

Blended Moocs: Impacting The Future of Higher Education

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Abstract: Today, all parts of the society are getting revolutionized with digital technology. This is also true with higher education. Universities are fast adapting to digital technologies and tools in their education system. The main aim of this adaption is to enhance student learning. Many surveys suggest that Massive Open Online Courses (MOOCs) will have a greater impact on higher education. In this paper, the authors explore and discuss the support of blended learning through MOOCs for better learning, reform and innovation.

Keywords: Massive Open Online Courses, higher education, blended learning, flipped classroom

1. Introduction

Blended learning or technology based learning is becoming highly prominent for higher education students. There was a time when academic community used face-to-face learning using black-board teaching. With the advent of digital technology, information is easily available through internet and the demand for new technique in teaching has become a necessity. The role of the teacher is now in supporting students to filter information and help them solve real-life problems. Blended learning [1] will enhance face-to-face interaction between students and teachers, using digital technology.

2. The Digital Strategy of Learning

The structure of existing student education is looking for a change. Information is now available at the fingertips, through the Internet using laptops and mobile devices. The role of the teacher has become very challenging. They are not simply doing information transfer but a role in mentoring students to segregate information and use them in solving real-life problems. The change has been unprecedented and trending. Faculty now cannot be treated as database of information anymore. The new alternative mechanisms requires a re-thinking in the way curriculum is designed, the delivery of information, various student activities, their assessment and collection of feedback. The way in which students are taught and learnt in Higher Education [2] must be adapted because it will create an impact on their skills,

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competencies and their ability for effective contribution in workplace and society. The whole world is going digital and higher education should reflect this, and should indeed be at the helm of revolution leading from the front for others to follow.

Many universities across the country have understood the change in the trend for higher education by introducing strategies like e-learning, blended learning and many more digital trends to support the changes offered [1] in the design of curriculum, academic practice, the basic infrastructure and support required to effectively deliver higher education in this digital era. Let us take the author's institution as an example, where the digital strategies like Inpods, Impartus, Wiksateetc. are used for student education. The strategy of Blended Learning will bring in a seamless opportunity for the institutions and universities to expand and enhance their claim for a better educative environment and workplace. The blended learning strategy sets a methodical framework for appropriate use of online resources, digital tools and technologies to support face-to-face interaction between students and teachers. Apart from these, institutions and universities will now be seen as an open, content-rich, digitally effective and connected environment where face-to-face interaction between students and teachers is supported by online contents in the form of audio and video, digital tools and services. In this environment, a virtual learning environment like a flipped classroom is just one of a range of online tools for providing students with learning opportunities and quite a good number of resources for collaboration and interaction. External learning channels like Coursera, edX, NPTEL, IITBombayXetc. are providing well populated openly available content offering the online courses in a full range of blended face-to-face courses.

3. The Blended Learning Approach

Faculty in various universities is using a lot of digital techniques and tools to support student learning. This is done due to the growing pedagogical literature which evidences in the effectiveness of digital technology in enhancing learning outcomes or course outcomes and continuous student engagement with the joy of learning [3]. The approaches that are generally followed across universities both by faculty and students are: event capturing, mobile learning, eBooks, social media, social learning platform, e-assessment and use of open educational resources.

Each one of the above digital techniques has its own literature base indicating the benefits and challenges for teachers and students to adapt, and every method has a repository of technical solutions. In the time where people continue to understand the potential of web in supporting and enhancing learning, faculty and students will expand their dimension in the use of collaborative and learning approaches of networking.

How do the institutions and universities support students to acquire new knowledge, skills or competencies? The blended learning approaches give us a clear indication about the most appropriate sequence of steps in developing the skill sets of the students. The advancement in technology and a database of huge online repositories have made the 'flipped classroom' approach a more realistic and usable option for the majority of teaching fraternity. The flipped classroom runs over the traditional sequence of events and helps in engaging the students in a conceptual and practical understanding of key information using online digital resources and tools before getting in touch with faculty. Assume a scenario where the traditional lectures are captured and have been divided into small topic-based videos using a digitized system [2,4], and is provided to students online with proper instructions on watching these online materials. Such opportunities for online interaction and discussion between faculty and students might create a huge learning framework for the young minds. The original lecture time is now utilized more like a tutorial or a seminar-based session where students are inclined towards undertaking proactive problem solving, question and answer, discussion, and other collaborative activities. By using these digital techniques and tools, classes forces a better understanding, creating challenging conversations and deepen their knowledge which would be a remarkable active learning approach.

