**Adaptive Online Lecture Model: A New Perspective of ~~Hybrid~~ e-Learning 2.0 Paradigm**

1. **M. Riad 1, Hamdy K. El-Minir, Haitham A. El-Ghareeb 3**

*~~Associate Lecturer,~~ 1, 3 Information Systems Department, Faculty of Computers and Information Sciences, Mansoura University, Egypt*

*2 Head of Communications Department, Misr Engineering Higher Institute, Misr Engineering and Technology Academy, Mansoura, Egypt*

**ABSTRACT**

Different Learning Paradigms can be presented by different educators as a result of utilizing several types of Information and Communication Technology "ICT" in the Learning Process to overcome ~~certain~~ time and place challenges, and to enhance the learning process. The three abstract Learning Delivery Models are: Traditional, Distance, and Hybrid Learning. Hybrid Learning attempts to maintain the best of Traditional Learning and provides the hopes and objectives of Distance Learning in a model that maintains the Learning Process on the right road. The widespread of Web 2.0~~; the Internet created by collaborative activities of different users~~ resulted in the appearance of the acronym “e-Learning 2.0”. ~~e-Learning 2.0 is supposed to make use of different Web 2.0 capabilities.~~ Web 2.0 is a big resource that changed the way everyone ~~around~~ thinks about, ~~accesses~~ utilizes the Internet, and greatly will touch the coming generations; the generations that ~~we~~ instructors are currently ~~presenting~~ delivering education to. ~~Another~~ Other big challenges to consider in learning nowadays is the growing numbers of students that is hardly met by growing numbers of instructors. ~~We remember that~~ One of the ICT utilization in learning main objectives was to ~~come over~~ overcome ~~this~~ ~~issue~~ those challenge. This has lead to a form of Synchronous Distance Learning Model that utilizes online communications methods to deliver learning via online meeting methods. Those meetings are challenged by spaces and miles between instructors and students that might prevent proper ways of communication between both. This ~~chapter~~ paper presents a proposed Pedagogical, and Architectural ~~technical~~ specifications models of utilizing Web 2.0 features to present an "Adaptive Online Lecture Model". In order to present an Adaptive Online Lecture Model, ~~a utilization of different aspects todays Web 2.0 features students is addressed~~ different Web 2.0 technologies will be utilized, so instructor can make decisions immediately based on students' feedback via the resources they like and utilize; Web 2.0 technologies. Proposed model tends to help instructors interact~~s~~ closely with students; ~~especially in circumstances of large lectures with more than 300 attending students at a time, and to~~ reach to students easily via Web 2.0 technologies, .

**1. INTRODUCTION**

E-learning 2.0 has lighted a new torch over processes and roles in acquiring knowledge. A heterogeneous community of teachers and learners can dialectically share and improve their knowledge, lit up by Web 2.0 facilities and massive multimedia employment. This trend has a particularly strong impact on e-learning, finally offering new tools and methodologies to effectively work as in an on line community of practice, articulated and promoted by people. The traditional way pursued by e-learning has been overcome by the wide use of Web 2.0 applications, from blog to podcast, from wiki to media sharing. From the accessibility point of view, e-learning 2.0 and its related novel Internet technologies represent a pitfall challenge (Ferretti et al., 2008).

~~I have a dream about a "Learning Model" that hopefully will become true via utilizing different Web 2.0 technologies. This dream entitles something I call: "Adaptive Lecture".~~ ~~In order to achieve "Adaptive Lecture",~~ Students ~~need~~ access ~~to~~ different online resources during the ~~lecture~~ online meetings conducted with instructors, ~~immediately~~, either via   her/his cell / smart phone and Tablet/Mobile PC. Instructor can assign tasks to students, and they immediately ~~switch to their mobile computing devices and~~ start working on them. Instructors can share the presentations from ~~his~~ their laptops with the ~~whole class that is connected via wireless connection~~ attendees. Instructors are not just telling students some information and giving them some assignments, they are ensuring that they can retrieve the information, understand, apply the information to become  "knowledge". Though current online meeting applications provide abovementioned capabilities, they suffer real-time communication shortages between instructors and students. Students might not be involved enough in the learning process with the instructor might be missing some important prerequisites for understanding certain topic, might need repetition of some parts while instructor can’t define those requirements due to distances between them. This is not the case of course when students and instructors are at the same place; because instructors can feel students immediately, and start asking them “What is wrong?” and “Is there something unclear?” questions. Even with the existence of web cams, students can easily fool them by starting them and starring at the monitors; only God knows what they starring at!

