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**INTERNET OF THINGS  
AND CURRENT TRENDS  
IN LIBRARIES**

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**INTERNET OF THINGS AND CURRENT TRENDS IN LIBRARIES:  
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## CURRENT TRENDS IN MASSIVE OPEN ONLINE COURSES (MOOCS)

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**Abstract:** This article aims to report on the current development of Massive Open Online Courses (MOOCs), and explore its evolution, different models, characteristics, major players, advantages, takeaways for LIS professionals, International and Indian scenario, role of librarians and its proposed challenges. The article also discusses various ways to deal with the onslaught of this leading edge innovation which has the potential to change the traditional education model. Numbers of ways have been suggested to the librarians to get equipped with the right set of skills; so that when job demands they can deliver and be relevant to their field. No matter this disruptive technology has created many challenges for learners, instructors/educators and administrators or traditional education model as a whole, but it has also brought many opportunities for its stakeholders. Now we need to decide which one to embrace, as the main aim for all stakeholders remains the same i.e. sharing of information, but, through which mode – is a matter of big concern.

**Keywords:** MOOCs, Massive Open Online Courses, Distance Learning, Internet, Higher education, Libraries, Librarians.

### 1.0 Historical overview

Since ages we have seen that Education and Libraries coexist, as they share a robust relationship with each other. We can't imagine either of them to function in isolation. Be it the ancient libraries of Takshashila and Nalanda or the modern libraries of Cambridge and Harvard, education and libraries always go hand in hand. Indeed, library is one of the most integral components of education system as it acquires, organizes, preserves and disseminates information amongst its users, who ultimately gains knowledge from these recorded experiences.

A glimpse at the collection of ancient libraries of Assyria and Alexandria would reveal that people in ancient and medieval period inscribe on clay tablets and papyrus rolls. The successive invention of Paper in China and Printing in Germany led to the unprecedented proliferation of publication houses. Consequently, with numerous publication houses several thousand publications started getting published in short span of time and the same were acquired by libraries. Gradually, with the passage of time advance ICT enabled techniques and modern storage devices relieved libraries from managing such a burgeoning flow of information. Ultimately, now the presence of ubiquitous Web is not an illusion anymore.

With the advent of Internet, each and every facet of human life has been penetrated by ICT enabled services, for instance libraries, banking, entertainment and education now is not an exception. This has resulted mainly into economy in terms of time, expenditure, flexibility and also remote access of almost any service. With the onslaught of spearheading technologies, there has been a major transformation in the way of teaching and learning. It is widely agreed, that the Internet has literally changed the way conventional classroom training was imparted earlier (Laha, 2014).

### 2.0 Transition from Distance Learning to MOOCs

The evolution of technology and the new ways of learning are always being related to each other. There has been a paradigm shift in the way of teaching and learning with more sophisticated

technologies at the disposal. The field of distance-learning had three main generations, as affirmed by distance learning specialists:

1) Correspondence study 2) Multimedia 3) Computer-mediated

The first among the above three models flourished in Europe and United States after the Industrial Revolution, mainly because a more qualified work force for factories was the need of the day. Moreover, postal services had become faster, cheaper and more reliable. For instance, in the 19<sup>th</sup> century, students from Australia were able to take correspondence courses from the world renowned universities, such as the London School of Economics, one of the first in the United Kingdom to offer distance education (Marques, 2013).

Predominance of correspondence courses was there until the arrival of multimedia, which popularized radio and television as education tools in 20<sup>th</sup> century. Students, learners and teachers from every part of the world took advantage of this disruptive technology. Those who did not have access to formal education could watch or listen to the classes for free from anywhere. But a major pedagogical factor was lacking, students could hardly interact with the instructors or other students. There was only one way communication in such type of learning model. Distance learning got popularized in multimedia age, which paved the way for new possibilities, but only computers and the web had the capability to unite the forces to provide a new e-learning infrastructure, predominantly built upon networks and online communities (Marques, 2013).