The main objective behind these well-integrated blended learning approach using appropriate digital tools and techniques should be to enhance the student learning and the quality of student experience. Now by combining the approach of flipped classroom with integrated use of digital tools and techniques [5] to support student learning would satisfy many educational institutions and universities. However, the use of these would bring in with it a number of challenges like adaptability, digital fluency, technical skill set and ease of use and usefulness in students mind.

4. An Example

In the author's institution, for the academic year 2015-16 odd semester, the courses Programming with C++ and Basic Thermodynamics were introduced with the concept of Blended MOOCs in association with IIT-Bombay.

In this paper, the focus will be on the course Programming with C++. This course is the adapted version from the IIT- Bombay course Computer Programming, generally taught to first year students. This course is a Comprehensive Course for third semester Computer Science and Information Science Engineering students with the following components - Theory, Practical and Self-Study. The credits for the course were 6 [3-1-2].

For the Continuous Internal Assessment, 80% of the marks are assigned through theory internals and practical exams and 20% of the marks from MOOC. These 20% of the marks is provided through a series of graded quizzes and graded programming assignments from the MOOC. The Course Outcomes (COs) are shown in Fig 1 and the syllabus of the course is shown in Fig 2.

CO1	To understand basic computational procedures, its representations and to differentiate between sequential and conditional execution of programs using C++.
CO2	To analyze iterative solutions and the usage of functions in C++.
CO3	To study the need for arrays and its uses in applications of sorting and searching.
CO4	To study the principles of Software Engineering and the usage of pointers and Strings using C++.
CO5	To introduce Object-Oriented Programming using Structures, files and file handling.

Fig. 1 Course Outcomes of Programming with C++

Contact Hours/Week : 5	Credits : 6 [L-T-P-S:3-0-1-2]
Total Lecture hours : 39	CIE Marks : 50
Subject Code : 15CIGCPCP	SEE Marks : 50

UNIT - I
Procedures, Programs and Computers: Computational procedures, details of computations, computer architecture, integer representation, elementary graphics and coordinate based graphics.
Sequential and Conditional Execution of Programs: representing floating point numbers, representing characters, strings, Booleans, structure of a simple C++ program, names and type declarations in C++, assignment statement and arithmetic expressions, assignment statement and logical expressions, sequential execution in C++ programs, and conditional execution in C++ programs. [7 Hrs]
UNIT - II
Iterative Solutions and Functions: Iteration idioms, while and do while statements in C++, for statement in C++, loops and assignment expressions, iterative programs: putting it all together, recursion about loops, introduction to functions in programming, flow of control in function call, parameter passing in function calls, and recursive functions. [8 Hrs]
UNIT - III
Arrays and Matrices: need for arrays, arrays in C++, using arrays for solving computational problems, solving simultaneous equations, Gaussian elimination, more matrix applications, digital images and histograms, associative arrays for histogram equalization, and histogram equalization program.
Sorting and Searching: motivation, selection sort, analyzing selection sort, merge sort intuition, merge sort in C++ and its analysis, sorting strings, other data types, and searching. [8 Hrs]
UNIT - IV
Strings, Pointers, Software Engineering: Character strings, more on strings, separating multiple words in a line, introduction to pointers, use of pointers in C++ programs, pointers in function call, pointers and dynamic memory, introduction to software engineering and basic principles of software engineering [8 Hrs]
Unit - V
Structures: introduction to object - oriented programming structures, simple operation and on structures, programming using structures, more on structures and pointers, and programming using structures.
File Processing: introduction to file, opening files in C++ program, function for processing data in file, handling input/output using files, handling text data using 'scanf' and 'printf', handling data in text file, creating a binary file, directly accessing files, and updating records in a file. [8 Hrs]