## 1.1 CURRENT ONLINE LECTURE MODEL “PROBLEM DEFINITION”

~~I'm not quiet sure who started the Current Lecture Model or when, all what I am sure of is that: it really exists for a long time.~~ Students login to online meeting system ~~go to some place~~, ~~where there are teaching stuff~~ instructors are already waiting, started the class, shared the files, presenting lecture~~s~~, defining assignments, defining ~~sections, and~~ labs to be followed ~~by teaching assistants~~ later, take questions, and leave. They wait for assignments before due time, mark them, repeat the scenario for another meeting/lecture, and so on. This model is the same exactly of the Traditional Learning Model; ~~This~~ the model used to work fine when the number of students used to exceed by more than hundreds the number of professors, but ~~is it still working the same quiet fine as it used to?~~ It is not working the same quiet fine as it used to. This system, is too much stable: students know the courses they are going to attend, they have question banks, and ~~all that~~ different academic ~~stuff~~ resources available today. This system has stabilized to the extent that under some circumstances it is killing innovation and preventing students and professors from “Knowledge”. ~~Why?~~ One of the reasons that affect this model efficiency is the lack of connection between students and instructors. With this huge number of students, there are doubts about the instructor's capability to connect with everyone individually ~~sitting in front of her/him~~. Of course this is a matter that differs with experience and varies from instructor to another; however it is till a matter to question.

This lecture model might be acceptable in countries with acceptable student-teacher ratio. However, based on the Arab Knowledge Report (2009), higher education in the Arab region suffers a considerable shortage of teachers. In 2005, the student-teacher ratio was 25:1, compared to the global average of 16:1. The Arab student teacher ratio is the highest among all regions of the world, including sub-Saharan Africa. The shortage is more severe in some countries than in others. The student-teacher ratio is at least double the global average in Yemen, Egypt, Algeria, and Palestine, and one-and-a-half times the global average in Jordan, Bahrain, Mauritania, Libya, the UAE, and Saudi Arabia. Hopefully proposed Adaptive Online Lecture Model will enhance the ~~lecture~~ learning experience and might help to overcome such a challenge; especially in Arab region.

Even in countries with acceptable student-teacher ratio, the current online lecture model doesn’t entitle students to feel a real utilization of new technologies in the learning process. The 2009 21-st Century Campus Report (2009) presents some facts that are important in imaging the current situation, and hopefully will be leading the move to the new model. One of the facts is the different views between instructors and students rate for utilizing technology. Instructors rate their use and understanding of technology as high, but students disagree with that assessment. Students rate faculty lack of tech knowledge as the biggest obstacle to classroom technology integration and see it as a growing problem.

**1.2 PROPOSED ADAPTIVE ONLINE LECTURE MODEL**

Adaptive Online Lecture is the lecture where ~~the lecture supports~~ one or more forms of adaptivity is supported via utilizing one/more of Web 2.0 technologies. Adaptivity features are many, and include (not only):

* Table of Contents / List of Lecture Topics
* Contents, Learning Materials, and Presentations
* Order of Topics and Contents
* Time Required for a topic
* Assessments

Adaptive Online Lecture is no new concept, because Adaptive Online Lectures make the difference between professors that students ~~you~~ really want to attend lectures of, and others. However, ~~our~~ proposed trend with Adaptive Online Lecture focuses on the (Engineering) of the (Online Lecture) process and moving it from the static model that it used to be on right now, to the dynamic and engineered model. Treating Learning as a process hopefully will present "Learning Process Management" advantages to e-Learning systems.

The rest of this chapter goes as follows: Section two presents a comparison between Current Online Lecture Model and Proposed Adaptive Online Lecture Model highlighting the expected advantageous features of it. Section three presents the proposed different and current suitable Web 2.0 technologies to support adaptive lecture model, and Section four presents the proposed IT infrastructure and technical model that satisfies adaptive lecture requirements. Section five present strategies to support adaptive lecture model in the near future. Section six discusses the expected outcomes of the proposed adaptive lecture model. Section seven discusses instructor challenges and attempts to define the expected outcomes of the proposed model. Section eight highlights future directions regarding adaptive learning. Section nine concludes the chapter and presents future work. References are present at section ten.

## 2. CURRENT LECTURE MODEL VS. PROPOSED ADAPTIVE LECTURE MODEL

Adaptive Online Lecture is the hype of Tutoring and Current Online Lecture Model. Tutoring is always the best solution to provide learning; however it is hard to afford tutoring due to the increasing number of students, ~~beside I would rather think about presenting "tutoring" to current lecture model as a problem that needs solution and can be challenged and solved by new technologies.~~ Table 1 presents a comparison between the Current Online Lecture Model and Proposed Adaptive Online Lecture Model ~~based on the adaptivity features presented in section 1.2~~.

