Content Creation and Pedagogic Strategies for Skill Development MOOC

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Abstract: Skill development is being promoted throughout the country, as a channel to create employable resource. Massive Online Open Courses (MOOCs) can provide a platform to enable such skill development programs at scale. The IITBombayX course, Basic 3D animation using Blender (SKANI101x), was the first of its kind offering of a Skill Development MOOC (sdMOOC) for the Indian learners. Over its two offerings, 6457 participants registered, 2465 (38%) were active and 1132 (19%) were certified. However while producing and conducting the course we realized the lack of content creation and pedagogic strategies for such sdMOOCs. Analysis of our pilot offering of SKANI101x, highlighted its effectiveness for both, first-time and experienced online learners. In the second offering we modified pedagogic strategies to foster student-instructor interactions that resulted in higher engagement and completion rate. This paper discusses the rationale of the strategic decisions taken for SKANI101x during both its offerings. Further, we report an evaluation study of participants’ performance, engagement during the course, consumption patterns of the content, and perceptions regarding the components of the sdMOOC. This provides an evidence for the effectiveness of the content creation and pedagogic strategies implemented.

Keywords: Skill development MOOCs, 3D animation skill development, content creation for MOOCs, pedagogic strategies for skill development MOOCs, IITBombayX, SKANI101x,

1. Introduction

Skill development is being promoted as one of the national programs in India (NSDC website). Traditional teaching methodologies for skill development aren’t enough to cater to this growing need. Therefore, online education initiatives are encouraged to reach out to the masses. Out of various domains which are popular amongst the learners, animation has large following, mainly due to its association with creativity and glamour. Western countries have been eyeing Indian talent for the animation and special effect domains. However, lack of enough opportunities in formal education for animation makes it difficult for them to get the right kind of personnel. Animation education in India has two clear sections. One section is the old school classical animation education available at the prestigious institutes like NID and IITs. These schools focus on animation as a medium of communication, and looks for various approaches to present it. The intake of these institutes is severely low, in comparison with the growing demand. On the other hand, there are other types of animation schools literally mushrooming all over, who focus on the animation software tools. The students of these schools are aplenty; however they are typically categorized as software technicians, than creative animators (Sabnani, 2005). Typically, aspiring animation students in India look for well structured animation course, with an appropriate balance of creativity and software skills, which is available at a low cost.

Developing animation courses using Massive Online Open Courses (MOOC) format can address this gap. IIT Bombay has started IITBombayX based on the Open edX platform, to disseminate quality education in MOOC format, which is free to all. To initiate a MOOC in the skill development domain, IITBombayX offered a course on basic 3D animation. This course is based on Blender which is free and open source 3D animation software. Blender was the chosen application to
propagate use of free software, and thereby addressing issues of piracy. The two offerings of this course have been successful, and a total of 6457 participants have registered. Out of these, 2465 (38%) were active and 1132 (19%) got certificates. This paper presents the content creation and pedagogic strategies implemented in this course along with the evidences to show its effectiveness.

The paper is organized in the following manner. The second section discusses the types of MOOCs and the specific need for the development of skill development MOOCs. Third section describes our implementation of the sdMOOC titled: Basic 3D animation using Blender (SKANI101x). The fourth section presents the design rationale for the content development and the implementation of pedagogic strategies. Fifth section reports an evaluation study of the two offerings of SKANI101x, as evidence of the effectiveness of the various strategies applied. We discuss the results of this study in the sixth section.

2. Emergence of Skill development MOOCs (sdMOOCs)

Many of the organizations which offer MOOCs, such as: edX (edX website) and Coursera (Coursera website) offer curricular MOOCs, by collaborating with popular universities. Few other platforms also offer MOOCs on allied topics. Other organizations such as Udacity (Udacity website) or Udemy (Udemy website), have some skill development courses across various domains. These organizations encourage industry experts and professionals to offer the courses, even though they are not faculty members in reputed universities/institutions. Most of these courses are modular and short term. Students, as well as working professionals use these courses to upgrade their skills (Yuan, 2013).

