

Android MOOC, Blended MOOC Intertwined with Curriculum for Outcomes-Based Education

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Abstract: This paper is a case study of two different MOOC conducted in tandem with the academic curriculum. The paper projects on how the Project Based Learning helps to contribute to Outcomes-Based Education using MOOC as the medium of learning. The concepts of Agile methodologies like Pair Programming and Rapid Development can be inculcated into the student at an earlier stage to bring in industry ready engineers. We discuss how Android MOOC and the Blended MOOC contribute to Outcomes-Based Education.

Keywords: MOOC (Massive Open Online Course), Android MOOC, Blended MOOC, Agile method, Pair Programming, Gamification

1. Introduction

The Massive Open Online Course (MOOC) is the new generation of teaching. This online course channelizes the system of higher education and provides a new platform for continuous learning for the faculty too. The education field is growing by great dimensions and it is creating newer opportunities to build a strong quality to the student. The MOOC based learning is an excellent way to provide a broad perspective of a given subject or a domain which complements and supplements the learning process along with curriculum for a student.

BMS College of Engineering has experimented two such courses Android MOOC and Blended MOOC. Android MOOC is conducted by Udacity in collaboration with Google Student Ambassador Programme (GSA) to train students to develop production level Android Apps through the formation of a Special Interest Group (SIG) to learn and complete the course together thus become a Udacity certified Android Developer. Udacity is an online provider of courses in which the lessons are taught by experts of the industry. Android MOOC is conducted simultaneously across the world in countries like United Kingdom, India, Nigeria, and Ghana. This opportunity gives the students a chance to network with other students across the world.

The other course Blended MOOC, is being conducted in collaboration with a prestigious institution IIT Bombay. The course is blended with the

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curriculum of the college in a way that the MOOC complements the learning of the curriculum and the students get the exposure of both the traditional teaching and the MOOC learning.

2. Android MOOC

The Android MOOC session started with the selection of students by a panel of teachers. They decided which of 25 people can be part of the program amongst others. The six week long course had the students roped in to be given the first-hand experience of project development and deadlines and how to work in a team to achieve the end goal. Fig. 1 depicts the entire six week learning process. The paper gives a brief description of attaining a rapid software been developed in this case, the Android Apps. As per the immense discussions in the [1], the ever changing needs in the market and the various initiatives and the solutions available across the markets make the engineers rethink and reinvent new solutions which are widely accepted as well as profitable to the developers. The process of designing the useful software quickly with less priority for testing is called rapid development. The rapid development was adopted in achieving the target of better app development within 6 weeks. Android MOOC programme allowed the student to listen to lecture video weekly releases and then followed by a 2 hour meeting on weekends with the GSA for verifying their doubts if any. The elicitation of requirements abided to the guidelines of the MOOC course which is an important skill in any product development as the product needs to solve the client problems. This paved way for recurring opportunities to improvise teaching learning process and deliverables.

A. Agile methodology

The weekly meeting with the GSA provided a paradigm to fix upon the sprints which served as next week agenda. The sprint is a small deliverable of the app which was developed during that week which had characteristics of the app and the requirements/constraints of the app as per the product design of the MOOC. This Agile methodology of software development is followed by the industry leaders in product development as discussed in [4].

B. Pair Programming

The student was allowed to work in pairs, to share ideas and think better solutions for a single problem.

