Leveraging Student Project through MOOC on UX: Case Study

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***Abstract*—Massive Open Online Course (MOOC) is the best means to learn latest /current technologies which are otherwise difficult to gain access and learn them. A case study of how, MOOC on 'User Experience (UX) provided by Udacity for mobile app' was utilized to enhance the quality of student projects, is presented in this paper. Most of the time, MOOCs are provided by the global experts who teach the course in a best possible way. Also, MOOC directly helps in attaining lifelong learning skills. MOOC can be used in many ways to deliver a curriculum. This paper focuses on, how the learning's and activities specified by MOOC on UX is included as part of student project course, its assessment, evaluation and results.**

The student projects are mobile apps specified by a company, which emphasized much on UX, the latest industry need. Therefore students were instructed to register for the MOOC on UX and learn on their own. Each student teams had to do UX design as specified in MOOC and same UX design activities were included as a part of project course assessment and evaluated. As a result, students were able to discover additional requirements addressing mobile UX and perform UX based design and construct according to it. These activities helped to attain ABET criteria 'i' with attainment 7.82 on scale of 10.

***Index Terms*—Massive Open Online Course (MOOC), User Experience (UX), Project Course, attainment, curriculum, lifelong learning.**

I. INTRODUCTION

In the field of computer science and engineering, the technology is rapidly changing. It is very much necessary to include the leading edge technologies in the curriculum to stay up-to-date with the current industry standards. But access to such technologies is not easily available for learning. Even if available, it's difficult to get good resources on it or an expert on that particular technology. MOOC is emerging and evolving. Since MOOC reaches to mass online global user, the cutting edge technologies for learning are put up as MOOC. One such latest technology that is a part of current industry standards is UX and it is fortunately as MOOC. This paper presents a case study of how the learning's from MOOC on 'User experience (UX) provided by Udacity for mobile app' is incorporated in Minor project course, assessed and evaluated.

A. MOOC on ' UX Design for Mobile Developers'

MOOC on 'UX Design for Mobile Developers' is hosted by Udacity. But the course is designed by Google. This MOOC emphasizes on UX design for building mobile app. It allows user to quickly learn about UX and apply it. In this case study, MOOC on 'UX Design for Mobile Developers' is taken as augment to the minor project course at third year level of computer science and engineering program. All the students are instructed to register for the MOOC to learn UX. They are also instructed to design UX for their mobile app as specified by MOOC.

B. Minor project course

In the minor project course students form a team of 4 to 5 members. Each team is assigned a module of the project specified by company, Contineo Bangalore. The project specified by the company is to build mobile app consisting of many modules. In building the mobile app, the company focused mainly on UX designs of the mobile app. Therefore students are supposed to perform UX design for the modules and build them. Since students had not learnt UX in any of the previous courses, they had to learn it on their own and apply it in the modules.

This paper focuses on MOOC integration into project course. But the details of UX design activities done in this project course can be found in our paper "in press"[18]. Apart from it, the project course is designed with Team based Learning (TBL) approach as presented in our paper "in press"[17]. A peer review is also included which is presented as separate paper "in press"[16]. In section II, theory background about Team Based Learning (TBL), UX and lifelong learning are briefed. In section III, proposed work along with its case study is presented. i.e. describing integration of MOOC into project course, its assessment and evaluation. In section IV, results are presented depicting performance in applying learning's from MOOC. Also, it presents how MOOC affected the different phases of minor project and quality of the product. Finally summary, conclusion and future scope is given in section V and VI.

II. THEORY BACKGROUND

The different theories in the preview of the paper are TBL, UX, MOOC and Lifelong learning. These are described briefly in following sub sections.

A. TBL

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Collaborative learning and knowledge building in a group can be achieved through TBL. The TBL is considered as an alternative teaching method for both improving the quality of teaching and enhancing learning effectiveness in an education through social learning [10] as reported by the Korean National Human Resources Development Council. In addition, TBL promotes higher learning skills including cooperative ability, critical reasoning, creative thinking, responsibility, and communication [11]. Thus it promotes both students' social and cognitive learning. TBL allows students to engage in the practice of knowledge building through a process of social investigation in a meaningful context. Therefore, teamwork competencies including communication, leadership, collaboration, and interpersonal relations, can be acquired during team-based social activities rather than in lectures or in individualized tasks.