Another initiative appeared in the United Kingdom in 1969 – the Open University, which influenced many other ideas in the future. The founders of Open University explored the existing communication technologies to revitalize the distance education by combining correspondence instruction, supplementary broadcasting and publishing, residential short courses and support services at local and regional levels. Open University also adopted an open policy of allowing more students to have access to academic knowledge. Moreover, Open University had also started offering online courses which in turn led to a strong student's community in many countries, quite similar to the MOOC philosophy based on their approach towards higher education (Marques, 2013). This was the infancy of the MOOC phenomenon. The only thing which was lacking was the access to the technology through computers connected to the Internet. However, this lacuna was too satisfied with the unprecedented proliferation of Internet and ICT enabled services in almost every sector of modern times.

### 3.0 Introduction to MOOCs

In a layman's term, MOOCs is a concept of free education available for all from anywhere at anytime. It is an online platform where all the world renowned universities offer their courses online on various disciplines by charging a nominal fee. Usually, MOOCs contains a series of 10-20 minute lectures followed by built-in quizzes, weekly online assignments and professor/instructor moderated discussion forums. It is quite a new concept in India although it has already reached to larger masses seeking higher education. According to the data from some of the major MOOCs aggregators' edX, Udacity, Coursera, Udemy and Futurelearn, India is currently the second largest market after US for online courses. From a recent study, MOOCs has reached about 12 million students globally since it began in 2008. This could also be seen as a disruptive force that could threaten the old system (Laha, 2014).

MOOCs actually is not so recent phenomenon, basically it did not emerge in 2012, but have been successfully developing since 2008 with a clear purpose to provide more learning opportunities and also to improve the overall learning experience. It is a general belief that the term "MOOC" derived out of a Skype chat between two Canadian educators, Dave Cormier and George Siemens (Cormier, 2008). Massive Open Online Courses (MOOCs) have undoubtedly generated enthusiasm, excitement and hype worldwide while recently also increasing skepticism (Fischer, 2014). Moreover, the acronym "MOOC" is the latest buzzword in the field of higher education

which has generated extensive discussions both in professional and popular media, hence The New York Times called 2012 “The Year of the MOOC” (Wu, 2013).

Siemens, Hill, Downes, Daniel and others had distinguished two different models of MOOCs:

- cMOOC model (c for connectivity), which “emphasizes creation, creativity, autonomy and social networking learning” and “focus on knowledge creation and generation”. The cMOOCs stand in the tradition of Connectivist philosophy, and refer to the work of Ivan Illich. As a sharp critic of institutionalized education, Illich proposed in 1970 to establish “learning webs” by using new technology.
- xMOOC model – which is more or less the approach described so far – which “emphasizes a more traditional learning approach through video presentations and short quizzes and testing” and “focus on knowledge duplication”. (Siemens, 2012)

#### 4.0 Characteristics of MOOCs

As we all know MOOCs stands for Massive Open Online Courses and can be characterized as under:

- They are free of cost
- Unlimited participants can register
- They are IT platforms which are online
- No prerequisites or formal entry requirement
- Usually courses here do not earn credits, but some of the MOOC aggregators viz. Coursera, edX and Udacity have recently started offering courses with accreditation certificate on payment basis that will eventually be accepted by the university upon successful completion of the course.
- Badges or certificate of completion are issued to learners on successful completion of the courses.

#### 5.0 MOOCs Aggregators

MOOC aggregators are categorized as, for profit and non-profit private companies, partnering with universities or individual scholars for providing services. Universities or individual scholars usually look after the content and the quality of the courses, while the company is responsible for the production and the technical facilities.

Following are some of the major MOOC aggregators:

**Udacity** – a for-profit company cofounded by Stanford professor Sebastian Thrun and Peter Norvig Data Scientist, Google, who started to offer information science courses online since 2012. The mission of Udacity is to democratize higher education, as they believe education to be a basic human right. Here all the courses are free but fees may be charged for certification. Apparently, Udacity does not have a university partner but maintains close relationship with 20 high tech companies among them Twitter, Facebook, Microsoft and Google. Its mission is to create an online university that imparts industry oriented skills which are need of the day, delivers employer endorsed credentials thereby charging a fraction of the cost of traditional schools. (Website: <https://in.udacity.com/us>)

