NEWSLETTER

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Guest Editorial

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Technologies for Higher Education

Indian higher education institutions are becoming very busy! Close to 10 lakh students took the GATE exam in 2013. This means that there are not only 10 lakhs engineers "out there" but are also interested in pursuing higher studies. . If educational institutions have to do justice to this growing population of engineering students coming to the colleges to learn, gain knowledge, and become "employable,"

we have to gear up to face many of the challenges that come with this scale. In my opinion as a teacher, the most important of the challenges we face is engaging the students constructively and keeping in touch with the progress during the entire time they are with us. This requires that we give space to the students to grow and teachers take on the role of facilitators instead of preachers on a podium. Learning has to become student-centric rather than classroom-centric.

Reflecting on the kind of scale we are talking about, I feel we as educators have no choice but to bank on technology to help us meet the challenge. In this article I will try to throw some light on the direction in which some of the technologies are heading and how educational institutions can embrace and leverage these practices. I will specifically talk about how higher educational institutions can leverage from LMS, lecture capture solutions, lab-in-a-bag, and cloud offerings to meet the emerging challenges.

Learning management systems (LMS) are (generally) web-based systems that can be used to manage the entire learning lifecycle of students in an educational institution. LMS allows the teacher and students interact in a way that has never been possible earlier. LMS serves as a "one-stop-shop" for lectures, notes, assignments, quizzes, and even discussions. It is organized in a way that everything pertaining to a course offering is available in a single place in an easy-to-use user interface. With the use of LMS, the teacher-student interaction moves from becoming a synchronous activity requiring face-to-face interaction to an asynchronous activity that frees the students and the teachers to interact as per mutual convenience. Indeed slide presentations have been pretty much adopted across the board in most class rooms today. But the time has now come to commit ourselves to LMS without which managing the learning environment in an educational institution is only going to become more and more difficult.

MOOCs (Massive Online Open Course) are revolutionizing the e-learning scene. MOOCs take the anytime-anywhere learning to the extreme. While there is no question about the impact and reach of MOOCs, the true academic rigor that goes into these courses is yet to be established. So the existing regulatory structures make it difficult for universities and colleges to directly adopt and offer existing MOOC for credit to students. But one small leaf to take out of the MOOC experience is the ability to listen to the instructor's lectures over and over again any number of times from anywhere. While the university may not permit us to offer or use existing MOOC courses directly, one can always use powerful and easy-to-use lecture capture solutions that permit lectures of our own faculty to be recorded and played back on demand by the students.

Another trend that is being seen in campuses today is the concept of BYOD (Bring Your Own Device) or Lab-in-a-bag. The traditional computer labs with rows and rows of desktop computers arranged in large rooms are becoming an infrastructure nightmare. Just spending a few minutes with your IT support personnel will reveal the difficulties with hardware maintenance, virus management, patch management, application software installations, and so on. While we cannot completely avoid such computer labs, we should encourage students to start working on their own machines. The institution only needs to take up the responsibility of making available legal copies of all the software needed for the courses but the installation and keeping it going is the student's responsibility. Trust me, your IT department will thank you for this!

One criticism of allowing the students to have their own systems (laptops or desktops) is that there is no control on the software versions, environments, etc. One solution to this is to look at adapting cloud solutions. One can use public cloud offerings that provide pre-configured software development environments configured exactly as needed. Almost all the cloud providers provide academic discounts. Using cloud services gives us greater flexibility in terms of environments compared to procuring, managing and building our own servers. If there are sufficient IT skills available within the institution, then setting up a private cloud is a great option too. I know of institutions where senior students have been roped in successfully to maintain and manage private cloud environments. Once an appropriate cloud set-up is in place, what software the students run in their devices does not matter anymore. They will only be expected use their device to connect to a compliant pre-configured environment to do their project or assignment or homework. While not directly related to student learning, education institutions can immensely benefit from cloud-based solutions that offer Software as a Service (SAAS) too.

In summary, the class rooms of today have outgrown the slide-lecture era. But we as educators in higher learning are facing challenges that can hardly be solved using the traditional learning environments. In this article, I tried to highlight some of the ways in which we can attempt to take the knowledge to the learners rather than struggling to draw the learners to the class rooms to disseminate knowledge. Indeed, we have some way to go but it is never too late to start.

Dr. Chandrashekar Ramanathan

From Chairman's Desk

The recent book The New Digital Age by Eric Schmidt (Executive Chairman, Google) and Jared Cohen (Director, Google Ideas) discusses the "Reshaping of the Future of People, Nations and Business.". The book starts with the observation that "the Internet is among few things humans have built that they don't truly understand". They further point out that "what began as a means of electronic information transmission has transformed into an omnipresent and endlessly multifaceted outlet for human energy and expression".

Apart from Moore's Law, which predicts that processor chips double in speed every 18 months, the predictive law relating to photonics regarding the transmission of information, predicts that the amount of data being transmitted through fiber optic cables, the fastest form of connectivity, doubles every 9 months.

It is envisaged that major changes in Education are bound to happen "as rising connectivity reshapes traditional routines and offers new paths for learning "."Education will be a more flexible experience, adapting itself to student learning styles and pace". Children will go to schools, to socialize and be guided by teachers, "but as much, if not more, learning will take place employing carefully designed educational tools." Flipped classrooms are becoming popular, with lectures being replaced by videos watched at home, as homework, and using school time for traditional homework.