*Table 1: Comparison between Current Lecture Model and Proposed Adaptive Model features*

|  |  |  |
| --- | --- | --- |
|  | Current Online Lecture Model | Proposed Adaptive Online Lecture Model |
| List of Lecture Topics | Static | Variable |
| Contents, Learning Materials, Presentations | Static | Variable |
| Order of Topics and Contents | Static, Predefined | Varies |
| Time Required for a Topic | Static, Predefined | Varies |
| Assessments | Predefined | Varies |

**2.1 LECTURE TOPICS**

In Current Online Lecture Model, list of topics within the lecture is already predefined by the instructor. Students are supposed to be satisfying course prerequisites  before attempting current course, so instructors might not pay much attention to different students needs. This is not the case with Adaptive Online Lecture Model because instructor is easily connected with students and capable of determining either it is accepted to move on with the predefined list of topics, or take sometime to present some of the prerequisites upon need before discussing the main lecture topics.

**2.2 CONTENTS, LEARNING MATERIALS, AND PRESENTATIONS**

Contents, Learning Materials, and Presentations to be presented during the online lecture also shall varies based on what students have learned before, and based on their backgrounds. One of the most taken for granted assumption is that "Students prefer animation and videos in learning". Authors have witnessed situations where students face problems with understanding what they see in the videos. It is clear that most of the videos are not created and edited by the instructors, so they have to display it the way it is. This situation took place with authors while teaching Computer Networks. After students watched the famous "Warriors of the Net: The Movie" available at <http://www.warriorsofthe.net/movie.html>, they became confused about many of the concepts they have been told about ~~kept telling them~~ during the online lecture before watching the video. Some students loose concentration during video presentations, and they just spend the time relaxing till the instructor starts talking again!

**2.3 ORDER OF TOPICS AND CONTENTS**

Order of Topics to be presented in the Online Lecture is mainly an instructor's responsibility. Authors ~~I~~ doubt the students' ability to define the order of topics to learn during a lecture; especially if all the proposed topics are new to them. However, students can easily define the order of contents displayed to them. Personal differences and out of control surrounding circumstances might drive the Online lecture in different paths. For example, if the lecture includes a presentation and a video file, there are different scenarios for driving the lecture:

* Watch the Video and then illustrate and start discussions with students
* Illustrate the video and take feedback from students, conclude the discussion with the video
* Introduce a brief about the video contents, watch the video, and ten talk about it
* Begin watching the video immediately, illustrate and talk about it, conclude the discussion by watching it for a second time

~~What is the best choice?~~ There is no best choice of course, however, there is always an optimal solution based on different inputs like, time, Internet connection speed and bandwidth, number of students attending Online Lecture, and other factors. Proposed Adaptive Online Lecture Model attempts to address Students themselves as an input factor to define such choices during the lecture. ~~projector availability, lightning in case projector display is affected by the high sunlight at the beginning of the lecture so delaying the video to the end of the lecture might overcome this challenge, and other factors~~. ~~The question is: Why don't add Students themselves as an input factor of the issue ?~~

**2.4 TIME REQUIRED FOR THE ONLINE LECTURE**

Bloom (1984) showed twenty-five years ago, as reported in his 2 sigma paper, that almost all students can learn to the mastery level, given the right learning environment (Bloom ,1984; Moursund, 2005). One of the important factors of the abovementioned right learning environment is the "Time Factor". Bloom showed that all students reached mastery level for certain topics after different time intervals of learning. Thus, assuming that learning *Topic A* for example will take *Time A period* might be not acceptable assumption in some cases and for some students. Instructors’ experience in topics and with teaching students helps a lot of course in defining such confusing issues, however with the new capabilities available for connecting both instructors and students, such decisions can be taken based on both sides points of view ~~as we are in the dawn of Web 2.0, why not start using Web 2.0 capabilities in e-Learning ?~~

**2.5 ASSESSMENTS**

Conducting Assessments is an important learning activity that tends to estimate and measure students’ understandings of taught topics. Assessments shall go beyond such testing students’ ability of recalling data from their short/long memory to verifying students’ abilities to use the gained knowledge in an efficient manner; so they become knowledgeable about the learned topics. Bloom’s taxonomy addresses this issue in detail (Krathwohl, 2002). Instructors might need to conduct one of the on-the-fly assessments to ensure that students have reached a basic level of knowledge regarding one of the topics s/he was just talking about before moving to the next topic. That next topic might rely heavily on the pre-topic; understanding next topic is based on understanding the first one. Those assessments are of no importance while grading students; in most cases instructors don’t count the speed of understanding topics in grades. Such type of assessments is made feasible via proposed Adaptive Online Lecture Model.