**edX** – a non-profit venture founded by Harvard University and MIT in 2012. It is the only online learning destination and MOOC provider, offering high quality courses from the world’s most renowned universities and institutions to learners everywhere with minimal cost. Fee is charged only for professional courses and courses with verified certificates. There is no cost involved for enrolling in the audit track which does not offer certificates. edX also offers 90% discount to learners who can benefit from verified certificates but cannot afford to pay full price. Most courses

that offer verified certificates are eligible for financial assistance except some professional courses. (Website: <https://www.edx.org/>)

**Coursera** – a for-profit social entrepreneurship company having world’s top universities and education providers as its partners was founded in 2012 by two Stanford Computer Science professors namely Daphne Koller and Andrew Ng. The main aim was to share their knowledge and skills with the world, so they put their courses online for anyone to take. Since then coursera is catering to several thousand learners in different parts of the world to earn credentials from world’s top universities and education providers. With learners base of 25 million, Coursera offers more than 2000 courses with 180+ specializations partnering 149 universities and education providers around the world. Its mission is to provide universal access to world’s best education partnering with top universities and organizations to offer courses online. Coursera and its partnering universities leave it entirely to the individual academics to decide how they want to teach. (Website: <https://www.coursera.org/>)

**Futurelearn** – a private company fully owned by The Open University, UK with a rich experience of over 40 years in the field of distance learning and online education. With learners base of more than 7 million, Futurelearn partners 138 top universities and specialist organizations which include best UK and international universities, as well as institutions with a huge archive of cultural and educational material, such as the British Council, the British Library, the British Museum and the National Film and Television School. Majority of the courses in Futurelearn are free to join except some courses that are designed for professionals looking to advance their careers. One can also upgrade the course and avail additional benefits like the ability to qualify for a certificate. (Website: <http://futurelearn.com/>)

**Udemy** – is a portal that offers on-demand, affordable courses for career advancement, personal interest or self improvement, as its mission is to improve lives through learning. Its extensive, multi-language library includes over 55,000 courses that are taught by expert instructors. In 2007, Udemy founder Eren Bali built software for a live virtual classroom while living in Turkey. He saw potential in making the product free for everyone and moved to Silicon Valley to found a company two years later. Ultimately, in May 2010, the site was launched by Bali, partnered with co-founders Oktay Caglar and Gagan Biyani. As courses offered by Udemy are entirely on-demand, learners can enroll in any course of their interest and learn at their own pace. Though Udemy is not an accredited institution, they offer skills-based courses taught by expert instructors in their field and every approved course features an Udemy certificate of completion. There is also a refund policy within 30 days of purchasing a course, if you seem that you are not satisfied with that course. (Website: <https://about.udemy.com/>)

India is also not far behind in understanding the potential of MOOC in this technology obsessed age. Thus, “**SWAYAM**” (Study Webs of Active-learning for Young Aspiring Minds) a Government of India’s initiative indigenously developed by Ministry of Human Resource Development (MHRD) and All India Council for Technical Education (AICTE) was launched with the objective of taking education to all, including the most disadvantaged. The courses available on SWAYAM an indigenously developed IT platform or in other words MOOC, range from 9<sup>th</sup> class till post graduation and can be accessed by anyone from anywhere at anytime free of cost, however, if you wish to get a verified certificate, you may need to pay a nominal fee. Rich experience of more than 1000 eminent faculty and teachers from across the country have been chosen to prepare these courses. At present, three different courses – one from UC Berkeley’s Professor Umesh Vazarani and two from IIT, Bombay are expected to be offered. SWAYAM platform which is basically bases on Open EdX, is specifically designed to benefit students from remote areas, working professionals and college dropouts. Learners will get “Verified Certificates” on successful completion of courses. However, it is not clear whether these certificates will be accepted for employment purposes (Bharati, 2014). Blended courses will be offered in native languages and include school education and vocational training (Phatak, 2014). In order to ensure

best quality content is produced and delivered; seven National Coordinators have been appointed viz. National Programme on Technology Enhanced Learning (NPTEL) for engineering, University Grants Commission (UGC) for post graduation, Consortium for Educational Communication (CEC) for under graduation, National Council for Educational Research and Training (NCERT) & National Institute of Open Schooling (NIOS) for school, Indira Gandhi National Open University (IGNOU) for out of the school students and Indian Institute of Management, Bangalore (IIMB) for management studies. (Website: <https://swayam.gov.in/Home>)

