Abstract
Enhancing excellence, equity and efficiency in higher education can be possible by means of updating the present system with the latest educational advancements. The global trend in higher education is the Massive Open Online Courses (MOOCs). The effective way of familiarizing this trend would be the infusion of MOOCs into the formal curriculum as a complement to the existing courses. As part of higher education, basic sciences need additional attraction over the professional courses, because of the poor representation of toppers in the basic science courses at higher education level. Open online courses and MOOCs initiatives in India are discussed in this paper. A non-validated model for infusing MOOCs into the existing basic science courses in formal, non-formal and informal sectors is also proposed as well. This paper is an attempt to envisage the possibilities of MOOCs in Indian context.

1. Introduction
Basic sciences refer to the fundamental science which keystones with the basic concepts, facts and principles in the subjects like physics, chemistry, botany, zoology and mathematics. These basic sciences laid the foundations of the latest technological advancements in science. Economic prospects of a nation could be achieved by its technological advancements which highly rely on a strong foundation in basic sciences. This could be evidenced from the National Knowledge Commission’s report, 2008 that developing countries like China and South Korea have invested largely in science education in the past few decades and are reaping enormous benefits today in terms of economic development and global standing in science. To develop India as a knowledge society, it is essential to build a strong foundation in basic sciences by attracting a large number of talented youths to this stream (NKC, 2008). For a decade, high achievers at the secondary level
across the globe didn’t prefer basic science as their career option. Indian government had initiated many programmes to attract the talented youths towards basic sciences. Infusing the latest educational advancement Massive Open Online Courses (MOOCs) along with the formal curriculum as a complement to the existing basic science courses could enrich and add a feather of attraction to the basic sciences in higher education. Adoption of MOOCs in higher education as a blended approach would pave the way for decorating basic science as glamour among the talent pools of the nation. Basic sciences via MOOCs can be offered as add on courses in the formal sector, alternative mode of transaction in the non-formal sector and knowledge repository in the informal sector for lifelong learning.

2. Online Courses in India

By 2030, nearly 140 million people in the college going age group, one in every four graduates in the world will be a product of the Indian higher education system. By 2030, the already existing challenges for Indian higher education such as access, equity and quality will only be greatly exacerbated unless we significantly transform our higher education model (Vashistha, et al., 2013). Many initiatives had been driven by Indian government in the context of reforming higher education according to the global trend. As a reflection National Programme on Technology Enhanced Learning (NPTEL) has launched in the year 2006. NPTEL provides e-learning through online Web and Video courses in engineering, science and humanities streams. The mission of NPTEL is to enhance the quality of engineering education in the country by providing free online courseware (http://nptel.ac.in/). In the NPTEL portal, 260 online courses are available in the disciplines of engineering and basic sciences and 1000+ courses proposed in different disciplines. 887 institutions and four organisations across India are utilizing this programme for their students in a blended way along with their formal programmes (http://nptel.ac.in/pdf/). These are open to all registered individuals and institutions. The attractive thing is that the course providers are seven Indian Institutes of Technology (IIT-Bombay, IIT-Delhi, IIT-Guwahati, IIT-Kanpur, IIT-Kharagpur, IIT-Madras and IIT-Roorkee) and Indian Institute of Science (IISc.Bangalore). Many universities in India, for instance Indira Gandhi National Open University, Delhi, Assam Don Bosco University, Karnataka State Open University, Jaipur National University, Sikkim Manipal University, Manonmaniam Sundaranar University, Tirunelveli and Amity University put their stage on online courses in distance education. Our higher education requires more endeavours for the expansion of online education across different sectors.

