ICT for Quality Education in India

A.K. Bakhshi & Vimal Rarh

What is Information and Communication Technology (ICT)?

AN UMBRELLA TERM THAT ENCOMPASSES ALL COMMUNICATION TECHNOLOGIES THAT PROVIDE ACCESS TO INFORMATION

satellite communications

wireless networks

cell phones

Internet

digital television etc.

ICT, if used creatively, can make a big difference in the way teachers teach and students learn and can help students acquire 21st century skills like digital literacy, innovative and critical thinking, creativity, sound reasoning and effective communication.

INFORMATION and Communication Technology (ICT), which encompasses all communication technologies such as Internet, wireless networks, cell phones, satellite communications, digital television, etc. has fundamentally changed the way we live now. We find a world of difference in the practices and the procedures of fields such as medicine, travel, tourism, business, banking, engineering as they operate now in comparison to how they operated three decades ago.

The impact of ICT on education however has been far less and slow. Though the lack of sufficient funding to purchase technologies has often been cited as a reason for this, the real and the most significant cause has been the lack of motivation among teachers to adopt ICT as teaching tools. But in recent times, factors have emerged that have strengthened and encouraged moves to adopt ICTs in classrooms and learning settings.

India has the third largest system of education in the world, next only to USA and China, with about 1000 universities and around 40000 colleges. To introduce ICT-enabled education in such a large system one needs to have high quality multimedia enriched content in different disciplines for various courses, capacity building of teachers and students in ICT skills and state-of-the-art infrastructure along with broadband connectivity for disseminating the content so that it reaches the doorsteps of the learners.

During the last few years, the Govt of India under the "Digital India" initiative has taken several steps to integrate ICT with higher education. The result is that the face of higher education in India is changing very rapidly.
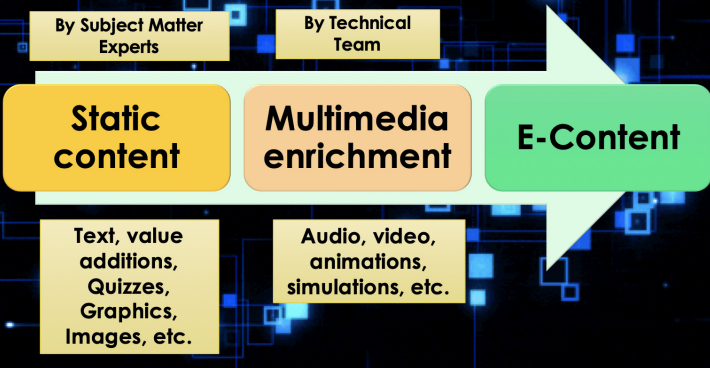
ICT in Learning: E-Learning and MOOCs

E-learning or electronic learning basically means learning using ICT – the focus is still on learning, ICT is just the mechanism. E-content is the basic element of e-learning and is obtained from static content developed by Subject Matter Experts (SMEs) after multimedia enrichment. The static content contains text, value additions, quizzes, graphics, images, etc. This static content is multimedia enriched by adding audios, videos, animations, simulations, etc. wherever necessary. Multimedia enrichment helps communicate difficult concepts in simpler ways and thus offers unique advantages in the field of education. It enables learners to experience their subject in a profound way.

Quality of E-content

The quality of e-content is very important in e-learning. A good quality e-content is one that has all the features that make self-learning exciting and interesting. It needs to be authentic; it should facilitate self-learning and self-assessment. It must be highly interactive, multimedia enriched and the whole content should have been written and arranged in a very structured fashion according to the prescribed syllabus. Easy navigation, modular and reusable are other qualities of a good e-content.
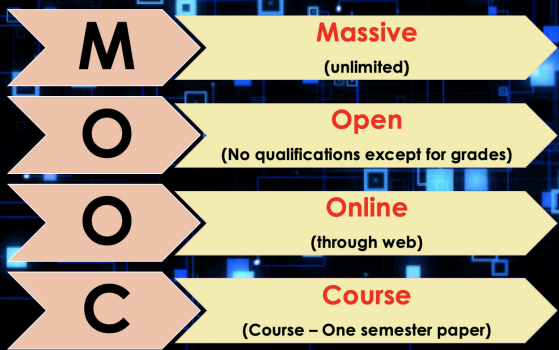
WHAT IS E-CONTENT?