Though Conducting Assignments is one of the most activities learners shall achieve successfully to ensure certain level of learning quality, it is not a highlighted part of Proposed Adaptive Online Lecture Model because it is already implemented in innovative ways rather than earlier days. It is almost impossible to find a learning institution without an online forum that gives the instructor the ability to define assignments after the lecture, so defining assignments can be considered as an after-lecture activity. Proposed Adaptive Online Lecture Model focuses on Real-time lecture data; that is the data needs to be captured, processed, and analyzed on-the-fly during Online lecture time to enable instructors make the appropriate decision.

**5. PROPOSED UNIVERSITY ARCHITECTURE TO SUPPORT PROPOSED ADAPTIVE LECTURE MODEL**

In Proposed Adaptive Lecture Model, Enterprise is the University, thus Enterprise Architecture and University Architecture are used interchangeable to refer to the same concept. Enterprise architecture tends to define the enterprise from the four dimensions in order to connect between them and present a complete view for the enterprise environment to face the ubiquitous challenges. It has become accepted that there is a clear need for an ‘architectural view’ of systems (Macaulay, 2004). The architectural view of systems (both business and IT systems) is defined in ANSI/IEEE standard 1471-2000 as “the fundamental organization of a system, embodied in its components, their relationships to each other and the environment, and the principles governing its design and evolution”. Enterprises can be thought of as the combination of business needs, and IT capabilities.

Different dimensions of the enterprise need to be defined in order to generate the enterprise architecture. From enterprise point of view, architectures are classified into four categories (Albin, 2003): Business Architecture, Information Technology (IT) Architecture, Information Architecture, Application (software) Architecture as depicted in figure 5.Enterprise Architecture classes utilize each other, and build over each other. Distinctions between classes are blurred because they all serve each other, and serve the enterprise.

*Figure 5: Enterprise Architecture Dimensions*

Proposed Adaptive Lecture Model requires certain amount of Enterprise Agility that is provided by utilizing SOA within the four Enterprise Dimensions. Utilizing SOA provides Educational Institution's with both Business and Technical Agility perspectives. Business agility means fast reaction to change and the ability to rapidly implement changes. Business agility needs to be holistic in scope (Evans, 2001). Technical agility refers to the ability to quickly change the type and flow of information within an organization within enterprise. Service Oriented Architecture (SOA) as a design pattern presents Applications, IT infrastructure and Information Architectures as loosely coupled, fine granular services that can address enterprises’ requirements once they are addressed either by adding new services or modifying existing ones. SOA also addresses Enterprises Information Systems’ inefficiency by enhancing reusability, thus theoretically, shortening information systems development time and effort required. SOA addresses technical agility requirements by presenting composability, modularity, and loose coupling concepts as services that wrap underlying IT infrastructure, databases, and legacy systems and present them via standard interface. There is a need to stabilize IT infrastructure rather than developing new ones (Baskerville, 2005) and SOA enables this stabilization. Enterprises should balance IT to become better positioned and more agile (Leidner et al., 2003). Services are the building Blocks of an agile enterprise (Pal and Pantaleo, 2005). W3C defines Service as “A Component capable of performing a task”. Service is “A vehicle by which a consumer’s need or want is satisfied according to a negotiated contract (implied or explicit) which includes Service Agreement, Function Offered and so on”. SOA is the design pattern that utilizes services concept to achieve architectural advantages. W3C defines SOA as “A set of components which can be invoked, and whose interface descriptions can be published and discovered”. This definition can be expanded to include the science, art and practice of building applications (Sprott and Wilkes, 2004). SOA is defined as “The policies, practices, frameworks that enable application functionality to be provided and consumed as sets of services published at a granularity relevant to the service consumer. Services can be invoked, published and discovered, and are abstracted away from the implementation using a single, standards based form of interface”.

**5.1 BUSINESS ARCHITECTURE TO SUPPORT PROPOSED ADAPTIVE LECTURE MODEL**

A business or business process architecture defines the business strategy, governance, organization, and key business processes within an enterprise. The fields of Business Process Reengineering (BPR) and Business Process Management (BPM) focus on the analysis and design of business processes, not necessarily represented in an IT system (Albin, 2003). Business Architecture defines the business roadmap usually via defining the business processes (Bechara, 2006). Business process is a series of inter-related activities that cross functional enterprise boundaries with individual inputs and outputs (May, 2003; de Putte et al., 2004). New Business Processes need to be defined to cope with the new educational requirements presented in today's educational institutions. Years ago, a concept like proposed adaptive lecture would be far away from reality. Nowadays, author believes professors and instructors in educational institutions are forced to Shake the stagnant water of traditional practices during lectures that lead to students' loss of interest in lectures, and probably in the traditional learning overall. Business Process Management (BPM) is a systematic, structured approach to analyze, improve, control, and manage processes (Chang, 2005). BPM needs to be adopted within universities to enhance both managerial and educational aspects of educational institutions. BPM need to address pedagogical and learning processes as it addresses managerial aspects. Proposed Adaptive Lecture Model can be further studied as a Business Process, and managed by educational institution's Business Process Management System (BPMS). BPMS is an enterprise information system that supports designing, administrating, and improving the business processes (Ha et al., 2004).