B. UX

User Experience (UX) incorporates individual's attributes, experience of using product, enabling user to use products, and emotions while using a particular product [5].

The products are developed and built to meet all the needs of users. The products are capable of delivering all the services as planned, since they are built using sophisticated technology and thorough software engineering processes. But although products meet all the goals, there is need to balance such goals with UX [6]. Also the usability of the product depends lot on UX design and therefore UX design should be done in the early stages of life [7]. Hence it is necessary to do UX design in building the products. UX includes User-centric Design, Interaction Design, Information Architecture, Visual Design, Usability and Human Computer Interaction. It is very difficult to address all of them in short duration of student's project course. The MOOC on 'UX Design for Mobile Developers' addresses all these concepts except Human computer Interaction.

C. MOOC

A massive open online course (MOOC) is way of teaching a subject online where unlimited users can take classes and it is has open access. Like traditional teaching, MOOC provides contents, materials in form of videos, animation, hands-on and e-materials interactively. MOOC is now currently researched area and evolving quickly [8] [9].

The authors in [1], identified seven codes as a) Concept, b) Design, c) Learning theories, d) Case studies, e) Business models, f) Target groups and g) Assessment in familiarizing the MOOC platform. In [2], the authors describe how the MOOC helps in enabling for accessibility, student engagement and life-long learning experiences. In the report [3] , the author present the types of MOOCs, 'learners goal and experiences', issues in 'business and financial models', and about 'completion & dropout rates'.

Thus the problems associated with MOOC are i) incompletion of course, ii) incorrect interpretation of concepts.

In [12] the author state that in traditional teaching learning process the number of students are in small number whereas in MOOC it is massive, students could be from anywhere across the globe. They also mention that face to face teaching/learning could not be replaced by MOOC in general. In online courses, learning is at self-regulated pace of the learner and evaluating the learners is a challenge.

In [13] the authors have designed a MOOC course for providing hands-on practical programming with feedback to the learners. In [14] an integration of moodle and MOOC with feedback analysis is described. In [15] based on the click's done by the learner, when using MOOC video's as a learning aid is analyzed. The click could be play, pause, seek or an error.

D. Lifelong Learning

The author in [4] states about 'learning everywhere', 'learning as a means' and 'learning as an end'. The necessity of lifelong learning is so strong that it is regarded not just as a matter of survival; it is 'positioned as a moral obligation'.

III PROPOSED WORK - CASE STUDY

The case study presents how MOOC on 'UX Design for Mobile Developers' and its learning's are incorporated, assessed and evaluated in students projects. The company which assigned projects to students had instructed students to perform UX design for the mobile app module that they are going to build. Since the students are very new to UX design, they had to learn it. Therefore a MOOC on 'UX Design for Mobile Developers' provided by Udacity is discovered and utilized in minor project course.

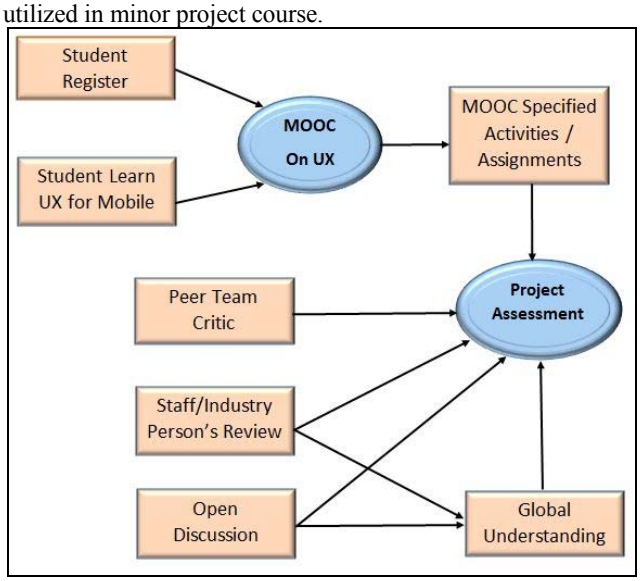

Fig 1: Integrating MOOC into Project course

The first challenge is 'how do you ensure students register to MOOC, learn UX from it and apply it to their project. To encounter this challenge, the activities or the assignment specified by MOOC were identified and listed. Then these activities are included as part of minor project assessment and evaluation. i.e each student teams are supposed to go through the lessons provided by MOOC and learn UX. Then each team

has to do the assignments of MOOC by using the project that is assigned to them. All these assignments are assessed and evaluated with weightage of 24% in total marks. Fig 1 shows such integration of MOOC in our project course.