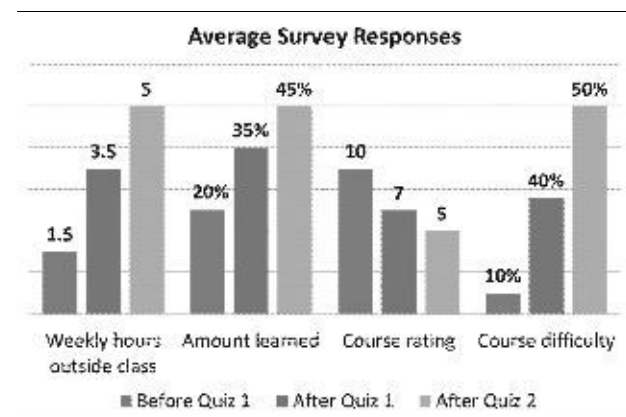
Fig. 2 Syllabus of Programming with C++

This course is now taught to around 300 students from both Information Science and Computer Science departments. The Semester End Examination will be conducted for 100 marks. The grade for the course is allotted based on both CIE and SEE marks. IIT-Bombay will provide a course completion certificate to all the students who complete the course.

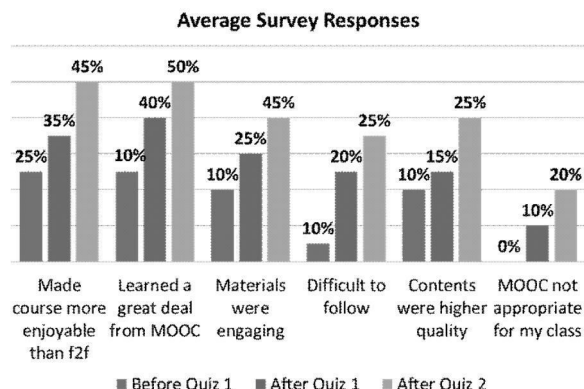
5. Student Survey

A student survey was done to know the response of the students towards blended learning and flipped classroom approach. The students considered were from third semester Information Science and Engineering class with strength of 60. They were exposed for flipped classroom approach and MOOC for the first time.

The first survey was based on the following factors - weekly hours spent outside class, amount learned, course rating and course difficulty. The amount of time spent before the first graded quiz was very less which increased drastically after the completion of Quiz1 and Quiz 2. The amount of information gathered through the course increased drastically. Students had rated the course as an easy course initially. After the two graded quizzes, the course was rated as one of the difficult courses.



The second survey was based on some general questions about the course and how the students are finding the course. The survey was based on the following factors - learning happened through the course, course more enjoyable than face-to-face, materials were engaging, about the course contents, how difficult it is to follow and how many want this to be removed from the class.



The survey results predict that around 40 to 50% of the students are very favourable towards MOOC. Some 20 to 25% of the students found it difficult to follow and came up with a conclusion as MOOC not an appropriate approach for the class. They were happier with the traditional method rather than the new method.

6. Current Limitations

In the implementation of MOOC till now, there are quite a few limitations. The first one would be technology, sometime online quizzes and programming assignments might not load on time due to some server issues, videos might take time to load; particularly at places outside the institution. There is a drastic learning curve for the subject teachers involved. Teaching in front of a class with strength of 60 in itself is a different ball game; with the students constantly giving feedback - faces, expressions, questions, comments. With various digital and online tools and techniques utilized, it sometimes creates difficulty in answering questions that arise during this process. This has been a challenge always, but a fun one. The other factor is the inconsistency of students to perform better in their online graded quizzes and assignments. Some surveys also predict that students who watch more online videos end up performing worse compared to students who listen to class lectures.

7. Conclusion

In this paper, the authors have outlined the benefits and challenges of using digital technologies and tools in blended learning and flipped classroom approaches. The paper also focuses on the advantages of blended learning which could be applied to such courses. The usage of MOOCs and flipped classroom

approach in higher education will enhance the learning for students provided they are particularly motivated to learn the subject. Such students tend to utilize the online digital resources to a larger degree. There is no doubt that Massive Open Online Courses are the only route for students to enhance their online learning opportunities; on the other hand should also evolve to provide what is needed for students with varying goals, skills and background if they have to survive for a longer period of time.

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