**5.1.1 PROPOSED ADAPTIVE LECTURE MODEL AS BUSINESS PROCESSES**

Proposed Adaptive Lecture Model different In-Lecture and After-Lecture features needs to be further studied by educational institutions to define the most suitable scenarios for them to implement and deploy. Business Process Modeling Notation (BPMN) is one of the standards widely used to present business processes. Figure 6 presents one of the in-lecture activities of the proposed adaptive lecture model; that is reshaping the lecture based on students’ indirect feedback via Web 2.0 technologies. In proposed model, different activities performed by instructor and student are highlighted in different lanes, besides the necessity for a Real time Application that performs the analysis tasks on students feedback. In this business process, reshaping lectures is a smooth activity that might take place without students’ notifications of the process happened.

Further tasks to that business process can include the instructor’s invocation of an overall feedback on the lecture. Thus, LMS needs to define the different utilized methods that students’ uses to access the LMS, the preferences stored for them to submit the quiz. Figure 7 illustrates the sequence of activities that takes place when instructor initiates such a process. Figure 7 starts from the end point of figure 6, and continues.

Adaptive Lecture Process.tif

*Figure 6: Proposed In-Lecture Informal Feedback activity feature of the Proposed Adaptive Lecture*

**Complete Feedback.tif**

*Figure 7: Proposed Formal In-Lecture Feedback Process of Proposed Adaptive Lecture Model*

**5.1.2 PHILOSOPHY, OBJECTIVES, AND STRATEGIES TO SUPPORT PROPOSED ADAPTIVE LECTURE MODEL**

Philosophy behind proposed Adaptive Lecture Model is the attempt to enhance the learning process and elevate the learning qualities within classrooms via utilizing modern and innovative technologies that are widely spread among students. Objectives are simply to present an educated and well informed learner that is capable of facing new daily presented challenges. Learners can estimate the value of technology when they use it daily in their learning process, so they become aware of them. Different strategies shall be defined and maintained; either by Top-Level Management or by instructors themselves to innovate the learning process. Many aspects of innovative technologies discussed in section three are facilitated and made available online via different implementations. Those services shall be used to support e-Learning in an innovative manner. Strategies include:

* Utilizing Different Technologies Available Right now
* Developing the proper IT infrastructure to support Adaptive Lecture Model (wireless networks, servers, etc.)
* Providing Students with appropriate access devices (laptops, Net Books, PDAs, etc.)
* Defining the Collaboration plans with third parties to accelerate the movement, and identifying what to develop and maintain in-house.
* Evaluating different system architecture approaches to achieve required goals. One of the design approaches presented in this paper is SOA, however it is not the only one.
* Defining differences clearly between applications and each one responsibility, making sure that e-Learning that is pedagogically implemented and maintained goes further beyond just University Management Information Systems

**5.2 SOFTWARE ARCHITECTURE TO SUPPORT PROPOSED ADAPTIVE LECTURE MODEL**

**(SOA), Mention the IMS SOA White Paper -> it’s really important.SOA is the model enabler, it is the softwar architecture that will combine different technologies. It is clear that the system needs different technologies, as an example the figure that illustrates the (Initiate Assessment). This activity requires interaction of different kinds of systems with different data, formats, and all this stuff. Talk about SOA in Integration only as you are always directed to do; avoid talking about it outside of integration scope. You can also mention the UMIS and LMS differences, and focus on different data presentations in both systems -> reference ACM eLearn Magazine article.**

Software / Application architecture serves as the blueprint for individual application systems, their interactions, and their relationships to the business processes of the organization. A software application is a computer program or set of programs that uses existing technologies to solve some end-user problem such as the automation of an existing business process. Software architecture can be defined as “the sum of the nontrivial modules, processes, and data of the system, their structure and exact relationships to each other, how they can be and are expected to be extended and modified, and on which technologies they depend, from which one can deduce the exact capabilities and flexibilities of the system, and from which one can form a plan for the implementation or modification of the system” (Hohmann, 2003). Application Architecture defines the form and function of the applications that will be developed to deliver the required functionality of the system (Macaulay, 2004). Integrating current University Management Information Systems (UMISs) that include different components like Student Information Systems (SISs), Library Information Systems, Financial Systems, and other components with the implemented Learning Management Systems (LMSs) has been a challenge that facing educational institutions for a while.

