

# Education Methodology and Instructional Design for E-Learning in Universities

<sup>1</sup>Sonymol Koshy, <sup>2</sup>Dr. Sunil Kumar, <sup>3</sup>Dr. U. V. S Teotia

<sup>1,2,3</sup>Dept. Of Comp. Sc., Shri Venkateshwara University Gajraula, UP, India

## Abstract

The Adoption of Open Education by higher education institutions in a country like India will facilitate in teaching maximum students economically with the help of Web 2.0 technologies and Open Education Resource. In addition, this also opens up learning opportunities and methodology that are learner centric rather than institution centric. Open source software offers many approaches to address the technical challenges in providing optimal delivery of resources for E-learning. The availability and sustenance of free, quality online resources, necessary infrastructure to provide accessibility and the essential skills required for both online teaching and learning and finally a thorough method of testing to keep up the reputations and value of the degrees issued, must be explored by the universities and institutions who are committed to the purpose of providing learning opportunities to all.

This paper explores the potential of Open Education, the possible impact of Web Technologies on education in the Indian context and the exciting new learning opportunities for the students and higher educational Institutions. The concepts are explained using clear diagrams by the author.

## Keywords

Open Education, OER, E-learning, Online Skills, Web 2.0 Tools, Online Education Methodology

## I. Introduction

The student numbers for higher education are growing at a rapid pace and government funding is available just to very few institutions. Consequently, the immediate requirements of the current education scenario are; bridging the gap between secondary and higher education, making use of the varied possibilities of the digital era and help students to become internationally competitive. Every government expects the higher education institutions to teach maximum students at a lower price without compromising on quality. The adoption of Open Education can be an ideal solution. Open Education comprises of open licensing, open source, open content, open courseware, open access, open science, open educational resources, open data, open teaching, open assessment, open learning and open policy.

Educational institutions are putting their academic resources and services online to exploit the potential of the web. Online education or eLearning shows great promise in India in spite of the technical challenges. Open source software offers one approach to addressing the varied problems in providing optimal delivery of online learning. Academic institutions are slowly digitizing education through various methods like Virtual Universities and e-learning, Online Courses, Education Portals, open Courseware etc [1].

## II. Challenges for Indian Higher Education

The reality about the Indian higher education institutions is that the location and type of funding directly dictate the kind of philosophy in software selection. Such institutions fall under various categories as Government funded institutions relatively small in number, Private institutions with no grant but are located

at commercial hubs in good number and Private institutions with no grant but are located at rural areas in large numbers.

It is seen that Government Funded Institutions have all the resources for research and development and hence the personnel are dedicated to try and implement and develop various open source initiatives more easily. The second category have the funds and are more proactive to the changing face of the IT scenario and industry requirements. Moreover using open source gives them a lot of financial ease. But the last category though like to have financial ease have a low level of awareness as well as the personnel with the know-how and initiative to implement these software.

An independent study conducted by me on the higher education market show that all segments of the Indian higher education IT market are expressing significant interest in open source software products.

Some of the grave issues faced by the higher education institutions that need immediate attention are: the scarcity of high-quality teachers, inadequate infrastructure of the universities particularly their libraries, and the low quality of educational resources utilized at various universities and colleges. If these problems are not taken seriously, the number of students enrolling into these institutions will be drastically reduced and the students graduating from these Indian colleges and universities will be less and less employable due to the lack of necessary skills.

## III. Role of WEB 2.0 tools in E-Learning

E-Learning has evolved along with the changes and developments in web technologies. "Web 1.0 consisted of communication and course management tools, from web page to, course management systems, PowerPoint, email, bulletin boards, and chat rooms"- Steven Mintz [2]. "Web 2.0, the next stage of e-Learning focuses on more collaboration and improved interaction through a set of tools like Wikis, blogs, podcasts, media sharing, tags, and social networking" (Gokhle and Chandra, 2009). These allow students to interact, inquire, share resources and create collaborative projects enabling them to devise their own conceptual models for understanding. This automatically has created a paradigm shift in the nature of education delivery and receipt, dictating the time, technology and the way it is imparted. Wikis, Digital Storytelling, Live Chat using Adobe Connect, Photo Sharing and Tagging, Podcasts and Video Podcasts, Social Networking, RSS feeds, Twitter or Microblogging, Video, discussion forums, Virtual Reality Environments are all popular tools of Web 2.0 [3]. With the use of the new web services from Web 2.0, e-learning has been infused with the potential to make learning a more personal and social activity along with the immense flexibility.