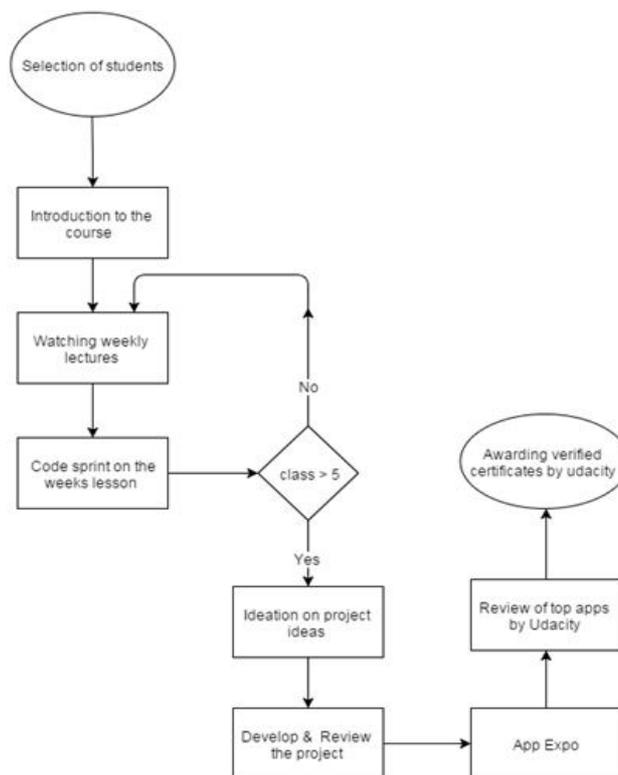


Fig. 1 Flow Diagram of Android MOOC

This paved way for better exposure of ideation and problem solving ability. The system of review called as peer review, checking each other's progress and supporting each other raised the standards of the solutions. This enables the student to think out of his comfort level of coding and enhances his threshold of analysis and design pattern.

A. App Expo

The projects were developed at the end of the fifth week. The project was verified by the GSA for the criterions of the MOOC course. This helped the students understand the User Acceptance Test.

The App Expo was organized at the end of the MOOC course; the expo had a team of faculty as panelists who decided the best of the projects. Table 1 provides the categories of apps presented. The students gained the experience of presenting their ideas to the panelists and feedback to reiterate their project to make it better.

1) Sense of Ownership: The App Expo instilled the ownership quality for the better critics and for the flaws which they had to refine.

2) Gamification: is a use of mechanics to engage the user (student) in competitive spirit to generate productive behavior as discussed in [2]. The whole process made sure of the efforts been recognized by their peer and other friends across the campus. This not only allows the developer of the app to showcase his project but others to be motivated to receive all the limelight of the day.

3) Winner: The MOOC winner gets a verified certificate from Udacity worth \$500 for no fee payment to recognize his/her effort.

Table 1. Categorization of the apps

Categories	Apps Developed
Public	Movie DB, Carpooling, Parking, Exlpocity
Game	Quizapp, Count till five
Knowledge/Updation	Eat Wise, Travel, QuickFood
Finance	StalkMarket
Software Testing	Bug Book

D. Evangelism

After this huge pool of efforts, the outcome of the process is noteworthy. The MOOC course enabled to create groups of evangelists on campus by creating a local resource pool for various events, workshops which will benefit others on the campus. The students were able to prepare apps for technical fests and conferences at the campus. It enabled them to participate in hackathons conducted by industry and other esteemed colleges.

3. Blended MOOC for Computer Programming

Amongst the many highly dreamt projects of the Ministry of Human Resource And Development, NPTEL and MOOC aim at generating continuous learning and provides platform for pursuing higher education. The NPTEL (National Programme on Technology Enhanced Learning) is a joint initiative of the premiere Indian Institutes like IIT and IISc. The MOOC program is by one of the esteemed institute IIT Bombay. Our college has adapted Blended MOOC for Computer Programming for Computer Science Cluster. Including our college, many of autonomous colleges across India have adapted this course as part of their curriculum and are found at [3]. The programme is split into five units and the next sections highlight some of the key concepts of the course and shall not on the marks distribution concept.

A. Curriculum Design: The syllabus is designed for an amateur. A non-programmer with no programming ability but with great learning enthusiasm can take up the course. The course starts with various components of the computers, the usage of the electronic components to build software solutions, their representations in the memory. The programming ability is further extended by introducing the iterations, sequential statements. The usage of modular programming with the functions concepts is introduced. The user defined datatypes like structures, pointers and Files are taught. These serves as building blocks for advanced studies in their higher semester. As a programmer /developer the client is always kept in the loop, therefore the software engineering principles are visited.

B. Course release plan: The video lecture series is released for the students every week. The course content is structured in a way to hold the attention of the listener. The maximum time for the videos is not more than 20 minutes.

1) Course structure: the students are able to write correct programs/ solutions to solve practical computational problems. The video releases are accompanied with the captions, ability to download the transcript as a .txt file for readers. The slides release is more acknowledged as they serve as pointers to remember key points or key constructs. The slides and videos are further made in Hindi in purview of the rural sections of the country keeping the language not to be a problem.