**Initiate Assessment.tif**

*Figure 8: Proposed needed Applications to satisfy Proposed Adaptive Lecture Model functions*

**5.3 INFORMATION ARCHITECTURE TO SUPPORT PROPOSED ADAPTIVE LECTURE MODEL**

Information Architecture is about Organising functionality and content into a structure that people are able to navigate intuitively. If Organisations didn't recognise the importance of information architecture, they run the risk of creating great content and functionality that no one can ever find. Information architecture is the term used to describe the structure of a system, i.e the way information is grouped, the navigation methods and terminology used within the system. An effective information architecture enables people to step logically through a system confident they are getting closer to the information they require. Information architecture is most commonly associated with websites and intranets, but it can be used in the context of any information structures or computer systems (Barker , 2005).

Information Architecture plays an important role in the Web 2.0 era. Amount of information became available online is tremendous. Everyone has become a participant in the generation of content. Proposed Adaptive Lecture Model tends to make use of the Web 2.0 technologies, and thus Information System that supports it is expected to deal with a large amount of real-time, changing, and updated data. Information Architecture is necessary to keep and maintain the logic behind the supportive applications for the Proposed Adaptive Lecture Model. Applications need to provide Web 2.0 functionalities, in a way that doesn't distract students during lecture; as much as possible. Instructors need to view analysis results and reports during the lecture without leaving the interface they use for teaching. Proposed Adaptive Lecture Model Information Architecture needs to address:

* **Instructor Portal:** That Instructor uses to launch required tools to enable lecture activities; like sharing files, desktop activities, initiating quizzes, and other activities. Also, this portal shall enable instructors to initiate and manage after-lecture activities; like assignments and workspaces.
* **Student Portal:** That studens use to access different aspects of the lecture activities, besides the after-lecture activities.

Proposed Adaptive Lecture Model utilizes different technologies as presented. It is important to present portals that provide those different functionalities without loosing the users' aim. Web 2.0 Technologies include Widgets/Gadgets presented in previous paragraphs. Different Widgets can be embedded in the Portal to provide the required functionalities on different sites without leaving the portal. However, widgets are challenged by limited capabilities and features. It is not an easy task for the Information Architect to maintain. Challenges will rise during architecting the portals.

The data architecture of an organization includes logical and physical data assets and data management resources. Information is becoming one of the most important assets a company has in achieving its objectives, and the IT architecture must support it. Information Architecture spans Business and IT Architectures, brings them together, keeps them together, and provides the necessary rich contextual environment to solve the ubiquitous data-quality problem.

**5.4 INFRA STRUCTURE (IT) ARCHITECTURE TO SUPPORT PROPOSED ADAPTIVE LECTURE MODEL**

Integrating different technologies, applications, infrastructures to serve the learning process is one of the challenges that came to surface as a result of different technologies presented recently. Service Oriented Architecture (SOA) is the ….. [IMS SOA White Paper]

The IT architecture defines the hardware and software building blocks that make up the overall information system of the organization (Albin, 2003). IT architecture includes hardware and software infrastructure including database and middleware technologies. The IT architecture should enable achievement of the business goals using a software infrastructure that supports the procurement, development, and deployment of core mission-critical business applications. The purpose of the IT architecture is to enable a company to manage its IT investment in a way that meets its business needs by providing a foundation upon which data and application architectures can be built.

Cloud Computing, Virtualization, and that stuff of IT Currently Became available lately

Adaptive Lecture.tif

Figure : Adaptive Lecture IT Infrastructure

**6. INSTRUCTOR CHALLENGES AND EXPECTED OUTCOMES OF PROPOSED ADAPTIVE LECTURE MODEL**

A real educated student, not just the student mentioned in the 2008 report

In e-Learning 2.0, instructors’ capabilities are challenged by new technologies. Instructors are more information related in the information age compared to the situation in the traditional model. It is not just that instructor needs to be capable of utilizing different technologies to achieve the adaptive lecture model, it is their ability to prepare and manage different scenarios during the lecture, and utilizing different technologies made available to their students. Instructors are challenged by the involvement levels with students. Online access and facilities opened new ways for students to communicate with their instructors, and forced instructors to present minimum level of online support that entitles collaboration and communication activities that wasn’t a necessity before.

