

# **E-learning and E-teaching; one step closer towards the concept of a Global University**

## **Abstract**

This paper describes our attempts to design a curriculum and a delivering mechanism that will enable engineering students at the school of engineering, Kabul University take classes at Southern Polytechnic State University (SPSU). The objective is to take a first step in building the concept of a global university based on e-learning and e-teaching. The need and rationale behind such an endeavor will be discussed. The characteristics of the two partner universities taking part in this project will be described. Attempt is made to propose an appropriate curriculum for an electrical engineering program. Problems associated with delivering lectures and laboratory experiments are mentioned. Last but not least the mechanism and instrument making the e-learning and e-teaching possible will be described.

## **I. Introduction**

The concept of global university was born through a conversation on the topic of international education and distance learning, during a faculty meeting at Southern Polytechnic State University. It was suggested that as an experiment, e-learning and e-teaching be used to deliver and teach courses for students at Kabul University to help them cope with the shortage of faculty.

Three decades ago, school of engineering at Kabul University was one of the best schools in the region. During the last 30 years Afghanistan underwent not only foreign occupation but also years of civil wars as result of foreign interference. Consequently, the school of engineering, like every other institution in that country, is no longer what it was years ago. 98% of the faculty, if not imprisoned or killed, was forced to leave the country. During the last three decades, Afghanistan was faced with a massive exodus of professional engineers. It took the unfortunate event of 9/11 for the world to finally pay attention to what was going on in Afghanistan and take action. Today the school of engineering is not capable of educating 1/2 of what it could educate 30 years ago. On the other hand the need for higher education especially in engineering majors is 10 times higher today than it was 30 years ago.

## **The concept of global university**

The idea of international university is as old as the idea of the university itself [5]. The Medieval and Renaissance universities in fact were international institutions. There are, presently, universities that are called Global University or World University. Our concept of a global university is unique. It is an institution of higher education and professional development whose mission is to educate eligible students from around the world. It is a university where any qualified instructor in the world, willing to teach, can teach and any eligible student in the world, willing to learn, can attend. There are no constraints with regard to the distance, size, enrollment or number of graduates. Both the teacher and the student can teach and learn respectively any time of the day/night. The student does not pay and the faculty is not being paid. What makes this concept possible is e-learning and e-teaching.

## **E-learning and e-teaching**

Distance learning is not a new phenomenon [4]. Its roots date back to 1700 when in USA first advertisement on correspondence learning was published in the press. The term distance learning or distance education is extensively used by colleges and universities to describe remote delivery of course contents. It usually refers to off-campus sites, web-facilitated courses, and web-based (online) courses. Development and assessment of synchronous and asynchronous distance learning curricula has gained a large momentum due to the new emerging virtual universities. In the last decade a rapid development of information technology, telecommunications and Internet has opened new horizons for Distance Learning providing new magnificent opportunities for mankind in the area of education. E-learning tools have progressed far beyond the audio and video streaming. Today's e-learning combines rich media with content development and delivery technologies to offer added value for universities and students.

E-learning content incorporates technologies such as Flash and Shockwave animations, streaming video interactive simulations, and audio and video-enabled power point presentations, offering compelling, impressive experiences that make even highly complex topics easier to learn, understand and remember. Point to point (P2P) caching and content distribution systems help universities take maximum advantage of existing infrastructure and minimize the impact on expensive networks. P2P communication technologies such as instant messaging, online meetings and small-group chat sessions augment media-rich content modules and classroom sessions. The Extensible Markup Language (XML) and sophisticated content management systems provide an open, standards-based approach to creating, organizing, and tracking "learning objects" and combining them as needed.

## **II. BS degree in electrical engineering program**

The first step towards building the future global university will be implementation of a BS in Electrical Engineering program. School of Engineering at Kabul University consists of the following four programs: BS in Electrical, BS in Mechanical, BS in Civil and BS in Architecture. Electrical Engineering has been decided to be the first program to be taught using synchronous and asynchronous e-teaching and e-learning. All courses will be taught in English by SPSU faculty, with classroom and laboratory assistance provided by local faculty drawn from local faculty of the School of Engineering at Kabul University. There are many reasons why electrical engineering has been chosen to be the first major to be e-taught. Two most compelling reasons are availability of volunteer instructors and the fact that SPSU is planning to have a brand new evening electrical engineering program. All physical facilities and equipment are the responsibility of Kabul University. SPSU faculty will travel to review facilities and equipment to ensure that they are appropriate for e-learning. Kabul University will provide classrooms, computers and software, internet connections, projection and other instructional equipment.