Today's students expect a higher level of classroom interaction. So it is left to the teacher to decide how to transform teaching using new instructional technologies. Learning has now become a two-way process, with learners both receiving information and at the same time contributing information for other learners. Educators are also learners of a different kind. Thus, in the age of Web 2.0, information has become a public and accessible commodity, disseminated via interactive communities.

#### IV. Online Teaching & Skills Required

Online teaching is based on the educational principles as a course with clear learning objectives, a high level of student interaction, creation of an online learning community, activities and tools for online learning and frequent feedback. It requires the teacher to create activities to develop students' critical thinking and problem solving skills. From the point of view of the educators, it can be tricky as it requires careful preparation and instructors have to keep up with posts and replies between the learning community. Many find it difficult to communicate with students when they can't see a face to face without "real-time" communication [4]. Without good writing skills, an online environment for teaching can be overwhelming.

It is seen that the faculty members who strive to remain socially present with their online students are more successful than those who do not do so (Jordan, 2009)[5]. In the online learning environment, it is vital that the educators strive to create some kind of social presence in the courses they teach. This can be done by providing virtual office hours, sending weekly checklists, utilizing social networking websites for announcements and for forming professional relationships with students. It is one thing to facilitate collaborative learning in a traditional, face-to-face classroom setting, but quite another to do so over thousands of miles that span several time zones and cultures. In this context, the learning community exercises some special qualities (Irwin and Berge, 2006).

Developing students' online collaboration skills is another area to be taken care of. New students must also be introduced to e-citizensry. Proper online etiquette and guides must be created for students (e.g. how to compile a project report or guidelines to write a synopsis of a research). Seminal feedback is to be solicited from students so that any mid-course adjustments can be made. Students must also be egged on to share resources with their fellow students. Skills must include the seamless usage of different tools like discussion boards, teleconferencing, collaboration tools etc.

#### V. Education Methodologies and Web Resources

There are millions of students who cannot afford higher education. There is another section who would like to combine education and work and be life long learners. Both these sections would like to access education anytime, anywhere and also motivating since they learn alone away from the physical classroom. Adoption of Open Education might be seen as one of the most exciting approaches to education in the digital era. Open Education comprises of open licensing, open source, open content, open courseware, open access, open science, open educational resources, open data, open teaching, open assessment, open learning and open policy.

There are a number of nonprofit organizations that provide information about the available open source products and their usability and applicability. Open Source Software (OSS) Watch is an advisory committee funded by the Joint Information Systems Committee (JISC) that gives a lot of analyses of the legal, technical, and economic aspects of open source software implementation in the higher education sector. [6].

**A. Open Educational Resources (OERs)** are online resources that provide free applications and learning materials for academic institutions [7]. It refers to free learning resources that includes complete course materials, modules, journals, reference materials, and tools that enable users to create online learning management systems. Such materials can also be designed, published, modified

and redistributed to facilitate widespread use. (Fig 1) OERs are teaching, learning and research resources that reside in public domain that permits their free use or customisation by others (Bissell, A 2007) [8].

**B. Open Source Curriculum (OSC)** is a similar venture that follows the open source philosophy, thus, making source material accessible to all concerned (Fig 2). Designers, content experts, and technical advisors work together on a set of specific instructional goals. A complete curriculum is then created through an open exchange of ideas making these online open source curricula meet world-class standards.

#### C. Open Course Ware

MIT has a special forum called Open Course Ware that makes undergraduate and graduate course materials from MIT available on the Internet [9]. This has encouraged other good institutions to publish their courses online as well, surpassing the speculation that it would damage the exclusiveness of its courses. (Fig 3).