**7. Current Technologies to Support Adaptive Lecture Model**

**Google Wave**

**Windows Live**

**8. CONCLUSION**

**REFERENCES**

Agee, A. S., Yang, C., the 2009 EDUCAUSE Current Issues Committee (2009). Top – Ten IT Issues. EDUCAUSE Review, Vol. 44, No. 4, July/August 2009. Retrieved November 11, 2009 from <http://www.educause.edu/ir/library/pdf/erm0943.pdf>

Ajjan, H.; Hartshorne, R. (2008). Investigating faculty decisions to adopt Web 2.0 technologies: Theory and empirical tests. *The Internet and Higher Education.* Volume 11, Issue 2. El-Sevier.

Albin, S. T. (2003). The Art of Software Architecture: Design Methods and Techniques, John Wiley & Sons, 2003.

Alexander, B., Levine, A. (2008). Web 2.0 Storytelling. Emergence of a New Genre. In EduCAUSE Review. Vol. 43 / no. 6. Nov./Dec. 2008. 40-56. Retrieved November 9, 2009 from <http://net.educause.edu/ir/library/pdf/ERM0865.pdf>

Arab Knowledge Report 2009: Towards Productive Intercommunication for Knowledge, (2009). *Mohammed bin Rashid Al Maktoum Foundation (MBRF) and the United Nations Development Programme/ Regional Bureau for Arab States (UNDP/RBAS)*. Retrieved November 11, 2009 from <http://www.mbrfoundation.ae/English/pages/AKR2009.aspx>

Barker, I. (2005). What is Information Architecture?. Step Two Designs. Retreived on 25 December 2009 from <http://www.steptwo.com.au/papers/kmc_whatisinfoarch>

Baskerville, R. (2005). Business Agility and Information Technology Diffusion, Springer.

Bechara, G. (2006). An Introduction to Enterprise Architecture, Oracle, Archived Article - Originally published on BEA Arch2Arch March 2006, <http://www.oracle.com/technology/pub/articles/dev2arch/2006/03/enterprise-architecture.html>

Bloom, B.S. (1984). The 2 Sigma Problem: The search for methods of group instruction as effective as one-to-one tutoring. *Educational Researcher, v13, n6, pp4-16*.

Chang, J. F. (2005). Business Process Management Systems: Strategy and Implementation, AUERBACH.

de Putte, G.V.; Benedetti, T.; Gagic, D.; Gersak, P.; Krutzler, K.; Perry, M. (2001). Intra-Enterprise Business Process Management. IBM Redbooks..

Downes, S. (2008). Ten web 2.0 things you can do in ten minutes to be a more successful e-learning professional, *eLearn Magazine*, Volume 2008, Issue 3, Page 4

Driver, E.; Moore, C.; Jackson, P; Keitt, T.; Schooley, C.; Barnett, J. (2008). Web3D: The Next Major Internet Wave For Information & Knowledge Management Professionals. Forrester Research, Inc.

El-Ghareeb, H. A. (2009). E-Learning and Management Information Systems: Universities Need Both. *eLearn Magazine, ACM*, Retrieved October 28, 2009 from [http://elearnmag.org/subpage.cfm?section=articles&article=96-1](http://elearnmag.org/subpage.cfm?section=articles&amp;article=96-1)

Evans, N. (2001). Business Agility: Strategies for Gaining Competitive Advantage Through Mobile Business Solutions, Prentice Hall.

Ferretti, S.; Mirri, S.; Muratori, L. A.; Roccetti, M.; Salomoni, P. (2008). E-learning 2.0: you are We-LCoME!. *Proceedings of the 2008 international cross-disciplinary conference on web accessibility (W4A). ACM International Conference Proceedings Series; Vol. 317.*

Fox, S.; Zickuhr, K.; Smith, A. (2009). Twitter and Status Updating, Fall 2009. *Pew Internet & American Life Project.* Retrieved November 11, 2009 from <http://www.pewinternet.org/Reports/2009/17-Twitter-and-Status-Updating-Fall-2009.aspx>

Grosseck, G. (2009). To use or not to use web 2.0 in higher education? *World Conference on Educational Sciences, - New Trends and Issues in Educational Sciences*. Volume 1, Issue 1, El-Sevier, Nicosia, North Cyprus.

Hill, D.; Webster, B.; Jezierski, E.; Vasireddy, S.; Al-Sabt, M.; Wastell, B.; Rasmusson, J.; Gale, P.; Slater, P. (2004). Smart Client Architecture and Design Guide. Microsoft Coroporation.

Hohmann, L. (2003). Beyond Software Architecture: Creating and Sustaining Winning Solutions, Addison Wesley.

Hulme, A. K. & John T. (2005). Mobile Learning: A Handbook for Educators and Trainers (Open & Flexible Learning), Routledge Falmer.