## 6.0 Advantages of MOOCs

Although MOOCs is a much controversial topic in academic lobby, many studies revealed several advantages. Listed below are some of the advantages of MOOCs:

- Online courses are open for all with no formal requirement for registration except some professional courses.
- Unlimited number of learners can register at a given point of time.
- Increased subject options for the learners, which won't be possible otherwise in the traditional university model due to shortage of funds, lack of teachers with right skill set and infrastructure.
- Increased accessibility and flexibility for the learners, as online courses can be accessed from anywhere, at anytime convenient to the enrolled person.
- Lifelong learning opportunities for students, in-service professionals and also college dropouts.
- Increased potential of learner engagement and collaboration through discussion forums.
- Economical: Developing an online course does not cost as much as traditional courses.
- Job specificity: Recently some companies have started compiling courses based on their needs. This ends the industry-academia difference.
- Wide reach: As there are no physical boundaries, these online courses are very well accepted by the students across the world.

## 7.0 What's in for LIS professionals

MOOCs have already marked their presence in the field of LIS, and there is literature available on the implications of MOOCs for libraries, although relatively very little on LIS education (Pujar and Tadasad, 2016).

Slowly and steadily LIS courses are gaining momentum in MOOCs, though currently very few MOOCs are available for those who wish to go for LIS. "New Librarianship" a course in LIS was offered by the School of Information Studies, Syracuse University, during July and August 2013 (Ischool-Syr, 2015); and is still available in self-study format. "Hyperlinked Library" course from San Jose State University was offered in the autumn of 2013 by Dr. Michael Stephens. Yet another course on LIS named "Emerging Future: Technology issues and trends" (Ischool-SJSU, 2015), was offered in the autumn of 2014, exploring the way new technologies have changed the way the libraries used to work. A course on "Metadata" was offered on Coursera in September 2013 and also in July 2014 by North Carolina University, empowering the students to appreciate the importance of metadata in preserving digital content (Pujar and Bansode, 2014). EdX also offered a course on "Library advocacy unshushed" in February 2014 by the University of Toronto which was also repeated in February 2015 (Edx, 2015). It is anticipated that in near future more MOOCs in LIS are expected by renowned universities for LIS professionals and students.

If we see in Indian perspective, Ministry of Human Resource Development, Government of India has also taken deliberate steps to accelerate the careers of professionals and students in various disciplines by launching SWAYAM (Study Webs of Active-learning for Young Aspiring Minds).

As of now there are only three LIS courses available viz. Digital Library by Dr. Jagdish Arora (Director - INFLIBNET), Information Sources System and Services by Renu Arora and Information and Communication Technology for Libraries by Usha Munshi. However, as of now, the SWAYAM is in its nascent stage and only limited information is available (Pujar and Tadasad, 2016).

### **8.0 MOOCs in LIS - an Indian Scenario**

Over a period of time there have been remarkable changes in LIS education in India. With the inclusion of Information and Communication Technology (ICT) in the curriculum, exceptional and unprecedented changes have been observed in the Indian LIS education. Several new educational features were brought in by the LIS departments across the country, keeping pace with the recent advances in the curriculum, method of instruction and use of ICT in teaching and learning. These new features in turn would equip the students of LIS with relevant and advanced skills and competencies required for smooth absorption into the current job market (Asundi and Karisiddappa, 2007; Lalngaizuali, 2010).

The state of postgraduate departments in Indian Universities is not very conducive financially as there is perennial shortage of funds; teachers especially those with right set of skills and infrastructure, therefore it becomes very difficult for them to offer courses and programmes in all the areas of librarianship including that of ICT. Under these circumstances, MOOCs can play a vital role by providing opportunities for LIS schools to collaborate and offer credits through MOOCs. In present Indian scenario the adoption of MOOCs in LIS education is virtually non-existent. To change this current scenario, what the LIS schools must do is to offer refresher and orientation courses or similar type of short term courses for in-service LIS professionals, to leverage their technical skills and thus improve their professional competency. MOOCs can cover a wide range of topics right from the basic library related courses to advanced ICT skills, technical communications and technology planning. This is how MOOCs can be exploited by focusing on the practical aspects of modern librarianship (Pujar and Tadasad, 2016).