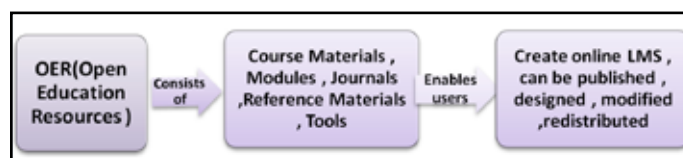


Fig. 1: Open Educational Resources

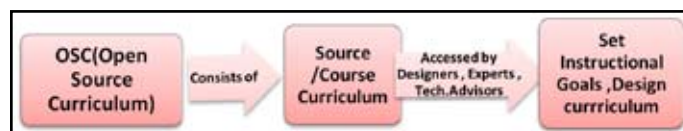


Fig. 2: Open Source Curriculum



Fig. 3: Open Course Ware

Another aspect penetrating the world of education very rapidly are the tools called Open Source Course Management System (CMS), also known as a Learning Management System (LMS) or a Virtual Learning Environment (VLE). These tools have become very popular among educators around the world in a short span of time. These are used mostly to create and manage learning content on the web by creating online dynamic web sites for students. Moodle is more widely used [10]. Brihaspati is an LMS from India developed as a joint venture of the IITs in India. These tools have varying degrees of compatibility with Linux, UNIX, Windows, Mac OS X, FreeBSD, and any other system that supports PHP, integration with IMS Content Packaging, SCORM, LAMS and other CMS such as Drupal, syndication with RSS.

**D. Mobile Learning** is a new way of learning for someone who is on the move all the time. The content is delivered to the learners through gadgets like Smartphone and devices such as the iPad thereby aiding them to learn without actually being in a specific place at a particular time. This kind of approach seems to be better for corporate learners rather than university students as the later are dedicated to learning for the particular period. The many benefits to delivering learning and support via mobile devices include Access anytime, anywhere, Just in time reinforcement and reminders

which can be great for product knowledge, compliance updates and performance support, Location specific opportunities include use of QR (Quick Response) codes, Extending the learning blend experience, Using cameras and video for user-generated content and informal learning.

**E. Rapid E-Learning** is another new methodology that is sure finding its foothold in education delivery method. Today, with changes occurring rapidly, one is continuously trying to cope up and deal with new products, courses, curricula, regulations, policies, procedures, systems etc. According to research by Bersin & Associates: a Leading Research and Advisory Services Firm in Enterprise Learning, Talent Management, Talent Acquisition, and strategic HR Solutions, 89% of companies need to develop e-learning solutions within three weeks [11]. A Forrester survey published in March 2010 found that rapid e-learning is the fastest growing part of the e-learning market [12].

Forrester found rapid e-learning is ideal where:

- speed is an issue and budgets are low
- content needs updating frequently and has a short shelf life
- content is being repurposed from other documents

Over 50% of organisations Forrester surveyed used rapid e-learning for:

- Compliance training
- Process and procedure training
- Desktop Systems/application training

## VI. Peer 2 Peer University

The mission statement of P2PU states that the Peer 2 Peer University is a grassroots open education project that organizes learning outside of institutional walls and gives learners recognition for their achievements. Leveraging the internet and educational materials openly available online, P2PU enables high-quality low-cost education opportunities. P2PU - learning for everyone, by everyone about almost anything. ([www.p2pu.org](http://www.p2pu.org))

The key principles of P2PU are openness, community, peer learning. This means that P2PU is open, and encourages sharing and collaboration that enable active participation and innovation. Everyone can use the content and can at the same time experiment and be a part of the development process. P2PU is a community-centric project where volunteers facilitate the courses, but the learners are in charge. So, respect for others opinions and perspectives is very important as the process of learning, review, feedback and revision are all done by peers (Fig 7). Peers in the same course review and assess each others' work and P2PU online certificates are offered at the completion of a course but any kind of accreditation or official certification are not issued.

The currently functioning P2PU Schools include School of Ed, School of the Mathematical Future, School of Social Innovation and School of Webcraft collaborated with Mozilla. Organizers of these P2PU courses submit their course idea and receive guidance from a wide array of experts and community members to create an all-inclusive syllabus of open materials which automatically helps in building a community-supported mentoring system. P2PU are also partnering with external organizations to cluster courses and create reputable schools of open learning and providing P2PU participants with a credible open education as in the case of the P2PU/Mozilla School of Webcraft. Rufus Pollock, Director and co-founder of the Open Knowledge Foundation, and Philip Schmidt, co-founder and Executive Director of Peer 2 Peer University have announced plans for a 'School of Data' on February 8, 2012, which will be a joint venture between the Open

Knowledge Foundation and Peer 2 Peer University (P2PU).

## VII. Open Study

It is a social learning network where independent learners and traditional students can come together in a collaborated and open multiplayer study group. The students ask questions, give help, and connect with other students studying the same subject making the world one large study group, regardless of school, location, or background. OpenStudy allows users to connect directly or indirectly through Facebook after the initial sign-in. The learners can join the groups of their choice to interact and learn collaboratively through profiles and group chat. This web-based platform makes it possible for students across the world to find answers to the questions through real-time interaction during the time of study though OpenStudy itself does not provide any study materials.