Krathwohl, D. R. (2002). A Revision of Bloom’s Taxonomy: An Overview. *Theory Into Practice*, Volume 41, Number 4. College of Education, The Ohio State University

Küfi, E. Ö; Özgür, B. (2009). Web 2.0 in learning English: the student perspective. *World Conference on Educational Sciences - New Trends and Issues in Educational Sciences*, Volume 1, Issue 1. Nicosia, North Cyprus.

Leidner, D.; R. Beatty, R.; Mackay, J. (2003). How CIOs Manage IT During Economic Decline: Surviving and Thriving Amid Uncertainty, MIS Quarterly Executive, 2003, Vol. 2.

Lenhart, A.; Fox S. (2009). Twitter and Status Updating. *Pew Internet & American Life Project.* Retrieved November 11, 2009 from <http://www.pewinternet.org/Reports/2009/Twitter-and-status-updating/Part-1/Section-4.aspx?r=1>

Lenhart, A.; Maden, M. (2007). Social Networking Web Sites and Teens. *Pew Internet & American Life Project.* Retrieved November 12, 2009 from <http://www.pewinternet.org/Reports/2007/Social-Networking-Websites-and-Teens.aspx>

Liccardi, I; Ounnas, A.; Pau, R.; Massey, E.; Kinnunen, P.;Lewthwaite, S.;Midy, M.; Sarkar, C.; (2007). The role of social networks in students' learning experiences, Annual Joint Conference Integrating Technology into Computer Science Education, Working group reports on ITiCSE on Innovation and technology in computer science education, ACM, NY, USA.

MAY, M. (2003). Business Process Management: Integration in a Web-enabled environment. Prentice Hall.

McCrea, B. (2009). Purdu U Brings Social Networking to the Classroom: Hotseat allows students to text in class, 11/18/2009. Campus Technology. Retreived November 29, 2009 from <http://campustechnology.com/Articles/2009/11/18/Purdue-U-Brings-Social-Networking-to-the-Classroom.aspx?Page=1>

Macaulay, A. (2004). Enterprise Architecture Design and the Integrated Architecture Framework, Microsoft Architects Journal. Vol. 1, pp. 4-9.

Moursund, D. G. (2005). Introduction to Information and Communication Technology in Education. *University of Oregon.* Retrieved November 2009 from <http://hdl.handle.net/1794/3181>

Nagel, D. (2009). 2Know Classroom Response System Gets Short Answer Feature. Campus Technology. Retrieved on November 12, 2009 from <http://campustechnology.com/articles/2009/09/10/2know-classroom-response-system-gets-short-answer-feature.aspx>

Pal, N.; D. Pantaleo, D. (2005). The Agile Enterprise: Reinventing Your Organization for Success in an on Demand World, Springer.

Pollock, J. T. (2009). *Semantic Web for Dummies*. Wiley Publishing Inc.

Riad, A., El-Ghareeb, H. (2008). A Service Oriented Architecture to Integrate Mobile Assessment in Learning Management Systems. Turkish Online Journal of Distance Education (TOJDE), Vol. 9, No.2, Article 12.

Rogers, Y., Price, S., Fitzpatrick, G., Fleck, R., Harris, E., Smith, H., Randell, C., Muller, H., O'Malley, C., Stanton, D., Thompson, M., Weal, M., (2004). Ambient Wood: Designing New Forms of Digital Augmentation for Learning Outdoors. Maryland, USA, ACM.

Schaffhauser, D.. (2009). Campus Technology. Retreived November 12, 2009 from <http://campustechnology.com/articles/2009/11/04/iparadigms-updates-peer-review-app.aspx>

Schooley, C.; Charron, C.; Driver, E.; Li, C.; Fossner, L. (2006). Social Computing Reshapes eLearning: Informal Learning Becomes a Component in Blending Learning and Work. Forrester Research, Inc.

Sprott, D.; Wilkes, L. (2004). Understanding Service Oriented Architecture",Microsoft Architect Journal, Vol. 1, pp. 10-17

Stone A., Briggs J. & Smith C. (2002). SMS and Interactivity – Some Results from the Field, and its Implications on Effective Uses of Mobile Technologies in Education. IEEE International Workshop on Wireless and Mobile Technologies in Education (WMTE’02), IEEE Computer Society.

The 2009 21-st Century Campus Report, (2009). CDW-G. Retrieved November 12, 2009 from <http://webobjects.cdw.com/webobjects/media/pdf/Newsroom/CDWG-21st-Century-Campus-1009.pdf>

**ADDITIONAL READING SECTION**

Forehand, M. (2005). Bloom's taxonomy: Original and revised. In M. Orey (Ed.), Emerging perspectives on learning, teaching, and technology. Retrieved November 2009, from <http://projects.coe.uga.edu/epltt/>