Recently some advances by the joint collaboration of MHRD and the University Grants Commission (UGC) were made to explore the possibility of adopting MOOCs, so that more subject options can be offered to the students. An experiment or a pilot study can be done by using this new medium of education in LIS schools. MOOCs, definitely, would be a boon for the LIS students as well as for the professionals to keep abreast with the latest developments and technologies in the respective discipline, as it would otherwise be very difficult for LIS schools to offer such courses with limited resources at their disposal. The most ideal way for LIS schools is to pool their resources and expertise by collaborating with other schools to develop MOOCs, which would also be a cost-effective way to enable students to meet the ever-changing needs of the modern librarianship (Pujar and Tadasad, 2016).

### **9.0 Role of Librarians in MOOCs era**

MOOCs mania has really put forth a major challenge to the profession of “Librarianship”. With such a challenge it has also given an opportunity to the librarians to make strategic changes in their conventional style of working. Katy Mahraj (2012) in her article “Using Information Expertise to Enhance Massive Open Online Courses” has suggested many different ways that librarians can get involved in MOOCs, for instance collecting open educational resources, helping with the organization and management of information and teaching information literacy skills.

As per the OCLC (2013) conference, the current participation of libraries in MOOCs fall under three categories: copyright clearance, course production and development of policies and best practices. Other possible but not so prominent areas include archiving class materials, curating



user generated content such as forum discussions and student projects, providing leadership (rather ‘partnership’) and teaching information literacy to MOOC students.

Copyright clearance as summarized by Kevin Smith (OCLCResearch, 2013a) includes seeking permission, license negotiation and fair use determination. It is probably the most important role for MOOCs librarians (OCLCResearch, 2013b). Some libraries, for instance University of Pennsylvania Libraries and Duke University Libraries, are very much into course production, while others, such as University of California Berkeley Library are involved into developing best practices for supporting MOOCs in terms of content accessibility and research skills (OCLCResearch, 2013c).

Librarians can give a thought in line with MOOCs and can collaborate with other stakeholders, for instance, instructors, MOOC aggregators and publishers to create an access model with an innovative pricing scheme that take MOOCs students into consideration (Wu, 2013).

If dealing with MOOCs seems too daunting, Librarians can also develop competency based videos having information literacy modules which eventually can be embedded with the courses by the MOOC aggregator or instructors. These modules are self-paced, reusable and scalable. Thus, Librarians can ‘flip the classroom’ by asking students to go through such module before the classroom session, thereby utilizing the class time for problem-solving and answering specific questions (Wu, 2013).

I would personally suggest to the Library administrators or supervisors to direct their subordinates to take MOOCs as a type of professional development. Moreover, they can also form a ‘MOOC Group’, wherein librarians can discuss their experiences and best practices and share takeaways. Subject librarians who have not been practicing in the field for years or those who do not have deep subject expertise can enroll themselves into relevant courses and become familiar to the current developments.

## 10.0 Challenges

The rise of MOOCs has created various challenges for learners as well as for traditional education models. Some immediate challenges are enumerated below:

**Recognition:** Recognition of courses in terms of accreditation, credits and employment is still a point of concern. Some of the courses have been accredited and universities have started to accept transfer credit on successful completion of MOOCs. This has led to raise many questions on how MOOCs may shape the future of higher education.

**Financial:** Which was earlier thought to be free of cost is not free anymore. All major MOOC aggregators have started charging for their services, thereby generating a major chunk of their revenue. Enumerated below are some of the paid services:

- Certification: Learners pay for a badge or certificate of completion
- Proctored assessments: Learners have to pay if they choose proctored assessments i.e. assessments with invigilation, as practiced by Coursera viz. Signature Track
- Applicant screening and employee recruitment: Employers/Company/Universities pay to MOOC aggregator for accessing learners/student performance records (Ripley, 2012)
- Human tutoring or assignment marking: This is for the students who prefer human tutoring as opposed to automated
- Selling MOOC platforms to enterprises to use in their training programmes to train their workforce
- Sponsorships: Third-party sponsors of courses
- Tuition fees: For instance, Computer Science Department of Georgia Tech College of Computing, which has decided to offer a master’s degree delivered with MOOCs for a fraction of the cost of a “normal” degree (Georgia Tech College of Computing, 2014).