Anybody can access materials like OpenCourseWare it does not matter if the learner is undergoing a formal study or is someone who is learning informally outside the conventional academic system. The difference between OpenCourseWare and OpenStudy is that, while the former allows easy access to different kinds of educational material it rather leaves the learner isolated, OpenStudy provides the opportunity for individual interaction and discussion that is vital to the learning process especially if it is e-learning. OpenStudy has linked up with institutions include MIT, New York University and the University of California. Having just come out of beta in February 2011, OpenStudy now has over 100,000 registered students from more than 143 countries ([www.openstudy.org](http://www.openstudy.org)). These well-structured opportunities for learners to interact around our content magnify the value of our publication, especially for visitors with the most limited educational opportunities (Carson, 2010). The founders of OpenStudy, are now forging a partnership with the National Programme on Technology Enhanced Learning (NPTEL) in India. (The Hindu, Feb 2011).

## VIII. Proposed System Using OER -ORL University (Fig 4)

Existing educational delivery models are finding it increasingly difficult to address the growing global demand for higher education. Many countries are having a tough time in garnering the resources to build the number of conventional universities that would be required to meet the future demand for higher education. The proposed system is Open Resources Learning (ORL) university with the aim to provide free learning to all students worldwide using OER learning materials thorough a virtual collaboration of like-minded institutions. Through the participating institutions OERu will open methods for the learners to earn formal academic credit and pay reduced fees for assessment and credit.

The ORL university concept will help to create a parallel learning ecosystem based solely on OER for learners excluded from the formal education sector by participating in free learning provided through the ORL university network. They can enrol themselves in the conventional method with a fee if they choose to do so. This indirectly helps in providing higher education to millions of learners around the world who are unable to continue further education today due to funding issues. Anyone can access and learn from the free material on the web. But they neither receive help while learning or any kind of credit or degrees for their efforts at the end. Through its network of accredited institutions ORL university make high quality, higher education more affordable and resulting in credible qualifications

## IX. OER in the Indian Context

Adoption of Open Education can be one of the best approaches for higher education institutions to teach maximum students at a lower price at the same time maintain quality so the students are internationally competitive. Even though the road might be extremely challenging it is worth taking.

The Working Group on Open Access and Open Educational Resources (2007) [15] of the National Knowledge Commission states "Availability of all these technology will not ensure quality man power unless the Indian government, continuously reviews and upgrades our higher education system". India has approximately 300 universities, more than 13000 colleges, 80 lakh students and 400000 teachers making it one of the largest education systems in the world ([www.indiandiaspora.co.in](http://www.indiandiaspora.co.in)). However, the world class institutions are greatly outnumbered by the weaker institutions that lag behind the technological advancements that's happening elsewhere. The reasons for this are seen to be low penetration of ICT in some urban and rural parts of India, reliable communications infrastructure, lack of content in regional languages, poor standards and specifications and long development or gestation periods for implementation. Some of the grave issues faced by the higher education institution are: the scarcity of high-quality teachers, inadequate infrastructure of the universities particularly libraries, and the low quality of Educational Resources utilized at the various universities and colleges. These problems need to be addressed to preserve the employability of the students graduating out of our higher education institutions.

The National Knowledge Commission (NKC) recommends the increase in the amount of Open Educational Resources (OER) and Open Access (OA) as one of the steps in addressing these problems [16]. The easy and widespread availability of high quality educational resources will significantly change the education scenario for both the learner and the educator and bring a direct impact on the betterment of quality of education. The students will also gain access to global educational resources.

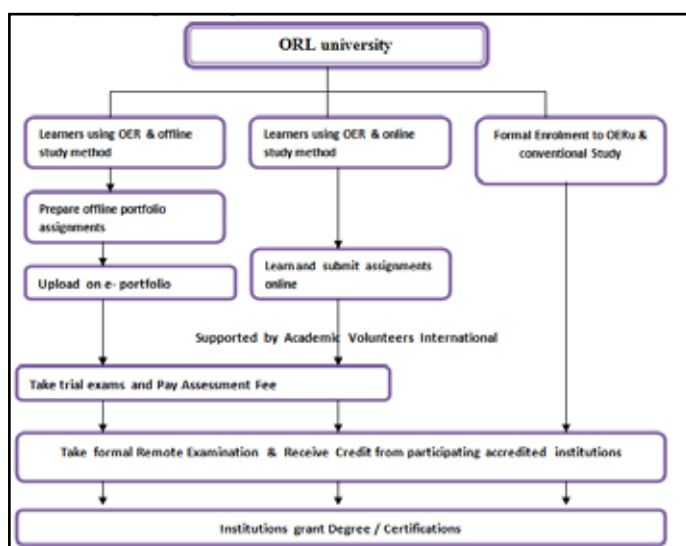


Fig. 4: ORL University

## X. Open Educational Resources

Open Educational Resources can be defined as free and open digital publications of good quality structured as courses that include lectures, related reading materials, snapshots of discussions, assignments, evaluations, etc created and evaluated by experts and can be accessed by anyone who wants to (Hewlett Foundation, 2008). Open Educational Resource material has been prepared in