2) Practice problems: the problem set/sets are released for the students to test the knowledge of what they have understood after the session. This also boosts them to learn better, mend their approaches to optimize the learning skills. The IITBombay site provides the answers and the reasoning is provided to help the students to become more judgmental. This stage also provides a preview of the quiz which is followed for due release.

3) Graded Quiz: Every fortnight, quiz releases for the topics given in the course release plan. The quiz has different set of parameters (numerical variations) with different answers with radio buttons. The space bar also helps the student to type in their answers, this reduces the random choice been selected. At times there may be more answers amongst the choice where the selection mode is done with the help of check boxes.

4) Practice Programming Assignment: Table 2 refers to the in-house faculty contribution in enhancing the approaches to solve graded programming assignments.

Table 2. Good Practices of programming

IDE, Compiler	Codeblocks, gcc on UNIX platforms
Naming variables	Pascal casing, Camel casing
Code structure	Indentation [Modular]
Error checking / bug fixing	Debugging on Codeblocks, gcc environment

5) Graded Programming Assignment: after the quiz closes, the assignment is released. This has sample input and sample output, based on the problem statement the solution needs to be designed. The solution needs to be written in the template provided by IIT Bombay. The code is checked for the three test cases, if it is successful only then it is uploaded. The auto grader of IIT Bombay will evaluate the file and displays the score.

6) Progress:

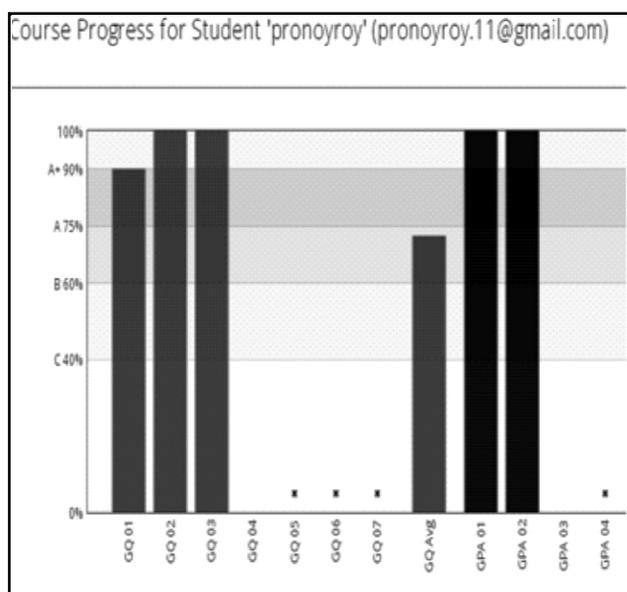


Fig. 2 depicts the progress of a student for the current semester wherein his marks for Graded Quiz (GQ) for GQ1, GQ2, and GQ3 are A+. The bar is empty for the GQ4 as quiz is released and not attempted by the student. And the x represents

the not released sections. The progress bar helps the student to know the status and improvise the scores.

C. Certificate

After successful completion of the graded quiz and graded programming assignment, a final exam is released. The marks obtained are printed on the certificate with grades A+, A, B, C. The certificate is the end product of the continuous learning.

D. Comparison between Blended MOOC and traditional teaching

The students get to learn different set of examples from the teacher and MOOC instructor. The decades experience of the MOOC professors, their varied domain knowledge and their teaching skills brings in a sphere of new application based learning. The applications dealt with image processing, operations research, applied mathematics and database storage activity. In traditional learning for the same course the in-house faculty can give various examples if the student does not understand a concept through live interaction. Based on the learning ability of the students, the in-house faculty was able to identify the slow learners to provide more basics in understanding the subject. Thereby these students were able to catch up with the video lectures at later stages. The Blended MOOC enhanced the continuous learning by introducing graded quiz and graded programming assignment. The Blended MOOC platform was well used for testing their understanding of the course through quiz and assignments. The usage of discussion enables the learning process and ability to solve greater dimensions with precise solutions. Therefore knowledge to be imbibed is of greater depth, as in-house faculty and the MOOC instructor contribute greatly. The peer activity and peer learning is enhanced.

4. Conclusions

The student is challenged to maintain equilibrium between the curriculum and the MOOC. The level of understanding and the contribution to the society shall be impressive. The impact of professional engineering contributes to societal and environmental contexts for sustainable development. The paper highlights in bringing changes to the current teaching process with the introduction of MOOC to curriculum to obtain the Outcomes-Based Education.

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