3. MOOCs Initiatives in India

Overwhelming increase of youngsters’ population in India needs a strategic model for higher education which should be enabled with Information and Communication Technology, high quality and capacity of developing knowledge based society. Digital technologies, particularly the extensive use of MOOCs, could help to meet this challenge (Agarwal, 2013). Many MOOCs providing platforms have sprung up rapidly across the world such as Coursera, edX, Udemy, P2PU, FutureLearn, OpenStudy and Canvas. Many universities have joined globally in the MOOCs platforms including IIT-Bombay from India. IIT, Delhi and Birla Institute of Technology and Science (BITS), Pilani are offering courses using Coursera to their own students. In India, the IITs are proposing to implement a Blended MOOC model based on a combination of online access using the open-source EdX platform and customization of the EdX platform to incorporate face to face instructor support at various physical centres across the country (Jain et al., 2014).
4. MOOCs Model for Basic Sciences

At its preliminary stage IIT-Bombay proposed a Blended Learning MOOC Model in collaboration with edX platform (Kolukuluri & Phstak, 2013). With this pre-evidenced model in engineering subjects, we can prepare a complementing model for infusing MOOCs in basic science subjects too. Without a strong foundation in basic sciences, propulsion on technological advancement is not possible. Most of the toppers at higher secondary level prefer professional courses rather than basic science courses for their furtherance. To create enthusiasm and attraction over basic sciences among such youngsters is possible by means of infusing MOOCs according to our context. With a purview of the above said ideas the following framework is prepared by the authors for infusing MOOCs in basic science courses to the Indian context.

High quality MOOCs can be developed in basic sciences with the collaboration of NPTEL, Indian Institute of Science and five Indian Institutes of Science Education Research (IISERs). High end e-Contents in basic sciences can be utilized from the national e-Content repository Communication Educational Consortium (CEC). The sponsors of open online courses can maintain a separate
special link for basic sciences. Memorandum with the universities, these MOOCs can be offered as add on courses along with their formal curriculum for improving a specific area in basic science. In distance education sector, MOOCs can be portrayed as alternative mode of curriculum transaction. As far as in the informal sector, MOOCs can be stood as knowledge repository. These are the ways for introducing and creating awareness of MOOCs.

5. MOOCs Providing Platforms in Basic Sciences

The world’s best courses in basic sciences are offered through online for free from many platforms in collaboration with world best universities. The following table shows some of the MOOCs platforms and its collaborating partners in specialized courses.

<table>
<thead>
<tr>
<th>Platform</th>
<th>Collaborating partners</th>
<th>Specialization in Basic Sciences</th>
<th>Website Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coursera</td>
<td>University of Virginia, Duke University, University of Pennsylvania, University of Illinois (110 Universities around the globe)</td>
<td>Biology &amp; Life sciences, Chemistry, Mathematics, Physics</td>
<td><a href="https://www.coursera.org/">https://www.coursera.org/</a></td>
</tr>
<tr>
<td>edX</td>
<td>Harvard University, Massachusetts Institute of Technology, Berkeley University (32 Universities around the globe)</td>
<td>Biology &amp; Life sciences, Chemistry, Math, Physics</td>
<td><a href="https://www.edx.org">https://www.edx.org</a></td>
</tr>
<tr>
<td>CourseSites by Blackboard</td>
<td>Charles Darwin University, Drexel University, Temple University (more than 50 Universities and Institutes across the globe)</td>
<td>Biology, Mathematics</td>
<td><a href="https://www.coursesites.com">https://www.coursesites.com</a></td>
</tr>
<tr>
<td>Open Education Consortium</td>
<td>Massachusetts Institute of Technology, Tokyo Institute of Technology, University of California (79 Institutes across the world)</td>
<td>Mathematics, Animal Zoology, Botany, Chemistry, Physics</td>
<td><a href="http://www.oecdconsortium.org">http://www.oecdconsortium.org</a></td>
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6. Conclusion

The major issue and challenge in basic sciences is to attract talented youths towards basic science courses and career and sustain them in it. The “FICCI Higher Education Summit 2013” suggested for promoting blended learning using MOOCs to deliver quality education. To deliver quality basic science courses at the institutions in India along with the complement of MOOCs, a mechanism has to be devised. MOOCs could be a complement for the formal courses, because of its convenience that anytime and anywhere learning. And also enrichment of knowledge from the hands of world class professors in specific required area is possible. There are evidences from the studies that the professional development, specific skill development and content enrichment were achieved through MOOCs. Globally, Indians form the second largest pool of students attending MOOC courses. It is quite clear that MOOCs can be a powerful disruptor in providing and enriching higher education in countries like India (The Hindu, July 1, 2014). Yet we still need to find the right model to use MOOCs in an Indian context.
References


BIOGRAPHIES

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