The second challenge is to ensure that students correctly understand and interpret the concepts with global common understanding. This is done by open discussions of students work, peer critics, assessment and evaluations by the experts at the end of course as explained in below sub-section B.

A. MOOC UX design activities

The list of UX design activities/ assignments identified from MOOC and that are part of Minor project assessment are

i. User interview, personas
ii. Low and High resolution wireframes
iii. Mobile persona and User context
iv. GUI design: - Responsiveness of Pages, Navigation, Information Architecture with User Context
v. Usability test

All these activities are evaluated in four stages. For every evaluation the rubrics are prepared, published well in advance and evaluated as per the rubrics. The details of UX design activities done in this course are given in our paper "in press"[18].

B. Assessment and Evaluation

The main challenge in MOOC is, 'how to ensure that students understand and interpret the concepts in correct way'? To overcome this challenge following ideas are used (depicted in Fig 1):

i. Writing rubrics and staff meetings to have common understanding among the staff.
ii. Open discussion in lab: since learning from MOOC should not be misinterpreted
iii. Peer review and critic across the teams
iv. After the open discussion, Finalizing common understanding and publishing to students through shared google doc.

For every activities the rubric are written and published well in advance. Before every activity, a staff meeting is held to understand these rubrics and to have common understanding among the staff. For all the activities, each team is supposed to present thier work, followed by open discussion. Here every peer team is supposed to review and critic the other team's work. This mainly solves the challenge said in the start of this section. i.e. when every team reviews the other team, they understand the concepts better that are learnt in MOOC and interpret it correctly. It also prevents students from making wrong interpretation of learning's from MOOC.

TABLE 1: REQUIREMENTS STATED THROUGH UX STUDY BY THE TEAM NUMBER- A23

requirements derived from persona	**requirements derived for mobile and user context**
• Notification to be provided whenever marks are updated • view class average • view minimum marks to be obtained in upcoming evaluations for obtaining certain grade • download as pdf • search option	• use icons, images fitting to mobile screen • Highlights information context. ex: highlight modified marks with different color or fonts • when user is not in campus, prompt to turn of Wifi as app works only in intranet • No notification during night hours

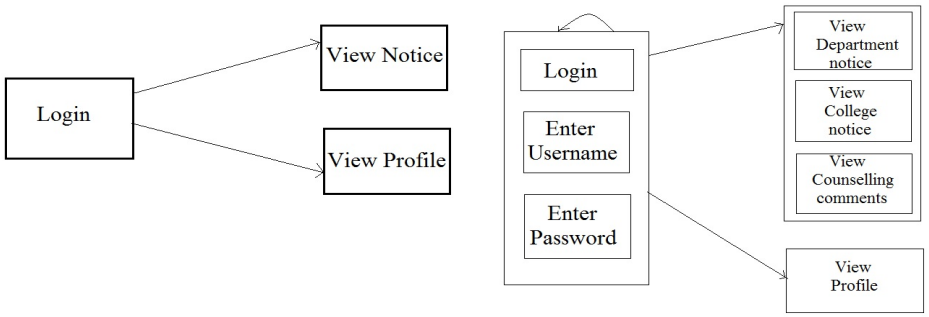

Fig 2: Low and High Resolution wireframes

TABLE 2: SAMPLE RUBRICS FOR EVALUATION 1 (AS PER TABLE 3)

