

# E-Learning: Tools and Opportunities for Enhanced Learning

## Abstract

Distant education courses offered by universities have been around for quite a while but online learning has emerged during the last decade. A number of universities across the world are offering courses through online mode called Massive Open Online Learning Courses. For developing good quality e-content in India Ministry of Human Resource and Development has assigned National Programme of Technology on Enhanced Learning for engineering, Consortium for Educational Communication for undergraduate education, National Council for Education Research and Training for school Education and Indira Gandhi National Open University for distance learning course contents. Universities like MIT also offer a number of courses through online learning mode. A good number of courses are available for free. In this paper a brief overview of such efforts at National and International levels has been presented with particular reference to science courses.

**Keywords:** Massive Open Online Learning Courses, e-content, MOOCs.

## Introduction

Availability of high speed internet, and its access to people at large, has had a profound impact on teaching and learning process. Live telecast of lectures by experts in real time has brought learning to remote parts of the world. A large number of resources are available online in the form of e-books, videos, activities, worksheets, question papers, online evaluation software, lectures of eminent personalities, power point presentations, animations, assignments, various e-learning tools developed by government and individuals has brought a revolution of sorts in the field of education. A good number of e-learning resources, online courses are free also called open courseware or OCW. OCWs help one learn at one's own pace and ease to acquire skills and knowledge that will enhance earning. Massive open online courses (MOOCs) are available online for free.

## Objective of the Study

This paper presents a brief overview of the recent developments in generation of e-content for education in India and at Global level. NPTEL, Vyas Channel, CEC, Spoken Tutorial Project etc. are the concepts developed under the aegis of Ministry of Human Resource and Development, India. NCERT, CBSE, UGC and various IITs in India are actively involved in developing a quality material. Internationally a number of universities have developed free and open content learning material. MIT, University of Michigan and open courses of various universities provide a quality content for teachers as well as students. Under Openchem project of Univeristy of California Irvine a number of video lectures are available for various topics in chemistry. We arrange shows of these video lectures in Chemistry Department of our college. This is a very exciting development in the field of Higher Education. This paper highlights these efforts particularly with reference to study of sciences. A teacher can use a number of such tools in class for effective teaching. During this study webpages of the mentioned universities/organizations were visited to study programmes offered by these organizations.

## Initiatives in India

UGC has also realized the importance of MOOCs in higher education. A day state level workshop was organized on MOOCs at RUSA State Project Directorate Chandigarh. The workshop was attended by 51 faculty participants (The Tribune, 2018). SWAYAM is an indigenous online learning platform supported by MHRD (ministry of Human Resource and Development). SWAYAM courses are offered free to learner (Financial Express, 2017). One can earn certification with nominal fee. Here is a brief look at initiatives in India.



**Ravinder Jeet Singh**

Assistant Professor,  
Deptt. of Chemistry,  
Samrala Road, A.S. College,  
Khanna, Ludhiana, Punjab

National Programme of Technology on Enhanced Learning (NPTEL) is a programme funded by Ministry of Human Resource and Development (MHRD) Government of India. The programme will develop a vast pool of educational resources for technology and engineering. 269 courses are open for enrolment for July to December 2018. The content for these courses is developed by senior faculty of seven IITs (Indian Institute of Technology) at Bombay, Delhi, Guwahati, Kanpur, Kharagpur, Madras, Roorkee and Indian Institute of Science (IISc) Bangalore. The courses are normally of four to twelve weeks duration. The courses and Aerospace Engineering (5), Agriculture Engineering 6, Architecture (5), Biotechnology and Engineering (15), Chemical Engineering 8, Chemistry 11, Civil Engineering 26, Computer Science and Engineering 29, Design Engineering 4, Electrical Engineering: 35, Humanities and Social Science 20, Management 24, Mathematics 17, Mechanical Engineering 31, Metallurgical and Material Engineering 10, Mining Engineering 1, Multidisciplinary 10, Ocean Engineering 3, Physics 6, Chemical Engineering 1, Textile Technology 2. These courses are free however nominal charges are applicable for certification for which one has to appear in an exam (NPTEL 2018.)

#### **Consortium for Educational Communication (CEC)**

In 1984 UGC (University Grant Commission) started country wide classroom program and use of television media for dissemination of knowledge. The efforts resulted in formation of CEC. Presently there are 21 media centres working under CEC. CEC uses broadcast and non broadcast modes for educational communications (CEC 2018).

#### **VYAS Channel**

This is a higher education satellite channel. Educational content for undergraduate course is presented for enriching classroom teaching. The channel is available by DTH or online at [www.webcast.gov.in/vyaslive](http://www.webcast.gov.in/vyaslive).

#### **EMRC**

Educational Multimedia Research Centre was established by CEC (Consortium for Educational Communication) in 1989 as Audio Visual Research Centre (AVRC) under the Country Wide Classroom (CWC) project. The centre was established mainly for the production of audio and video educational programmes, studying and promoting new techniques for effective educational communication. EMRC has produced more than 20000 educational video programmes. In Punjab EMRC centre is situated at Punjabi University Patiala.