While planning for the (SKANI101x) course, we analyzed the challenges which, Indian students face while learning using the MOOCs offered by western countries. In terms of the animation skill development, most of these courses are based on the proprietary tools, since majority of animation industry is driven by these software. However, for the average users, it becomes difficult to practice the skills explained in the course, since they cannot afford to purchase the proprietary software. The option left to be chosen if of piracy, which should not be encouraged since it is unethical. Many of these courses have a small utility/concept/skill covered in it. This strategy helps in the monetization of the content; however, the users are required to take up more courses to learn the particular skill. This micro course module structure and the payment option availability in foreign currencies make it difficult for them to take up these courses for learning animation. English language is a major barrier for majority of Indian students; however it is further difficult because if the European/American English ascent of the instructors (Gaebel, 2014). It also restricts their interaction over the discussion forums or eMails.

2.1 Researchers believe that xMOOCs + cMOOCs is the way ahead

Two separate approached prevalent in MOOCs are xMOOCs and cMOOCs. xMOOCs are content based MOOCs, which are an extension of classroom teaching pedagogy. On the other hand, cMOOCs explore pedagogies beyond classroom teaching, by collaborating the learners and the instructors (Yuan, 2013). These are wide apart in their execution, and therefore researchers are trying to select a midway, to implement best of both. This blended approach is about facilitating interaction between the MOOC instructors and the participants, in an online or face-to-face manner (Holotescu et al, 2014) xMOOCs are often used for training a large number of individuals in a curriculum of knowledge and skills. It relies on multiple choice questions to assess the learning, however, also assures a scale up in terms of numbers (Rohe, 2014). Pedagogic strategies of the cMOOCs have an option for the course participants to make use of the technology based interaction tools to interact with the instructors. The entire focus of cMOOCs is to have a personalization feeling to the participant (Conole 2015). This particular aspect is important in the course design of a MOOC.

In the parlance of skill development, it is important to have modularized approach for the content creation, to make it easier for the learners. At the same time it needs a strategy to create interaction opportunities between instructor and learners, and also the peer groups. The course design needs to be created with appropriate weightage given to the explanation and assessment, both.
3. SKANI101x: Our offering of skill development MOOC

IITBombayX was established in 2014, with an objective of creating and imparting high quality academic content, across the country using the massive online open courses (IITBombayX website). The platform used to build this system is Open edX. Since, animation is emerging as a preferred medium for communicating content, a course on animation skill development was created and titled: SKANI101x (SKill development course on ANImation). Computer animation needs software to demonstrate the modeling and motion. This course is based on free and open source 3D animation software: Blender (Blender website). Use of Blender, makes it accessible for each and every individual to use this software for the practice, without spending any money on the license.

The course was designed with two types of novice learner groups in online education. One was of the first-time learners (FLs), and other one which has participants who are experienced learners (ELs). The content was designed, in a way that both the learners would benefit from the course.

3.1 Course contents
Animation principles, Blender installation, basic processes like transformations,

3.2 Learning and instructional objectives
The primary learning objective for the course was: After taking this course, the participant should be able to use Blender 3D software to create a video (of ~20 seconds), having basic animation principles.

In order to achieve that, concepts from various domains were incorporated in the course design. These were the instructional objectives for the course:

**Animation principles:** As the course was based on animation, popular animation principles formed the core of the course. However, since this was a short course (8 weeks), only two of them were incorporated. Activities and skill (of using Blender) were woven around these principles. The principles chosen for this course were: Stretch and squash, and Timing and spacing.

**Blender operations:** A range of Blender skills were incorporated in the course design, since the objective of the course was to enable the users to create an animation using Blender. Basic skills like: transformations, modifications, animation, and rendering were included in order to achieve the learning objectives.

**Other allied concepts:** In addition, to the animation principles and the Blender skills, there were some generic concepts included in the course. These were necessary to provide a complete view about 3D film making. These include: visualizing 3D space, concept of camera, and rendering of an image using software.

3.3 MOOC resources generated for SKANI101x
The resources created for SKANI101x were of different types. For the explanation of the various concepts and skills, various types of content corresponding to these objectives were created.

**Videos:** Since the concept of motion involves change over time, motion graphics (videos) were created. Each week had 4-5 videos (approximately 40-55 minutes) to be consumed. The concepts requiring more time for explanation, were split in parts, so that no video was having duration more than ~10 minutes. In all, 48 videos (7.5 hrs) were created for the entire course.

**Slides:** Each video was accompanied by the slides showing the stepwise processes explained in the video. The slides were created for reinforcement, and were made available, next to the videos, so that the participants could download them for reference.