an open standard format and is interactive in nature owing to the current use of Web 2.0 tools.

Several universities in the United States (MIT, Utah State University, Carnegie Mellon, Yale, Johns Hopkins University, etc) Australia, India and China are playing an active role in the development of open educational resources. Consequently, hundreds of courses and lectures on specific topics have already been made available from these universities. But even such institutions require financially sustainable models for OER development, maintenance, popularization, and periodic updating.

Some major initiatives in India, for creating OER are in the field of basic sciences and engineering sciences areas have been undertaken [17]. National Program on Technology Enhanced Learning (NPTEL) by the seven IITs, Ekalavya Project by IIT, Bombay, E-Grid Project Supported by The Human Resource ministry at IIT, Kerala, Inter-University Consortium for Technology-Enabled Flexible Education and Development at IGNOU (IUC-TEFED), India ([www.ignou.ac.in](http://www.ignou.ac.in)), 2004 BITS' Initiative by The Birla Institute of Technology and Science (BITS), Digital Library of India Hosted at the Regional Mega-scanning Centre at IIT, Hyderabad. (<http://dli.iit.ac.in/>).

Some of the other initiatives are by Department of Science and Technology, Ministry of Information and communication Technology and Human Resource Ministry Open Educational Resource initiative, to be truly beneficial to all types of learners, it is important that these resources cover broader areas of study and is to be developed in more regional languages especially for the agricultural sector.

The usage of OER among teachers can be increased by training faculty /teachers at various universities for content delivery and provide continuous adoption support. Centers of excellence must be identified so that the faculty of those institutions can create, modify, and expand these OER repositories. More areas like agriculture, teacher training, basic and applied sciences and engineering, technical education, liberal arts and social sciences, communication skills, law, public health and management need to be covered by OER. If standardized national evaluations are performed using this OER material then automatically both teachers and students will start using them more profusely.

## XI. Conclusion

With the student numbers are growing at a fast pace and the availability of government funding being rather grim, the compulsive requirements of the current education scenario are bridging the gap between secondary and higher education, students being internationally competitive, and making use of the all wide range of potential of the digital age.

Adoption of Open Education will aid millions of students who cannot afford Higher Education or those who would like to combine education and work and learn life long will be able to access education anytime, anywhere and also remain motivated enough to learn alone away from the physical classroom.

Universities and Higher Education Institutions must take advantage of OER and Open Education methodology thereby helping and mentor the rapidly increasing number of learners irrespective of their geographical location or socio-economic conditions. Reputed and established institutions who produce high-quality knowledge, teaching, and have a lot to gain, from Open Educational Resources without worrying about getting obsolete.

Online teaching is based on the educational principles as a course with clear learning objectives, a high level of student interaction, creation of an online learning community, activities and tools for



online learning and frequent feedback. This requires the teacher to create activities to develop students' critical thinking and problem solving skills. So Faculty development programmes focussing on online skills required for conducting e-learning classes and creation of appropriate material, must also be part of the university agenda in order to make this approach a productive and successful one.

At the end of the day the online students must feel supported and connected to both the institution and their instructors if the venture has to be truly successful. Future research regarding social presence theory in online learning environment and about holistic methodology that make online students feel more connected must be explored. The OER-OLR university is very ambitious venture to look out for, because it talks of open resources and accreditation. Peer to Peer University is great method of learning but it can be better if the learners can get certified from accredited institutions.