### **Laboratories:**

It has been argued that the ease of transfer of different disciplines from on campus teaching to online teaching is discipline dependent. In engineering disciplines, laboratory experiments

always served as the tool for relating the theoretical world to the real one. Other disciplines on the other hand do not necessarily require extensive hands-on labs. Practical or hands-on experiments delivered in traditional laboratory settings are now delivered through simulation software. Even though simulation is needed to reinforce concepts, practical experiments develop the student's skills in dealing with the real instrumentation. SPSU is one of the pioneers and believers in hands-on and applied engineering in the USA. Therefore, although virtual labs have emerged and could be use to give the students the practical experience it has been decided that laboratory experiments will be performed locally at Kabul University and the laboratories will be staffed by local faculty. It is understood that the SPSU faculty will visit the lab facilities to determine if the facilities and equipment are comparable to those at SPSU.

**Table 1. Proposed Electrical Engineering Curriculum.**

| <b>Electrical Engineering - Bachelor of Science</b> |        |                                       |   |          |   |
|-----------------------------------------------------|--------|---------------------------------------|---|----------|---|
| Essential Skills                                    |        |                                       |   | 9 Hours  |   |
| ENGL                                                | 1101   | English Composition I                 |   |          | 3 |
| ENGL                                                | 1102   | English Composition II                |   |          | 3 |
| MATH                                                | 1501   | Calculus I                            |   |          | 4 |
| Institutional Options                               |        |                                       |   | 4 Hours  |   |
| SPCH                                                | 2400   | Public Speaking                       |   |          | 2 |
| STS                                                 | 2400   | Science, Technology, and Society      |   |          | 2 |
| Mathematics, and Technology                         |        |                                       |   | 11 Hours |   |
| MATH                                                | 1502   | Calculus II                           |   |          | 4 |
| PHYS                                                | 2211K  | Principles of Physics I               |   |          | 4 |
| PHYS                                                | 2212K  | Principles of Physics II              |   |          | 4 |
| Social Sciences                                     |        |                                       |   | 12 Hours |   |
| ENGR                                                | 3424   | Engineering Economy                   |   |          | 3 |
| Area F                                              |        |                                       |   | 18 Hours |   |
| MATH                                                | 2206   | Probability and Statistics I          | 3 | 0        | 3 |
| MATH                                                | 2401   | Calculus III                          | 4 | 0        | 4 |
| MATH                                                | 2403   | Differential Equations                | 4 | 0        | 4 |
| CHEM                                                | 1211K* | Principles of Chemistry I             | 3 | 3        | 4 |
| ENGR                                                | 2214   | Engineering Mechanics — Statics       | 3 | 0        | 3 |
| Major Requirements                                  |        |                                       |   | 68 Hours |   |
| ENGR                                                | XXXX   | Engineering Science Elective          | 3 | 0        | 3 |
| EE                                                  | 1XXX   | Foundations of Electrical Engineering | 2 | 1        | 2 |
| EE                                                  | 1XXX   | Engineering Programming               | 3 | 0        | 3 |
| EE                                                  | 2XXX   | Circuit Analysis I                    | 3 | 0        | 3 |
| EE                                                  | 2XXX   | Digital Logic Design                  | 3 | 3        | 4 |
| EE                                                  | 2XXX   | Circuit Analysis II                   | 3 | 3        | 4 |
| EE                                                  | 2XXX   | Electronic Devices and Systems        | 3 | 0        | 3 |
| EE                                                  | 3XXX   | Microprocessors and Embedded Systems  | 3 | 3        | 4 |

|                      |      |                                                |     |   |   |
|----------------------|------|------------------------------------------------|-----|---|---|
| EE                   | 3XXX | Microelectronics                               | 3   | 3 | 4 |
| EE                   | 3XXX | Communication Systems                          | 3   | 3 | 4 |
| EE                   | 3XXX | Electric Machines                              | 3   | 3 | 4 |
| EE                   | 3XXX | Signals and Systems                            | 3   | 0 | 3 |
| EE                   | 3XXX | Electromagnetic                                | 3   | 0 | 3 |
| EE                   | 4XXX | Control Systems                                | 3   | 3 | 4 |
| EE                   | 4XXX | Professional Practice                          | 2   | 3 | 3 |
| EE                   | 4XXX | Senior Design Project                          | 1   | 6 | 3 |
| EE                   | XXXX | EE Electives                                   |     |   | 9 |
| XX                   | XXXX | Technical Elective [EE or Engineering Science] |     |   | 3 |
| Degree Program Total |      |                                                | 128 |   |   |

### III. Online course delivery systems

A distance learning management system (DLMS) is the platform used by most institutions for the delivery and tracking of blended learning, i.e., online and traditional learning. [1] A robust DLMS should provide a seamless integration for educational, administrative and supervisory tasks. As with any online system, a DLMS system must offer security by selectively limiting and controlling access to online content. It also must be scalable to meet future growth in the volume of instruction and/or the size of the student body. The system must be user-friendly to facilitate the distance learning experience. It also should be built on an open architecture that supports content from different sources and is interoperable with different platforms. Several platforms, listed in Table 2, are available in the market and an excellent review of some of the features offered by these platforms and others can be found on the instructional technology site of Marshall University

