reference, instruction, technology facility and support to patrons. The new methodology is characterized by electronic communication, synchronous and asynchronous, web-based information sources, and multimedia information and is uncontrolled largely as a result of internet facilitating information creation, distribution and access. Documents with hyperlinks to other related documents/information in various Web formats are now typical, and they emphasize the fact that any information accessed by a user is a minute segment of a larger body of information on the Web .This paper explores some of these emerging service paradigms in online education their ground reality, Challenges, use of access controls, Scope and Future of Virtual university and online education.

Keywords – Virtual education, View, Benefits, Driving Forces, Challenges, Technical Aspect, Access Controls

I. INTRODUCTION

Virtual learning is defined as the delivery of learning through electronic mediation which bridges the gap caused when the instructor and student are separated in either time or place. The new technology, and delivery of material at a distance, brings the possibility of great and positive change for higher education. Virtual education using advances industry in ict is one of new strategies for educational justice development in the contemporary world. According to experts and information and communication technology virtual training based on electronics environment is conventional methods of teaching in the world to 2020. Experts say ICT to support learning can create the context in which the information can manipulated or changed. In this new type of learning new solutions for issues to be find. [1]

Virtual education is a teaching-learning process based on the principles of active pedagogy (the student should take the responsibility of a frequent and effective participation), with the characteristics of distance education (during all Classes, or most of them, the students and the teacher will not meet personally, although this could happen in a virtual space), and with the possibility of synchronous or asynchronous interaction. Technology is constantly improving and evolving, and educators are there to meet this new demand. Close cooperation and mutual information and communication technologies with new approaches and theories of learning is one of the change foundations in the educational system in this new world environment. And new approaches toward teaching and learning and virtual education have purposes and common borders their main focus is the role of the learner in the learning [3]. Computer-based learning and teaching technologies, Web-based training, virtual universities, Virtual classes on the networks that developed in the world have paved the way for the emergence of new methods of training. Thus today's the growth of this technology with other learning methods as a teacher, students are not considered but with using of virtual education ways we want to achieve creative learning. [1]

	Tradinational learning	*Virtual learning*
Focus of Course	*Group*	*Individual*
Focus of content	*Teacher-centered*	*Student-centered*
Form	*Synchronous*	*Asynchronous*
Time	*Scheduled*	*Anytime*
Place	*Classroom*	*Anywhere*
Flexibility	*Standardized*	*Customized*
Content	*Stable, durable*	*Dynamic, transitory*
Number of students	*Space delimited*	*Without limits*
Instructor preparation	*Some (transparencies*	*Extensive pre-preparation*
Distribution of materials	*Hard copy*	*Electronic download*
Interaction	*Spontaneous*	*Structured*
Range of interactivity	*Full interactivity*	*Limited interactivity*

 # The Table Lists General Differences between Traditional and Virtual learning

II. DRIVING FORCES AND OPPOSING FORCES

The main forces driving the development of virtual education are:

- Technological improvements that offer new, creative and flexible venues through which individuals can acquire lifelong learning
- Continuing decrease in costs related to the technologies, particularly computer hardware
- Demand from all types of learners for more equitable access and service.
- The realization that information and communication technologies can enhance the quality of the learning experience
- The overall expectation that virtual delivery modes will reduce costs, increase productivity and enable educational expansion. (Despite this shared expectation of significant cost reductions, data on costs is still scarce and unreliable).

The Opposing Forces in the development of virtual education is related to disparities in access due to:

- Amount of bandwidth that the institutions can access
- Cost of network access
- Front-end cost of implementing high quality virtual models
- Limits on learners' access to the necessary equipment, including computer hardware and software and network access.

The Opposing forces related to the current organization of educational institutions include:

- The lack of systems of learner support that can function in a virtual environment to help the less independent or capable learners through the educational process

- Opposition from students -- mostly from younger and less experienced independent learners -- who still prefer a face-to-face learning environment.
- The "reticence" from teachers and faculty to embrace the use of information and communication technologies, generally related to:

❖ *Lack of training in the use of the technologies*
❖ *Concerns over job security*
❖ *Need for greater preparation as a result of operating in a public environment*
❖ *Need to manage an increased amount of communication with students*
❖ *The belief that learning should be structured and directed by teachers, rather than constructed by the learner*

To stimulate the expansion of virtual education across the regions, the Commonwealth of Learning study group recommends to policymakers and educators to:

- ensure that the development of information and communication technology infrastructure incorporates educational planning to guarantee the adequacy and sustainability of educational applications
- use policy, legislative, and regulatory incentives to reserve some portion of telecommunication Capacity, such as cable channels or bandwidth, for educational use at affordable costs
- when considering new programs, evaluate the adequacy of the technologies to the skills and characteristics of the learners who will be using them, the nature of the program contents ,the current competency of the instructional staff and the availability of funds
- ensure that a clear plan is in place indicating whether there will be real savings and how the savings will be effected, rather than a simple transfer of costs to students ,if the purpose of the educational application of technologies is to achieve cost savings
- Recognize that the development of virtual education models will create change forces in a variety of other ways, such as student counseling, advising and assessment, quality assurance of providers, credit recognition and transfer, and others. Institutions must be committed to the changes and prepared to deal with them as a whole. For instance, the offering of courses on-line will be limited if the institution Registry insists on "hardcopy" processes.[6]

III. THE CHALLENGES IN VIRTUAL EDUCATION

Virtual Education can be lauded as the space for all students. The challenges include,

- The Cost
- The Level of Technology
- Access Control Methodology
- Security
- Quality and Purpose of the Education.