In terms of the future, the authors refer to the Ray Kurzweil book The Age of Spiritual Machines: When Computers Exceed Human Intelligence, in which he stated that "Technology is the continuation of evolution by other means, and is itself an evolutionary process".

Prof. R. Natarajan

BITES Distinguished Guest Lecture on "Multi-Disciplinary Engineering as the Future Trend: Case of Nanotechnology"

Date: 4th April 2013
Venue: RVCE, Bangalore

Dr. Madhusudan .V. Atre (Head, AMD India) gave a presentation on "***Multi-Disciplinary Engineering as the Future Trend: Case of Nanotechnology***" at the Computer Science Dept, RV College of Engineering.

The talk started with highlighting the evolution of science and engineering – starting from ~300BC. This included the studies of Greeks, European, as well as the great Indian scholars. Starting from a very integrated multi-disciplinary study, the changing pattern of scientists and their approach to studying nature over the centuries was described, transforming into more specializations and silos. The key point made was that though studying nature started off as a multi-disciplinary philosophy, it became more specialized into various sciences and engineering disciplines – and is now re-morphing back into an inter-disciplinary approach.

To illustrate the multi-disciplinary philosophy in the modern context, Nano – technology, science, engineering was taken as an illustrative example. Natural and man-made systems, top-down and bottom-up approaches, the various industry sectors and related applications were illustrated.

Going deeper, various aspects of Nano-Electronics were brought out – Moore's Law and economies of scale in chips semiconductor chips and photo-voltaic, new materials and complexity, etc.

Various aspects of multi-disciplinary research were brought out in the synergistic areas of sciences, engineering, industries, applications and technology-management – thus paving the way for a hotbed of innovations. Exciting overlap of the Nano domain in medicines, diagnostics, drug delivery, energy storage and devices, transportation, construction, health and safety, etc.

Importance of technology management in the Nano world including health, environment, standards, legal, synergies between academia-government-industry were highlighted.

Lastly, the importance and role of academic institutions were discussed. Educational institutions should evolve as a catalyst and enabler encouraging students to develop multi-disciplinary skills. Some suggestions to this effect were made like:

- Setting up inter-disciplinary/departmental programs and courses spanning physics, chemistry, biology, and engineering.
- Involve engineering and management faculty to define an integrated approach
- Offer new career options through "new education" – courses, programs, research, faculty
- Integrate into ecosystem of industries, and their R&D initiatives
- Stimulate entrepreneurial start-ups, strong link between start-ups and VCs

In summary, the message was clearly brought out: multi-disciplinary approach to science, engineering, technology will become increasingly common. Barriers between various disciplines of sciences and engineering, medicine, biology, etc will crumble and overlap and the world see probably see lot more unifications of the various disciplines.

BITES Distinguished Guest Lecture on "Building Compelling Mobile Applications: Open Source Way"

Date: 2nd April 2013
Venue: PESIT, Bangalore

P N Anantharaman, Director Engineering at Adobe Systems India gave a lecture ***on "Building Compelling Mobile Applications: Open Source Way"*** at PES Institute of Technology.

In the foreseeable future, Smartphones and Tablets are expected to surpass the traditional desktop/laptop PC as the primary computing devices. However, due to the diversity of platforms, the software development process for mobile devices have remained complex. While programming the devices in the native language leverages the device capabilities optimally and can present rich UI, supporting multiple devices running different operating systems, with different screen sizes and resolutions has always been a hard and expensive problem. In addition, developers are required to debug and test across a large variety of devices. The "Mobile Web" approach presents an alternative to native programming. The recent advances in mobile web standards and the availability of several open source frameworks around HTML5 makes the development process for multi devices easy and cost effective. The lecture brought out in detail the mobile application development challenges and covered the emerging trends in the mobile development. Several open-source development tools like Adobe Edge code, Apache Cardova and Adobe phone-Gap were illustrated and their salient features and advantages were brought out. Phone-Gap provides a JavaScript Library that reaches out into the native APIs and is completely open source

Out of the box, Phone-Gap provides support for a number of basic device APIs like:

- Accelerometer
- Camera
- Capture
- Compass
- Connection
- Contacts
- Device
- Events
- Geo-location and many more

Debugging Phone-Gap applications are easy as they use just HTML/JS and one can use a browser and take advantage of Chrome Developer tools/Firebug to test application's UI.

Tools like Weinre allows the debugging and manipulation of Device API's from one's PC. Weinre can be configured as a server (there is a Mac version as well) and uses the developer tools from Chrome to provide hooks into the mobile app. For added functionality Phone-Gap provides a plug-in mechanism that includes OS-specific code/libraries and the JS to use it in Phone-Gap. Examples include PayPal, Facebook, and Push Notification etc.

The Lecture also touched upon Mobile Cloud Infrastructure which is combination of cloud and mobile networks to bring benefits for mobile users, network operators, as well as cloud providers. Big Data Analytics is an emerging field and mobile devices are data sources feeding Big data through Traffic Data, Location data, Images and Video, Browsing patterns etc. These present new opportunities for developing new applications, new visualization techniques. Mobile devices are also being considered as computing nodes for data processing.

The Lecture Concluded highlighting the opportunities available for open-Source Enthusiasts. They can

- Contribute to open source software for mobile systems
  - System stack: Android, WebKit, etc
  - Frameworks and SDKs: Apache Cordova, Apache Flex, WinRe, Jquery, etc
- Contribute to data and content that can be used in mobile applications