By Subject Matter Experts | By Technical Team

Static content — Multimedia enrichment → E-Content

Text, value additions, Quizzes, Graphics, Images, etc.

Audio, video, animations, simulations, etc.

What are MOOCs?

MOOCs is also a form of e-learning but in a very structured manner. "MOOC" is an acronym for *Massive Open Online Course*. The word "MOOC" was coined in 2008 by Dave Cormier. "MOOC" is an acronym where "M" stands for massive, because there can be unlimited or massive enrolments; "O" for open i.e. no qualifications are required for enrolment in a MOOC until and unless you want to obtain grades/credit. "O" for online, as this content is available online and can be accessed through web; and "C" for course having specific learning outcomes.
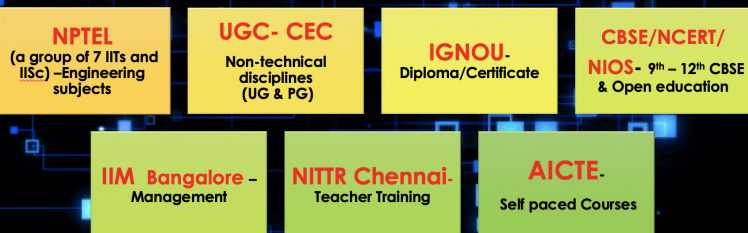

What are MOOCs?

M Massive (unlimited)

O Open (No qualifications except for grades)

O Online (through web)

C Course (Course – One semester paper)

A MOOC can be of any duration to meet certain learning outcomes, but normally for one semester paper we have one MOOC. For example, in MSc chemistry if there are sixteen theory papers, there will be sixteen corresponding MOOCs.

In India the responsibility of developing MOOCs for various programmes has been given by the MHRD to various National Coordinators. MOOCs are normally developed by


Development of MOOCs in India: National Coordinators

NPTEL (a group of 7 IITs and IISc) –Engineering subjects

UGC- CEC Non-technical disciplines (UG & PG)

IGNOU- Diploma/Certificate

CBSE/NCERT/ NIOS- 9th – 12th CBSE & Open education

IIM Bangalore – Management

NITTR Chennai- Teacher Training

AICTE- Self paced Courses

leading experts of the country. It is like *the best of the country addressing the rest*.

The basic philosophy of the MOOCs is encapsulated in '4 A's' - anytime, anywhere, anyone, any number of times. MOOCs are highly economical as they are made available almost free of cost. The most important thing about a MOOC is that one can decide one's own pace of learning, you don't need to be physically present in the classroom; you can learn at any time convenient to you. MOOCs are like mini smart colleges.