**Threat to traditional education models:** In the MECCA of business education i.e. USA, it can be clearly seen that student applications to higher studies have been dropping steadily. On investigating, it was found that students are increasingly opting for MOOCs which has also led some to predict that half of the higher educational institutions will shut down in next few years. In initial years, no one literally expected such an exponential growth of MOOCs, even it was laughed at by top American universities. Now to exist in the market, they all started offering these courses which are called 'Blended MOOCs' where there is some face to face interaction alongwith virtual learning (Laha, 2014).

**Individual Instruction:** As MOOCs is open for all without any formal requirement for registration, it attracts masses. Such a huge variety of learners do possess different learning styles. It becomes very difficult for the instructors to engage such learners and maintain their interest in the course and also tailor the learning environment to fit each learner. Therefore, dropouts are a major setback for MOOCs. To overcome this, a solution was proposed by Carr viz. machine learning. In this process, computers are used to collect and analyze data from a learning system about how people learn (Carr, 2012). During this process, every variable is tracked like learner's pause during a video, increased feedback speed, response to quiz questions, revised assignments and forum discussion. Data collected in such a manner is then used to analyze learner behavior and how people learn. In this way, an instructor could tailor the learning environment to fit each learner's style and needs. However, many researchers disagreed with machine learning. They were of the opinion that, a critical component of education is the interaction between students/learners and teachers, which cannot be simulated by the machines (Carr, 2012).

**Student Performance Assessment:** One of the biggest challenges in MOOCs is the assessment of student performance (Rodriguez, 2012). Cheating in online education also presents a major challenge (Carr, 2012). There is no full proof mechanism to verify and validate the original work or to prevent and detect plagiarism is one of the most discussed challenges of online education (Cooper & Sahami, 2013). Some solutions have been proposed by the aggregators of MOOCs. For instance, Udacity and edX conduct tests for their online courses at dedicated test centers. In this case, however, cost to the students presents a barrier. Coursera also attempted to use plagiarism-detection software in detecting cheating. In addition to this, Machine learning has been proposed to identify cheating by the analysis of learner behavior (Chen, Barnett and Stephens, 2013).

## 11.0 Conclusion

With the onslaught of spearheading technologies in distance education, the context of education and learning has been greatly influenced. MOOCs have given a new perspective to traditional education but are still in infancy stage. It seems that educational institutions are quiet apprehensive about MOOCs when they relate to accessibility, affordability, recognition of courses and student success. Moreover, in a time where higher education is being criticized for low productivity, high costs and inefficient use of technology (Levine, 2013), MOOCs provide feasible alternatives of high productivity, low costs and leading edge technology. One of the immediate challenges is to find a common ground that not only enhances access and affordability but also maintain academic rigor and ensures student success (Chen, Barnett and Stephens, 2013). Even the loudest of the critics of MOOCs do not expect them to fade away. It is most likely that in the nearest future MOOCs will morph into many different shapes may be the basic services provided by the MOOC 1.0 will be complemented by the premium services developed in MOOC 2.0 (Fischer, 2014). MOOCs acceptability and credibility in India in terms of employability is still a point of concern as recruiters here are not yet ready to embrace this concept. They are of opinion that online courses should first establish benchmarks which could earn people jobs. But this mindset could be changed

by making small endeavors, thereby introducing blended MOOCs – which is a refined version of original model (Laha, 2014).

On the contrary, it can also be seen as an opportunity for various under-developed or developing countries where education is synonymous to “Luxury”. MOOCs can be a boon to the students of such countries where all can have access to online courses without any economic discrimination. Well, it is now quite apparent from these developments that Gen Y now believes in Open Access, Open Data, and MOOCs which is quite contrary to the ancient belief of Closed Access.

However, we can't totally ignore the old order of classroom instructions, face-to-face interaction, and supervision; therefore an ideal model can be of hybrid nature i.e. Virtual as well as Interactive.

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