Parameter	**Marks**	**Rubrics**
User interviews	**4**	• 3-4 with valid proofs(video, email from user, undersigned paper forms) – **4 marks** • 3-4 user interviews with proofs- **4 marks** • User interviews without proofs- **2 marks** • 1-2 user interview with proofs-**2 marks** • 1-2 user interview without proofs-**1 marks** • False/nil use interviews -**0 marks**

persona	**6**	• Attributes in persona reflected from user interview and use-cases for each users identified- **6marks** • Attributes partially reflect user interview and use-cases for each users identified - **3marks** • Attributes do not match user interview and use-cases for each users identified - **2marks** • Attributes do not match user interview and use-cases for each users not identified - **0marks**
Low res wire frames	**5**	• Low res wire frames for all features with correct steps-**5marks** • Low res wire frames for few features with correct steps-**3marks** • Low res wire frames for few features with in-correct steps-**0 to 2 marks**
High res wire frames	**10**	• High res wire frames for all features with correct sub-steps and navigation-**10marks** • High res wire frames for few features with correct sub-steps and navigation-**6marks** • High res wire frames with in-correct sub-steps and/or invalid navigation- **0 to 4marks**
Total 25 marks will scaled down to 6/100 marks		

Next, it is also very important to have common understanding about the learning's from MOOC. Therefore in every phase, after open discussions, the common understanding of the learning's from MOOC were finalized, documented and published to students through shared google doc. Finally at the end of the minor project, a project exhibition for industry persons and UX experts was conducted. Through the feedback from exhibition, it was confirmed that students understanding and interpretations of UX design through MOOC learning were in accordance with current industry expectations and are meeting the industry requirements.

IV RESULTS DISCUSSION

Through UX study for their mobile app module, the students were able to discover more requirements regarding the app features and mobile device requirements, apart from the requirements specified by the company. For example, team A23, which was assigned module: students CIE (Continuous Internal Evaluation) marks listed new requirement based on UX study as given in Table 1.

Similarly all teams found out new requirements based on UX study they conducted. This was possible due to open discussion on UX (learnt from MOOC) done in lab. In similar way, other UX based activities (section III A) are conducted. Fig 2 shows a sample of Low and High resolution wireframes done by the students of team A21.

Trusted Relative Peer Review (TRPR) is conducted to measure individual performance within the team as given in our paper "in press"[16]. Since evaluation of UX based activities are team evaluation, the marks obtained by the team are multiplied by each individual peer rating to get individual score "in press"[16]. Then the individual score of each student is considered for attainment calculation.

TABLE 3: UX TASKS EVOLUTION LIST

Evaluation Number	UX Tasks	Marks
1.	Evaluation User interviews and wire-Frames (persona ,low res and high res wire frames as per MOOC on UX from UDACITY)	6/100
2.	Mobile persona test plan	2.5/100
3.	User context test plan	2.5/100
4.	GUI Design and Implementation	7.7/100
5.	Usability Test	5/100
	Total	23.7 i.e 24%

The evaluation list of UX tasks are given in the Table 3. The marks scored in these evaluations directly maps to ABET criteria 'i', 'Lifelong learning skills'. The attainment obtained is 7.82 on the scale of 10. Table 2 gives the sample rubrics for evaluation 1(as per Table 3). Fig 3 indicates different activities marks weightage and its attainment.

First three UX based activities are specified (section III A) by the MOOC. These activities are done by the students as instructed by the MOOC, but students are asked to perform these by applying the same concepts to their module "in press"[18]. These activities are evaluated for marks with weightage of 11%. Here also, similar attainment is calculated and attainment of 6.8 on scale of 10 is obtained (shown in the Fig 3). Fig 4 shows the comparison of individual performance in UX based activities. Half of the students scored more than 80% indicating that students are able to apply the learning's from MOOC in a better way.

UX design learnt from MOOC is part of design phase in projects. Including UX design, total weightage of marks dedicated to design phase is 30% of marks as compared to previous year weightage 10%. Fig 5 depicts the comparison of phase wise marks weightage in current year and previous year of minor-project course.

As shown in Fig 4, with help of MOOC on UX, it was possible to include UX in minor project which increased weightage of design phase. With inclusion of UX, more emphasis is given to design phase which helped in building quality product.