Basic Philosophy of MOOCs

Highly economical

4 A's

Laptop Smart Phones Tablets

Anytime — Anywhere — Anyone — Any Number of Times

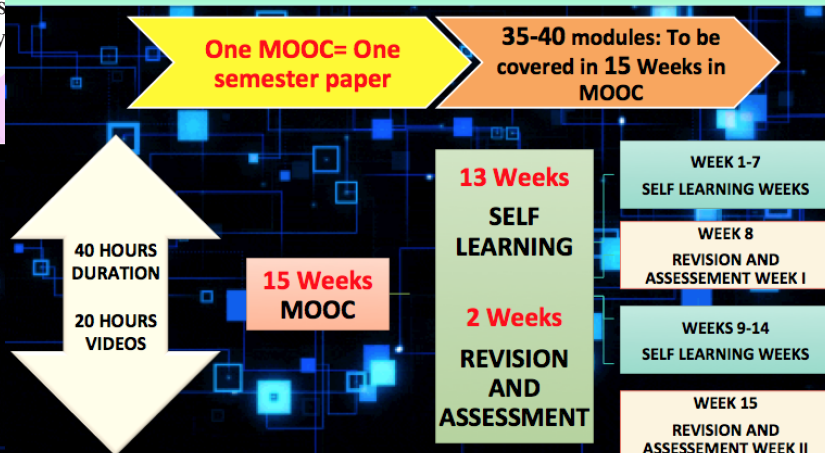MINI SMART COLLEGES

One can decide one's own pace of learning
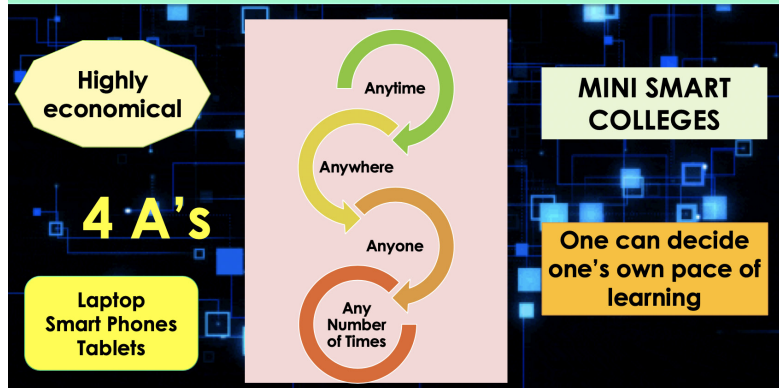
Structure of a MOOC

In a MOOC, e-content is arranged either in week-wise format or topic-wise format. For example, for a MOOC developed under ePGPathshala project of UGC, in one MOOC corresponding to a one semester paper there are 35-40 e-content modules having a total of 20 hours of video content and 20 hours of non-video content. The various modules are arranged in a very systematic and logical manner and are covered in fifteen weeks. The first seven weeks are self-learning weeks; eighth week is a revision and assessment week; week nine to fourteen are again self-learning weeks and week fifteen is revision and assessment week.

Throughout these weeks, discussion forums are active and course coordinators can provide activities like quizzes to the students through the hosting portal. At the end, there is an offline/online proctored examination for successful completion to earn certificate/credit.


An Example of Structure of a MOOC

One MOOC= One semester paper

35-40 modules: To be covered in 15 Weeks in MOOC

40 HOURS DURATION

20 HOURS VIDEOS

15 Weeks MOOC

13 Weeks SELF LEARNING

2 Weeks REVISION AND ASSESSMENT

WEEK 1-7 SELF LEARNING WEEKS

WEEK 8 REVISION AND ASSESSMENT WEEK I

WEEKS 9-14 SELF LEARNING WEEKS

WEEK 15 REVISION AND ASSESSEMENT WEEK II

MOOCs and SWAYAM Portal

All the MOOCs being developed under the aegis of the MHRD by various national coordinators are uploaded on the SWAYAM portal and can be accessed through www.swayam.gov.in. SWAYAM stands for *"Study webs of active learning for young aspiring minds"* and is a platform for hosting various MOOCs. Technically, it has been developed as a Learning Management System having the functionality of uploading and hosting e-content in video and non-video format along with online self-graded quizzes, discussion forums, assignments, etc. for each MOOC.
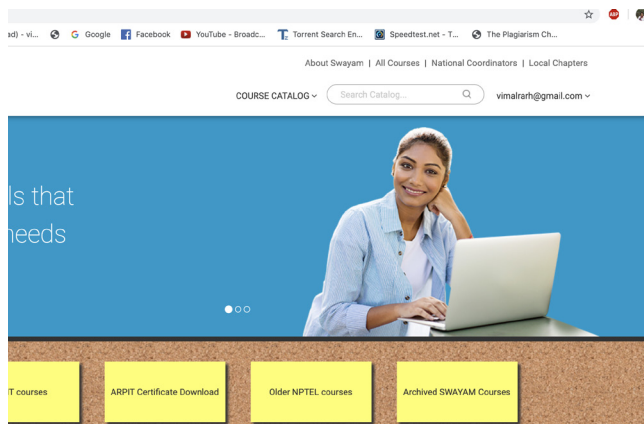
Once all MOOCs are uploaded on the SWAYAM platform, it shall provide Any Time learning (ATL) similar to Any Time Money (ATM) available from banks. MOOCs are going to be a game changer for the higher education sector in India. They can help in increasing the gross enrolment ratio (GER) which at present is only 26.3%, in providing high quality education to the masses, in making learning learner-centric and in proving a boon for life-long learners.