#### **National Mission in Education through ICT (NMEICT)**

This programme was started by MHRD (Ministry of Human Resource and Development) with the aim of increasing Gross Enrollment Ratio by 5%. Another aim of NMEICT was to do R&D for generation of quality education content, establishing virtual labs, lab centres and finishing schools. A virtual technical university was also envisaged under this programme for strengthening distance learning and providing world class teaching resources and educational

content. Content generation and connectivity among 100 institutions and learners were thrust areas (MHRD 2016).

Spoken Tutorial Project: Spoken tutorial Project was launched by MHRD Government of India under the 'Talk to a Teacher' initiative under NMEICT. The programmes aim to address the issue of digital divide and create software literacy among academia and students. Some of the FOSS (Free and Open Source Software) software trainings offered are: Linux, Python, Scilab, Latex, Avogadro, C and C++, GIMP, Blender etc. More than 46 lakh students have participated in over 93000 online training workshops offered under this project. Certification of some courses can be availed after appearing in a test. The project is being run in collaboration with IIT Bombay and large number of colleges have joined as resource centres (Spoken Tutorial 2018). The training workshops were absolutely free till 2017-18 sessions. However from 2018-19 session colleges have to pay a nominal fee and unlimited certifications can be obtained. Harjinder Singh a student of B.Sc. at A.S. College, Khanna created animations in chemistry using blender animations after attending spoken tutorial workshop on Blender Software, although it was not a part of the curriculum.

#### **International Online Courses Carnegie Mellon University**

Under the Open Learning Initiative (OLI) the university offers 32 courses. No credits are given for these courses and hence no fee is charged. The platform is meant for the educators and the students for enhancing their learning. Some of the courses offered in the field of science are: Chemistry (Stoichiometry), Modern Biology, Biochemistry, General Chemistry, Virtual Chemistry Lab, Anatomy and Physiology etc. These are very exhaustive courses for educator as well as students. There are 15 modules offered under one course of Chemistry (Stoichiometry), (OLI 2018)

#### **Massachusetts Institute of Technology**

The university offers courses from entire curriculum under the OCW (OpenCourseWare). There are no credits, no fee and no exams. The learning material can be used for enhancing, enriching teaching and learning experience. Video lectures, online text books, assignments are available for various courses. One can download the files and share with others also. The school of science offers material on Biology, Chemistry, Brain and Cognitive Sciences, Earth, Atmospheric and Planetary Sciences, Mathematics, Physics. Around 48 courses are available under chemistry alone for undergraduate and graduate chemistry students. Apart from theory modules it also includes videos on chemistry experimentation. Advanced Kitchen chemistry is one of the popular courses in lab category (MIT 2018).

#### **University of California**

Open Chem project of the university comprises video lectures for undergraduate students. UCI Open courses are offered to learners as well as professors. 17 courses are available under this initiative. There are 28 lectures under the Organic Spectroscopy section. Full curriculum is provided

under this section (UCI 2018). In addition a number of courses are available for Chemistry, Physics and Astronomy, Earth System Science and Mathematics under Physical Science Section. Under Biological Section two courses are available. The university launched its opencourseware programme in November 2006.

#### **Carnegie Mellon University**

The university offers a large number of programmes under the OLI (open learning initiative). In chemistry video lectures are available on stoichiometry divided into two units and 15 modules. There are total 32 different courses, of different streams, available on the website. One has to register for viewing the courses (CMU 2018). The courses are free.

#### **American Inter Continental University**

The university offers courses in Business, Information Technology, Healthcare Management, Criminal Justice, Design and Education. The degrees offered are Associate, Master, Bachelor, and Certificate-Diploma. The fee per course may vary from around 15000 to 60000 dollars (AICU 2018).

#### **The Open University**

The University in UK offers distance and online courses. According to university website 2 million students have got education from the university worldwide. It offers certificates, diplomas, short courses, undergraduate and postgraduate degrees, BSc (Honours) Natural Sciences in Earth Sciences, Biology, Chemistry, Physics, Astronomy and Planetary Sciences. Degrees in Mathematics, Law, Engineering, Arts and Language (French, German) are offered. Recently the students Open University's School of Physics were allowed access to robotic telescopes COAST and PIRATE controlled remotely. This enabled students to operate telescopes as a part of their studies (TOU 2018).