Finally with learning of UX from MOOC, students are able to build mobile app called "*KLEstudIo*", which is more usable compared to its browser based application. These mobile apps usability is as good as other mobile apps available in online stores. Fig 6 shows variants snapshots of a 'CIE module' built by different teams. The best one is selected for integration into mobile app.

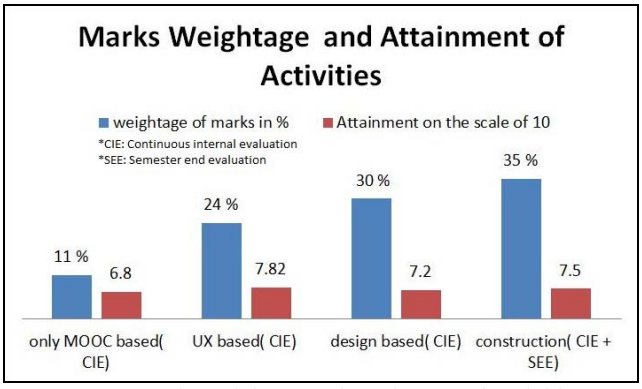

Fig 3: Marks weightage and Attainment of Activities

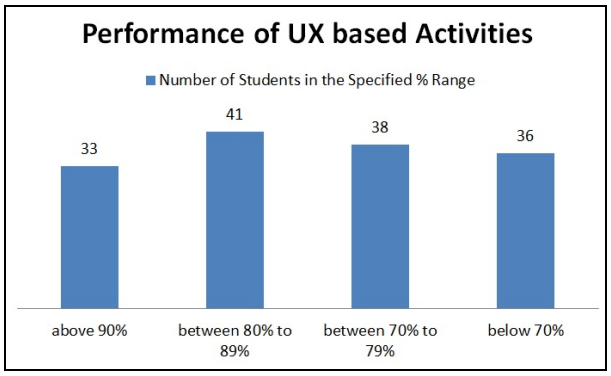

Fig 4: Performance of UX based Activities

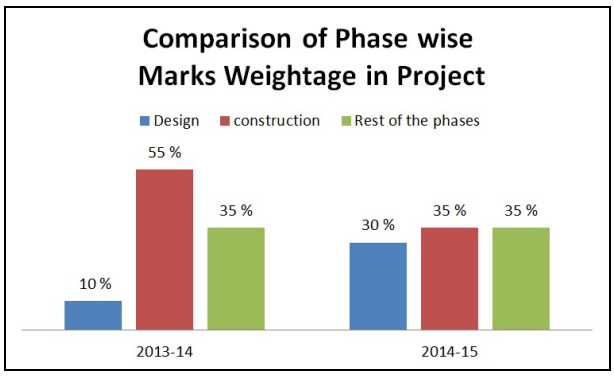

Fig 5: Comparison of Phase wise marks Weightage in Project

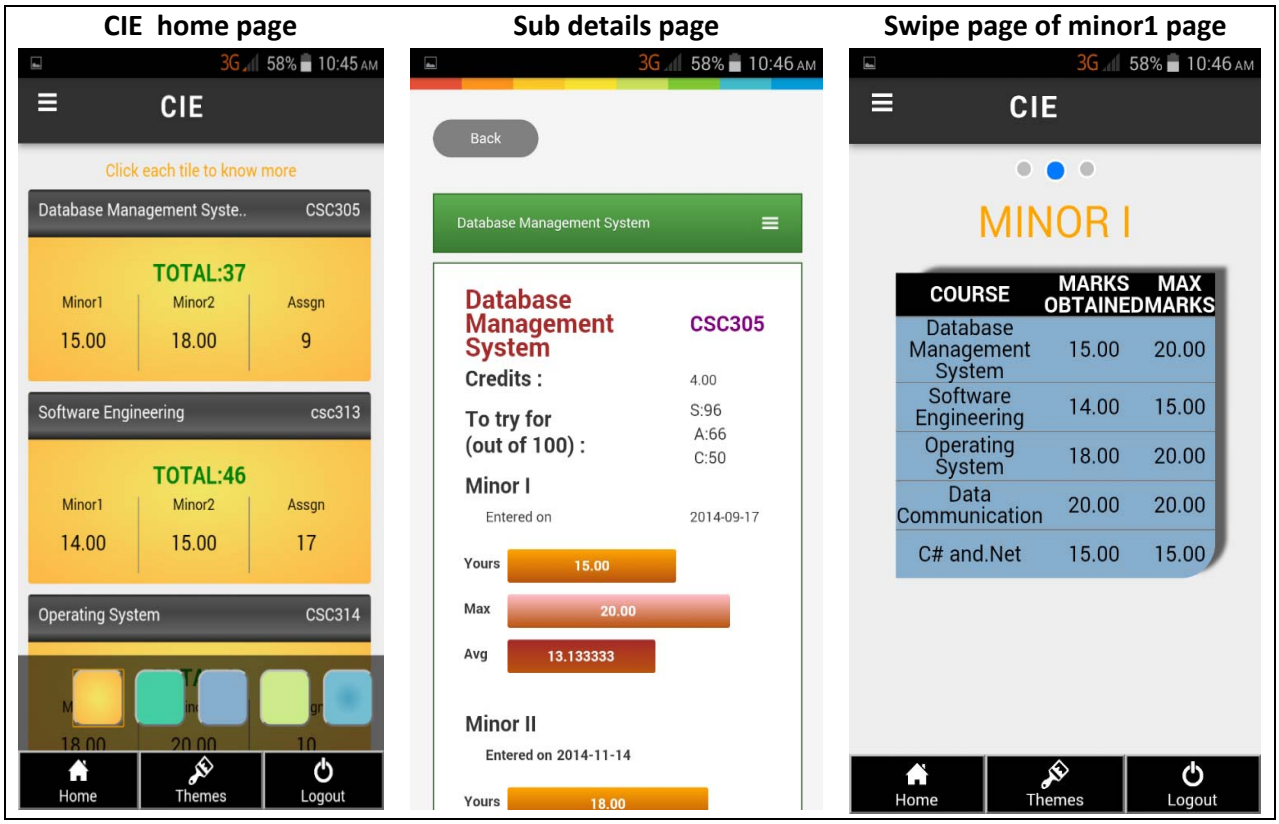

Fig 6: Continuous Internal Evaluation (CIE) module snapshots

V SUMMARY AND CONCLUSIONS

MOOC is evolving and has no limitation in educating, considering the current science and technology. MOOC can be adapted to suite curriculum of the university and is making its way in to the curriculum. Though the MOOC has disadvantages, we can solve them by blending MOOC in some ways and take advantages of MOOC. For ex the case study presented here in which all students able to understand and interpret the knowledge obtained through MOOC. This can happen only under supervised environment.

The main problem with MOOC is incompletion of course and wrong interpretation of concepts learnt from MOOC. In this case study, the students are asked to learn UX from MOOC. Then apply those learning to the projects that they are currently assigned. To ensure that students go through the all the lessons of MOOC, the same assignments specified in MOOC are made as part of assessment and evaluations. This enforced students to go through all the lessons of MOOC in order to complete the assignments. Next to overcome the problem of wrong interpretation of concepts, each team is supposed to present their work in front of all other teams and instructors. Open discussions are done and the work of each

team is critiqued by peer teams and instructors. By doing so, all confusions, doubts, wrong interpretation of concepts are resolved. The open discussion also ensured that all had common understanding.

Later in middle of the semester, a UX expert is invited to verify and validate the UX design done by the students. After UX expert review, it was confirmed that students had interpreted concepts learnt from MOOC correctly and most of the teams had done UX design as per standards acceptable to industries.

VI FUTURE SCOPE

MOOC can be included in the curriculum which can reduce the burden of instructor at colleges in teaching, assessment and evaluations. Further MOOC enables instructors to concentrate on other tasks of education like research, course design and aim to achieve higher level of cognition. All this is possible only if MOOC meeting our requirement is available. If so, then students can register to such MOOC course and get certified.

Even though if MOOC meeting our requirement aren't available, we can still develop and host MOOC locally at university. Once a MOOC is developed and hosted, it can be used for several years since there are many basic courses to be learnt and the content of such courses don't change over the years.

Finally MOOC is boon to education not bane, but MOOC can't completely replace the education system.

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