MOOCs have now also been introduced as a part of the formal education system in India to earn credits, wherein a student can earn upto 20% of credits per semester through these online courses [UGC (Credit Framework for Online Learning Courses through SWAYAM) Regulation, 2016].
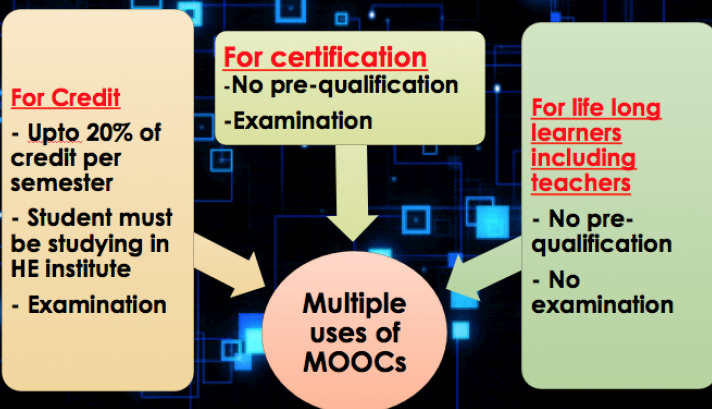

ICT in Revision of Syllabi

The much required regular and more frequent revision of syllabi in view of fast growing knowledge is a very big challenge in the university system. The process is very cumbersome and time consuming as it has to go through various statutory bodies besides soliciting the opinion of various subject experts. ICT can be of great help in this regard.

Through emails, discussion forums, video conferencing, etc. experts across the country can work in a collaborative manner towards regular upgradation and improvement in syllabi. They can also take inputs from industry, if need be, to make the course up-to-date and industry relevant so that the students are better employable.

ICT in Assessment

Due to the paucity of time and poor teacher-student ratio, frequent and uniform assessment of students is a big challenge. With the help of ICT, Online examination and assessments can be done more frequently and uniformly with immediate results. Analysis of testing and individualized feedback can be given, so that the weak concept can be studied again.
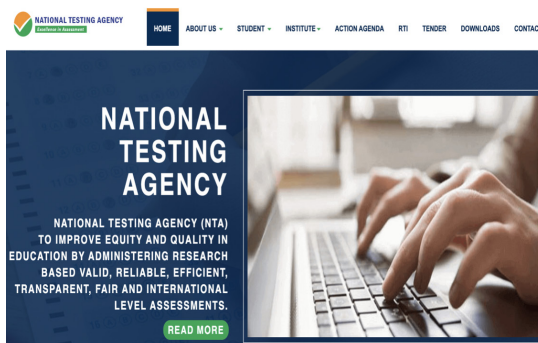
NTA is a Government Agency created by MHRD in Nov. 2017 to conduct various entrance exams nationwide.

Online testing initially requires large infrastructural investment, but is cost-effective in the long run and can meet the challenges of the growing number of enrolments. As a part of the "Digital India" initiative, the government in 2017 created the National Testing Agency (NTA) to conduct various entrance examinations nationwide. These examinations include IIT-JEE, UGC-NET, National Eligibility and Entrance Test (NEET) for admission into MBBS/BDS courses, Graduate Pharmacy Aptitude Test (GPAT), Common Management Admission Test (CMAT), National Council of Hotel Management and Catering Technology Joint Entrance Examination (NCHM JEE) and Delhi University Entrance Test (DUET), etc.