#### **Open Education Consortium**

The OEC is a nonprofit global network of open education institutions. 243 institutions from 44 countries are members of OEC. The Consortium offers a search engine on open education resources (OER) in collaboration with MERLOT. MERLOT is a programme of California State University that began in 1997. MERLOT established as a consortium of around hundred campuses. The search engine takes you to vast educational online resources for students as well as teachers. We searched 'chemistry' in OEC and it takes you a large number of resources particularly high school chemistry, virtual chemistry text book. We got a link to 40chemistry practical demonstrations created by University of Leeds. Some downloads may require nominal charges. The University is recognized by Maters State Commission on Higher Education (MSCHE) Philadelphia. (OEC 2018)

#### **Indira Gandhi National Open University (IGNOU)**

IGNOU was established in 1985 for providing education through open distance learning mode. The university has 21 school of studies, 67 regional centres and 29 overseas centres which cater to the educational needs of about 3 million students. The university offers courses on virtual classroom

platform. The courses are: Virtual Education in Sustainable Development, Virtual Education in Health Sciences, Virtual Education in Law, PG Certificate in Cyber Law, Virtual Education in Agriculture, PG Diploma in Food Safety and Quality Management, PG Certificate in Agriculture Policy, PG Diploma in Food Science and Technology, Certificate course in Spanish language, PG Certificate in Medical Informatics, PG Certificate in Health Insurance, PG Certificate in Quality Management in Health Care. University also offers diploma, degree and PG courses through its Centre for Para-Medical Sciences (IGNOU 2018).

**eGyankosh:** eGyankosh was launched by Indira Gandhi National Open University (IGNOU) on June 09, 2008. The website offers 2389 videos programmes for learning. A nominal charge is applicable for downloading important notes (India Today, 2016). e Gyankosh offers 1040 topics of Chemistry alone.

#### **Coursera**

Coursera is an open education platform was founded in 2012 by Professor Daphne Koller and Andrew Ng. One can earn certificates/ degrees/ diplomas from the top universities of the world. More than 2700 courses are offered in about 250 specialisations. Indian School of Business (ISB) of India is associated with coursera. Some free courses available with coursera are: Powerful tools for teaching and learning Web 2.0 tools by University of Houston Systems, Antibiotic Stewardship by Stanford University. There are 330 courses available for Physical Science and Engineering and 511 for Computer Science (Coursera 2018).

#### **Open 2Study**

The website is a good repository of short term courses. A one month course may typically include 8-9 video lessons, quizzes and assignments per module. These courses can take one to the accredited courses offered in Australia. Under the science and technology some of the courses listed are-Basic Physics, Climate Change, and Big Data for Better Performance, Early Childhood Education, and Education in a Changing World, Emergency Management, Microbiology and Forensic Science, The Human Body as a machine, Water in a Thirsty World, Astronomy: Discovering the Universe. Accredited Courses are also offered through Open University Australia. Open university Australia offers 190 courses online from Curtin University, Australian National University, Griffith University, University of South Australia etc. (Open2study 2018).

#### **Conclusion**

Universities across the world have recognized the importance of providing education through online platform and distance education. Online platform at present is more popular for knowledge enrichment. As a matter of fact employers still prefer to have professional with a regular degree rather than earned by distant education. Online learning is a great tool for the students residing in remote areas, educational institutes with limited resources. It offers an opportunity to busy professionals for learning at their own pace and time. In coming times online certification will increase in

quantity as well as quality. In the onsite visit a number of videos on science experiments were also found. However it would be difficult to use these videos as a complete alternative to lab work. Simulations are a great way of learning difficult experiments.

#### References

1. AICU 2018. <https://www.aiuniv.edu/degrees> retrieved on 2.10.2018
2. CEC 2018 <http://cec.nic.in/Pages/Home.aspx>IGNOU 2018. <http://www.ignouonline.ac.in/CPMS/> and <http://www.ignouonline.ac.in/VirtualClass.htm> retrieved on 5.10.2018
3. CMU. 2018. Carnegie Mellon University. <http://oli.cmu.edu/learn-with-oli/see-all-oli-courses/> retrieved on 12.09.2018.
4. Coursera 2018. <https://www.coursera.org/courses> retrieved on 18.09.2018
5. Financial Express, 2017. *What is Swayam: All you need to know the first of its kind initiative in India.* Financial Express, Education-2,
6. India Today 2016. *Ignou restarts online notes portal 'eGyankosh'.* <https://www.indiatoday.in/education-today/news/story/ignou-egyankosh-311908-2016-03-05>. retrieved on 5.10.2018.
7. MHRD 2016. <http://mhrd.gov.in/technology-enabled-learning-0> updated on 19 April 2016, retrieved on 1.10.2018.
8. MIT 2018. Massachusetts Institute of Technology. <https://ocw.mit.edu/courses/chemistry/>. retrieved on 12.09.2018.
9. NPTEL 2018. <https://nptel.ac.in/> retrieved on 29.09.2018
10. OEC 2018. Open Education Consortium. <https://www.oecconsortium.org/#> retrieved on 14.09.2018.
11. Open2study 2018. <https://www.open2study.com/> retrieved on 17.09.2018.
12. Spoken Tutorial 2018. *Project Overview* [https://process.spoken-tutorial.org/index.php/Project\\_Overview](https://process.spoken-tutorial.org/index.php/Project_Overview) retrieved on 3.10.2018
13. *The Tribune*, 2018. *Workshop on Online Courses for faculty begins.* *The Tribune*, October 4, 2018
14. TOU 2018. <http://www.openuniversity.edu/>
15. UCI.2018. University of California. <http://ocw.uci.edu/> retrieved on 11.09.2018