## References

- [1] Shaheen Kakhan, Kavita Jhunjunwala (2008), "Open Source in Education" (<http://creativecommons.org/licenses/by-sa/3.0/>).EDUCAUSE Quarterly, vol. 31, no. 2 (April-June 2008)
- [2] Steven Mintz, "E-Learning: Higher Ed in a Web 2.0 World", Columbia University Graduate School of Arts & Sciences Teaching center, [Online] Available: [www.columbia.edu / cu/tat/pdfs/e-learning.pdf](http://www.columbia.edu/cu/tat/pdfs/e-learning.pdf)
- [3] Pratibha A. Gokhale, Smita Chandra, (2009), "Web 2.0 and E-Learning: The Indian Perspective", DESIDOC Journal of Library & Information Technology, Vol. 29, No. 1, January 2009, pp. 5-13.
- [4] Credence T. Baker, Jennifer T. Edwards, (2011), "A Holistic Approach for Establishing Social Presence in Online Courses and Programs, The International HETL Review, Vol. 1, Article 7, 2011, Tarleton Univ, USA.
- [5] Lindsay Jordan, "Transforming the student experience at a distance: designing for collaborative online learning , engineering education, Vol. 4, Issue 2, 2009.
- [6] Christina Smart, (2005), "Choosing Open Source Solutions," JISC eLearning Focus, [Online] Available: <http://www.elearning.ac.uk/features/oss>.
- [7] William, Flora Hewlett Foundation, "Making High-Quality Educational Content and Tools Freely Available on the Web", Open Educational Resources, [Online] Available: <http://www.hewlett.org/Programs/Education/OER/openEdResources.htm>.
- [8] Bissell, A, "Some Guiding Principles for Legal and Technical Interoperability in OER", Proceedings of Open Education 2007; Localizing and Learning, Logan, Utah University, USA.
- [9] "MIT OpenCourseWare", [Online] Available: <http://ocw.mit.edu/OcwWeb/web/home/home/index.htm>
- [10] Barry Sampson (2009), "Open Source Alternatives to Moodle", [Online] Available: <http://barrysampson.com/2009/04/open-source-lms-10-alternatives-to-moodle.htm>
- [11] [Online] Available: <http://www.bersin.com/Practice/Subject.aspx?s=Content-Development>
- [12] [Online] Available: [http://blogs.adobe.com/captivate/2010/03/recording\\_forrester\\_webinar\\_on.html](http://blogs.adobe.com/captivate/2010/03/recording_forrester_webinar_on.html)
- [13] wayne-mackintosh, 2011, "introducing-oer-university-5-questions", [Online] Available: <http://opensource.com/education/11/3/introducing-oer-university-5-questions->

wayne-mackintosh

- [14] [Online] Available: <http://www.timeshighereducation.co.uk/story.asp?storycode=415127> , Feb 2011
- [15] Report of the Working Group on. Open Access and Open Educational Resources, 2007, [Online] Available: [http://www.knowledgecommission.gov.in/downloads/.../wg\\_open\\_course.pdf](http://www.knowledgecommission.gov.in/downloads/.../wg_open_course.pdf)
- [16] NKC: Recommendations: Open Educational Resources, 2007, [Online] Available: <http://www.knowledgecommission.gov.in/recommendations/oer.asp>
- [17] V. Venkaiah, Open Edu. Resources in India – A Study of Attitudes and Perceptions of Distance Teachers , Dr. B.R. Ambedkar Open University, India



Sonymol Koshy was awarded the B.E.(CSE) degree from Marathwada University Maharashtra, India, in 1990, MTech(IT) from Allahabad Agricultural University, Allahabad, India in 2006 and is presently pursuing Ph.D in Computer Science and Engineering with focus on Open Source, Education and Instructional Design .She started her career as an instructor to Defence cadets

at the prestigious National Defence Academy, Khakwasla, Pune, India and is currently conducting collaborative research in open source software at Apex Institute of Technology, Kaushalgarh, UP, India. Due to her interest in object oriented programming ,she worked for sometime as a software developer in Web based Java applications and EJB. She has authored and edited many books based on Computer Applications and core Java. Her main research interests are Open Source Software in Education and Industry .



Dr. Sunil Kumar is currently the Head of the Department of Computer Science at Shri Venkateshwara University, Gajraula, Distt- J.P. Nagar (U.P.).



Dr. Udai Vir Singh Teotia was awarded M.Sc (Botany& Microbiology), LL.B and Ph.D from CCS University. Meerut. He has established many higher education institutions in north India and worked as Director in many reputed Institutions beside that he is having 22 years of research and administrative experience. His main research interest is higher Education reforms in India and inducted new job oriented vocational courses in

higher Education sector. Currently he is working as Professor cum Director (Life Sciences, Academic and Research) at Shri Venkateshwara University, Gajraula, Distt-J.P Nagar (U.P)