ICT in Research

The exponential growth of knowledge in different subjects poses a very serious challenge for researchers in those fields.

A researcher needs to do literature survey of the research field and this task is becoming more and more difficult in view of the fast growing knowledge.

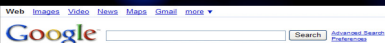ICT has a solution for this challenge in the form of electronic databases. Printed journals are now slowly losing their significance as the primary source of information and their place is now gradually being taken by searchable electronic databases. These are now becoming the real source of information in the 21st century and are going to be extremely useful for researchers. Using the search functions of these databases just by a click of mouse one can get the relevant information on the screen.

ICT and New Pedagogical Innovations: Blended Learning and Flipped Learning

In the ICT-enabled education two e-learning methods viz., blended learning and flipped learning, are making an impact. While these two methods have some overlapping components but a common objective, they are each unique in their execution.

Blended Learning is a combination of online learning, and face-to-face learning (often referred to as "traditional learning"). The online learning includes components like videos, games, podcasts, online reading material, and online assignments. These can be accessed from home (or anywhere

you have access to the Internet), and are usually delivered through a Learning Management System (LMS). Online learning does not replace traditional learning, instead the two methods of learning are used complementary together, to create a full and inclusive learning experience.

Flipped Classroom learning, on the other hand, is when you reverse the delivery method in traditional learning. Traditional delivery of learning is reading, watching, and absorbing learning material in class, and being tasked with work to complete at home. In a flipped learning classroom, teachers, administrators and instructors prepare audio or video lectures for learners to watch at home, in their own time. The time in class is spent on working through the concepts being delivered, with the guidance of an instructor. Complementary to all of this is an online platform where learners and instructors can discuss with one another on a desktop or through mobile apps.

ICT in Continuous Professional Development of Faculty

ICT is also now being used for the continuous professional development of faculty. In November 2018, the MHRD launched the ARPIT scheme under the Pandit Madan Mohan Malaviya National Mission on Teachers and Teaching (PMMMNMTT) for online professional development of 15 lakh HE Faculty using the MOOCs platform SWAYAM. ARPIT is an acronym for *Annual Refresher Programme in Teaching*.

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The MHRD has created various National Resource Centres in the country for different disciplines with a mandate to develop these Online Refresher Programmes which will focus on latest developments in the discipline, pedagogical improvements and methodologies for transacting revised curriculum. Each ARPIT course is of 40 hour duration with 20 hours of video content and 20 hours of non-video content and is offered in a highly flexible format and can be done at one's own pace and time.

There are built-in assessment exercises and activities as part of the academic progression in the course. At the end of
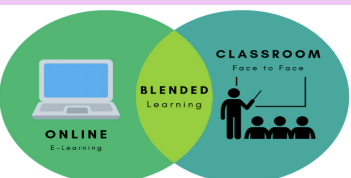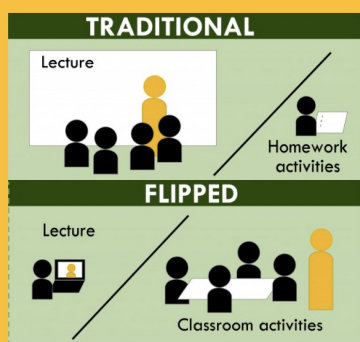
the course, there is an Online terminal assessment conducted by the National Testing Agency and those who qualify this exam are awarded certificates of having qualified the refresher course. These certificates have been accredited by UGC and AICTE for promotional requirements.

Artificial Intelligence for Personalised Learning: NEAT programme

Recently, the MHRD has launched the National Educational Alliance for Technology (NEAT) scheme to use ICT for better learning outcomes in Higher Education. The scheme aims to use Artificial Intelligence to make learning more personalized and customized as per the requirements of the learner.

NEAT is aimed at taking the concept of Massive Open Online Courses (MOOCS) on the SWAYAM platform a step ahead. While MOOCs on SWAYAM aim to provide conventional courses as supplementary learning, NEAT aims to provide courses that aim to enhance the employability skills of the student.