The Cost-factor includes, huge financial implications associated with the emerging technology-based services in Virtual education. Costs range from infrastructure costs, hardware and software,(including lifecycle replacements and upgrades), technology support, staff training for the use of technology, all in addition to subscription costs for the electronic resources, costs for creation of electronic resources, such as digitized images, Web page authoring, development of tutorials, etc. Virtual Education imperative is to develop strategic plans for harnessing technology to offer viable services in a time-effective flexible manner within the dynamic technology environment.

Apart from the cost factor, all other factors explicitly depend on technical implementations. Therefore it is imperative to address the technical challenges for dynamic environment of virtual education.

A key challenge in leveraging technology to support a virtual learning environment is the volatility of emerging technologies. Some relevant technologies that are needed for an effective infrastructure have not yet reached maturity (for example, see the discussion below on authentication, authorization, encryption, and other security technologies). On the other hand, even wise investments in relatively mature technologies have at best limited life spans in a world where performance doubles every eighteen months. [12]

IV. VIRTUAL EDUCATION TECHNICAL ASPECTS AND CHALLANGES

Virtual Education is challenged to develop strategic plans for harnessing technology to offer viable services in a cost-effective manner within the dynamic technology environment. Tebbetts (2000) offers some costing approaches to budgeting for technology and options for meeting these technology costs in libraries. Dugan (2002) also offers a model for defining technology costs in libraries. Services from traditional services incorporating card catalogs, printed books and periodicals, bibliographic instruction, in-person/face-to-face reference, to new services and delivery modes incorporating: electronic collections, such as e-books, e-journals

and databases; virtual reference services, and other online services. Innovation of new services that are peculiar to the online/Web environment is the trend in modern electronic libraries. During the last decade, many academic communities have witnessed the emergence of new service paradigms in areas of information access and delivery, reference, instruction, technology facility and support to patrons. Virtual education continues to harness new technologies to offer services in innovative ways to meet the changing needs of their patrons.

The new information environment is characterized by electronic communication, both synchronous and asynchronous, Web-based information sources, multimedia information, and is uncontrolled largely as a result of the Internet facilitating information creation, distribution and access. Documents with hyperlinks to other related documents/information in various Web formats are now typical, and they emphasize the fact that any information accessed by a user is a minute segment of a larger body of information on the Web. In the electronic environment, a library researcher has the control of browsing the content related to the client by the passes data to be retrieved. In today's information technology, authorization is concerned with the ways in which users can access resources in the computer system, or informally speaking, with "who can what."

Access control:

Access control is arguably the most fundamental and most pervasive security mechanism in use today. Access control shows up in virtually all systems and imposes great architectural and administrative challenges at all levels of enterprise computing.[5] Adequate security of information and information systems is a fundamental management Responsibility. Nearly all applications that deal with financial, privacy, safety, or defense include some form of access control.

Access control is concerned with determining the allowed activities of legitimate users, mediating every attempt by a user to access a resource in the system. In some systems, complete access is granted after successful authentication of the user, but most systems require more sophisticated and complex control. In addition to the authentication mechanism (such as a password), access control is concerned with how authorizations are structured.

In some cases, authorization may mirror the structure of the organization, while in others it may be based on the sensitivity level of various documents and the clearance level of the user accessing those documents. [3] Access control technology has evolved from research and development efforts supported by the Department of Defense (DoD).

This research has resulted in two fundamental types of access control: Discretionary Access Control (DAC) and Mandatory Access Control (MAC). While initial research and applications addressed preventing the unauthorized access to classified information, recent applications have applied these policies to commercial processing environments.

Background on access control: DAC, MAC, and RBAC

DAC: DAC permits the granting and revoking of access control privileges to be left to the discretion of the individual users. A DAC mechanism allows users to grant or revoke access to any of the objects under their control. As such, users are said to be the owners of the objects under their control. However, for many organizations, the end users do not own the information for which they are allowed access. For these organizations, the corporation or agency is the actual owner of system objects as well as the programs that process them. Access priorities are controlled by the organization and are often based on employee functions rather than data ownership.