**Table 2. On-line Learning Management Systems (DLMS) [1]**

| DLMS          | Company                             |
|---------------|-------------------------------------|
| Angel™        | CyberLearning Labs, Inc.            |
| WebCT™ /VISTA | WebCT, Inc.                         |
| Blackboard™   | Blackboard Inc.                     |
| Desire2Learn  | Desire2Learn Inc.                   |
| Embanet™      | Embanet corporation                 |
| eCollege.com™ | eCollege                            |
| IntraLearn™   | IntraLearn Software Corporation     |
| Symposium™    | Centra Software                     |
| Convene™      | Learning Technology Partners (LTP), |

The most popular DLMS systems are Blackboard™, WebCT™, Desire2Learn™ and Angel™. The Angel platform is gaining a large popularity due to its open and flexible architecture and ease of use despite that it does not contain as much features as the two leading DLMS. The different DLMS systems provide several multimedia capabilities such as:

- Different text formats: PDF, DOC, HTML, XML, and PPT.
  - Different Graphic formats: JPEG, TIFF, BMP.
  - Streaming Audio: MP3, WMA.
  - Streaming Video and animation: AVI, MPEG, WMV, Flash, and Shockwave.
- In addition, there are many Web Conferencing softwares that are simpler and user-friendlier for both the teachers and students, such as:  
Live Classroom, Wimba, ECP software, Breeze, Macromedia, vRoom, Elluminate, Skype, GoToWebinar, GoToMeeting, Webex,

#### **IV. Wimba classroom, to be used as e-teaching tool in global university**

As it is evident in the table given above there are many products with similar synchronous and asynchronous elements. However, we at SPSU have chosen Wimba Classroom for this particular project. Mainly because Wimba Classroom is designed specifically for classroom use and it is fundamentally and pedagogically superior in the way it supports interaction with and among students.

Wimba Classroom is a web-based software that supports interactive audio, video, application sharing, polling and allows users to communicate with each other online in real-time through multiway voice and video. Additionally, classroom facilitates public and private text chat, for those who are more comfortable with writing than speaking. It also has a phone conferencing function. A user-friendly interface gives the presenter/s the power to display PowerPoint slides, Microsoft Word and Excel documents, web pages, PDF documents, Flash presentations and more. Online polls and surveys can be taken in real-time; and application sharing allows a presenter to show or share any application running on his or her computer with all participants in a presentation.

Classroom presentation content, including voice, chat and video, can be archived, so students can go back asynchronously and review course content if the instructor sets up the course in this manner. Wimba Classroom participants must have a USB or Bluetooth headset with a microphone attached; a webcam, if they wish to broadcast video; and a highly recommended DSL or cable modem internet connection.

At the electrical and computer engineering department of Southern Polytechnic State University, this software is being used in teaching a number of on-line courses very successfully. The author has taught a senior course “Control Systems” on-line for short periods of time using this software with utmost satisfaction.

Instead of face-to-face classes, students are required to attend synchronous on-line Webcasts as scheduled. Course materials, such as the syllabus, schedule, PowerPoint notes, handouts, etc. were stored on the server and students could download them prior to class. The instructor controls what the students are allowed to do. Students cannot speak until given permission by the instructor. Normally, students click a button that indicates they are holding up their hand, like in a face-to-face class, asking permission to speak. The software has the ability to conduct tests, and instant surveys.

Course materials such as PowerPoint slides were loaded on the server and shown during the class. Two other significant features of the software that supported the interactivity of the course are the smart board and application sharing. Using the smart board the instructor can write freehand equations, draw charts and type text on the whiteboard. All students can see the screen and ask questions if not clear.

With application sharing, the instructor can share anything that is running on his/her computer with the students [2]. This feature allows the instructor to bring up an application such as Excel and create programs or manipulate data as the students watch on their computer monitors. The instructor can pass control of these applications to the students. The students do not have to have the same application software on their computers. Live on-line office hours were conducted one hour per week. During the office hour sessions, students asked questions about problems they were having. The instructor could then point out where the students were making mistake and how to correct it. Also, other students could see the attempted problem solution and hear the discussions as well as ask questions or offer help in solving the problem.

## V. Conclusions

It was shown that online courses can be an effective way to deliver a course to students at remote locations. The system appeared to work equally for students here in USA as well as for a number of students at Kabul University. The software appeared to work equally well for both locations. Student performance in this on-line course was about the same as a traditional face-to-face course. The main obstacle and difficulty, at the moment, seems to be lack of instructors volunteering. The work is continuing, other sister institutions that use the same software tool, all over the world, are being contacted and solicited for taking part in the project. As a result more and more volunteers are expected to join us in the very near future.

## VI. References

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