The MHRD aims to recognize the development of technologies in Adaptive Learning and bring them under a common platform so that learners can access it easily. It proposes to create a National Alliance with such technology developing EdTech Companies through a Public-Private Partnership (PPP) model. MHRD would act as a facilitator to ensure that the Adaptive Learning Solutions are also freely available to a large number of economically backward students.

Under the scheme, a National NEAT platform would be created to provide one-stop access to Adaptive Learning Solutions. EdTech companies would be responsible for developing solutions and manage the registration of learners through the NEAT portal. All India Council for Technical Education (AICTE) would be the implementing agency for the NEAT programme. It would help to certify maximum students with highly marketable skills and would also improve the employability of students.

Capacity Building of Teachers in ICT Skills: Preparing Modern Age Teachers

With the advent of ICT in the 21st Century, the education system throughout the world is undergoing a metamorphic change in respect of how the teachers will teach and how the students will learn. For success in their new roles in imparting digital education to the learners, the teachers no doubt will need domain knowledge and pedagogical skills but they will also need to be proficient in ICT skills, which can help them in both teaching and research.

MOOCs with their ability to bring education to the doorsteps of the learners have the potential to change the face of education throughout the world. In imparting digital education to the learners through MOOCs, ICT skills can indeed be very helpful especially in regard to managing discussion forums in virtual classrooms and in assessing the students on-line. With the MOOCs being implemented in the formal education system in India for credit transfer, there is a need to train teachers in ICT skills at a very fast pace.

The MHRD of the Govt of India has launched the Pandit Madan Mohan Malviya National Mission on Teachers and Teaching (PMMMNMTT) with an objective to address comprehensively all issues related to teachers, teaching, teacher preparation and professional development. Many centres have been created under the PMMMNMTT scheme such as Teaching Learning Centres, Faculty Development Centres, Centres for Innovations in Maths and Science, etc. to achieve the desired goals.

ICT if properly integrated with education has the potential to enhance the quality of education in India. This integration of ICT with education has become essential if we really want to create a holistic learning environment focusing on quality, creativity, innovation, expansion, excellence and inclusion. ICT–enabled education is not only an answer to the growing demands for enrolments in education, but is also in tune with the mindset of the present day students and can help meet the challenges of the growth of knowledge in different disciplines.

ICT, if used creatively, can make a big difference in the way teachers teach and students learn and can help students acquire 21st century skills like *digital* literacy, innovative and critical thinking, creativity, sound reasoning and effective communication. It is also heartening to note that realisation now slowly seems to have dawned on the teaching community that ICT is primarily to empower the teachers and not to replace them and therefore they are coming forward to embrace ICT and become ICT savvy.

Prof. (Dr) A.K. Bakhshi is Former Sir Shankar Lal Professor of Chemistry at Delhi University. He is presently Vice Chancellor, PDM University, Bahadurgarh, Haryana. He has been Vice-Chancellor of UP Rajarshi Tandon Open University (UPRTOU), Allahabad; Executive Director of Tertiary Education Commission (TEC), Mauritius and Head, Department of Chemistry, Delhi University. He has also been the Director of the Institute of Lifelong Learning (ILLL), University of Delhi and the Centre for Professional Development in Higher Education (CPDHE), a UGC Academic Staff College of the University of Delhi.

Dr Vimal Rarh is a senior Chemistry Faculty at SGTB Khalsa College, University of Delhi. She is a leading woman edupreneur in the field of e-learning at the national level. She has developed 48 MOOCs for SWAYAM. She is the Coordinator of ARPIT Chemistry-2018 and 2019. As the Project Head and Joint Director of the prestigious "Guru Angad Dev Teaching Learning Centre" of MHRD, Govt. of India, under the Pandit Madan Mohan Malaviya National Mission on Teachers and Training (PMMMNMTT) scheme, she has trained more than 8000 teachers. Dr Rarh is Member, UGC Regulations for Online Programmes/Courses (2018) and Member, Expert Evaluation Team, NEAT, AICTE.