MAC: MAC as defined in the DOD's Trusted Computer Security Evaluation Criteria (TCSEC), is "A means of restricting access to objects based on the sensitivity (as represented by a label) of the information contained in the objects and the formal authorization (i.e. clearance) of subjects to access information of such sensitivity."

These policies for access control are not particularly well suited to the requirements of government and industry organizations that process unclassified but sensitive information. In these environments, security objectives often support higher-level organizational policies which are derived from existing laws, ethics, regulations, or generally accepted practices. Such environments usually require the ability to control actions of individuals beyond just an individual's ability to access information according to how that information is labeled based on its sensitivity. [4]

RBAC: Role-based access control (RBAC) is a technology that is attracting a great deal of attention, particularly for commercial applications, because of its potential for reducing the complexity and cost of security administration in large networked applications. Under RBAC, security administration is greatly simplified by using roles, hierarchies, and constraints to organize privileges. RBAC reduces costs within an organization, because it takes into account that employees change much more frequently than the duties within positions.

Under RBAC, if, for example, an employee moves within an organization, only his or her role assignment is changed. Accordingly, it is unnecessary to revoke his or her existing privileges and assign a completely new set of privileges.RBAC can be configured to support a wide variety of access control policies,

including traditional discretionary access control (DAC) and mandatory access control (MAC), as well as organization-specific policies. Recently, RBAC has also been found to be a natural access control facility for workflow management systems.

The concept and design of RBAC make it perfectly suited to a wide variety of application and system software environments, for both stand-alone and distributed deployments. It provides a safe and effective way to manage access to an organization's information, while reducing administration costs and minimizing errors. RBAC differs from DAC in that DAC allows users to control access to their resources, while in RBAC; access is controlled at the system level, outside of the user's control.

Although RBAC is non-discretionary, it can be distinguished from MAC primarily in the way permissions are handled. MAC controls read and write permissions based on a user's clearance level and additional labels. RBAC controls collections of permissions that may include complex operations such as an e-commerce transaction, or may be as simple as read or write.

A role in RBAC can be viewed as a set of permissions. Fig.1 represents the difference between generic access control decisions and RBAC induced decisions for virtual environments.

Three primary rules are defined for RBAC:

1. Role assignment: A subject can execute a transaction only if the subject has selected or been assigned a role.
2. Role authorization: A subject's active role must be authorized for the subject. With rule 1 above, this rule ensures that users can take on only roles for which they are authorized.
3. Transaction authorization: A subject can execute a transaction only if the transaction is authorized for the subject's active role. With rules 1 and 2, this rule ensures that users can execute only transactions for which they are authorized.

Additional constraints may be applied as well, and roles can be combined in a hierarchy where higher-level roles subsume permissions owned by sub-roles. Based on current research and experience, RBAC appears to fit well into the widely varying security policies of industry and government organizations.

There are further short-comings in RBAC models as it does not support efficient Session Management and server PUSH/PULL mechanisms. Therefore emergence of further efficient models is order of the day based on the existing RBAC access Models.

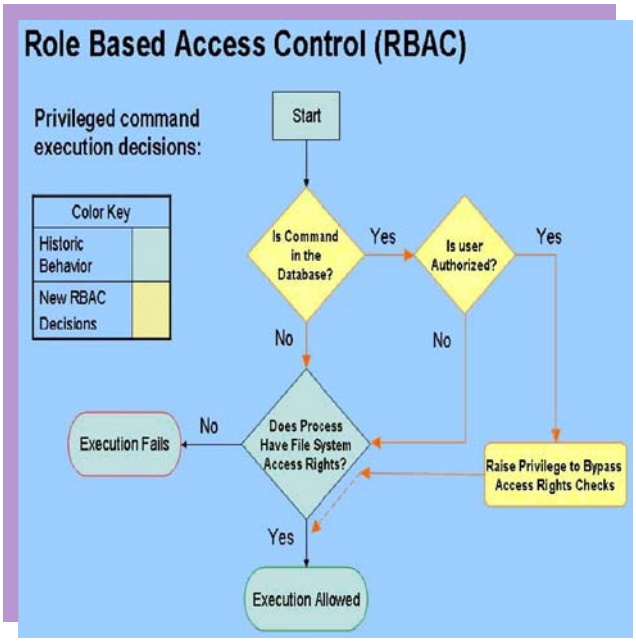

Fig.1 New RBAC Induced Process for Virtual Environments

V. CONCLUSION

In spite of this litany of technical realities, Virtual education is inexorable, not only for the power and economies that it may afford, but for the changing base of customers and their orientation to online activity. There are several steps that Virtual Environments should consider, regardless of their long-term assurance to virtual learning. As mentioned above, access controls for virtual information sharing in virtual learning is vital. Role assignments, Role authorization, Transaction authorization are imperative in addition to robust desktop computers, state of art networking strategies and standardization of the software on those desktops.

The access control models will keep on emerging for providing a dynamic virtual environment for learning. As we surmount the technical challenges that lie to the fore, the journey will only accelerate.

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