**Additional documents** such as Keyboard shortcuts, or sample of assignment submissions were created for easy recall of the Blender actions. These were released after 6th week, so that the participants can print them, and refer while performing the Blender actions.

**Assessments:** 9 Quizzes and 7 Assignments were designed for the course.
3.4 Orchestration of SKANI101x
Offering the course in the MOOC format was decided, when the course was conceived. However, there was no evidence available to decide on the pedagogy strategies to be implemented during the course.

3.4.1 First offering (OF1) in a MOOC format
This offering had the standard features of MOOC (Glance et al., 2013). Week wise content was made available on the platform; Corresponding assessment activities were published; Instructors and the course staff provided support using the discussion forums; Reminders were sent using mass mails. The pedagogy strategies were common for both the offerings were: (a) The assessment quizzes for the content released in a particular week, were released in the subsequent week, thereby allowing participants to practice. (b) A score of 50% (average) in the quizzes was required to be eligible for getting a certificate. (c) Participants were encouraged to submit the assignments (but not mandatory). Decision was taken to upload the submissions, to encourage other learners.

3.4.2 Second offering (OF2) having interaction options in a MOOC
After the first offering (OF1), the feedback of the participants was reviewed, which mentioned a need for more interaction with the instructors (Majumdar & Sahasrabudhe 2016). The course was re-offered (OF2). Pedagogic strategies modified accordingly are explained below:

**Interaction** options were offered at various levels, depending on the number of participants interested in interacting (See Figure 1). A calendar was shared with the participants, and they were asked to select a slot (one hour) depending on their convenience. For individual participants who wanted to interact, the channels used were eMail and phones. For a small group (2-7) of participants, in addition to the basic channels, Skype calls were available. For a classroom scenario (from 10 to 80 participants), AVView technology, created by IIT Bombay and Amrita University, for large-scale synchronous distance mode teacher training (Kannan, 2011), was made available apart from all other channels mentioned earlier. For a community (participants from a particular town, irrespective of their affiliations) were interacted using Google hangouts.

**Assignment** instructions in this offering were modified, based on the feedback received in the earlier offering (Majumdar, 2016). The sample image provided along with the assignment, as an example, was removed in this offering. Open-ended approach was adopted, and the participants were encouraged to come up with their own designs instead of matching the given specifications. Although the content remained unchanged, the instructors changed the pedagogy strategies in the conduct of the course. These decisions are discussed in the next section.

Table 1: Participant demographics in the 2 offerings of SKANI101x

<table>
<thead>
<tr>
<th>Year</th>
<th>2015</th>
<th>2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Students Registered</td>
<td>1393</td>
<td>5033</td>
</tr>
<tr>
<td>Number of Students Certified</td>
<td>125 (9%)</td>
<td>1007 (20%)</td>
</tr>
</tbody>
</table>

| Registration from number of States | 27 | 32 |
| Registration from number of Cities | 404 | 988 |

<table>
<thead>
<tr>
<th>Distribution of Area</th>
<th>Number</th>
<th>%</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rural</td>
<td>365</td>
<td>23.81</td>
<td>1427</td>
<td>27.67</td>
</tr>
<tr>
<td>Semi-urban</td>
<td>325</td>
<td>21.20</td>
<td>749</td>
<td>14.52</td>
</tr>
<tr>
<td>Urban</td>
<td>775</td>
<td>50.55</td>
<td>2891</td>
<td>56.05</td>
</tr>
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</table>

<table>
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<th>%</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
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<td>1037</td>
<td>69.09</td>
<td>2908</td>
<td>57.37</td>
</tr>
<tr>
<td>Female</td>
<td>464</td>
<td>30.91</td>
<td>2161</td>
<td>42.63</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>Number</th>
<th>%</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>18-25</td>
<td>1249</td>
<td>86.08</td>
<td>3950</td>
<td>83.11</td>
</tr>
<tr>
<td>25-40</td>
<td>152</td>
<td>10.48</td>
<td>692</td>
<td>14.56</td>
</tr>
<tr>
<td>40-50</td>
<td>45</td>
<td>3.10</td>
<td>88</td>
<td>1.85</td>
</tr>
<tr>
<td>50-60</td>
<td>4</td>
<td>0.28</td>
<td>16</td>
<td>0.34</td>
</tr>
<tr>
<td>Above 60</td>
<td>1</td>
<td>0.07</td>
<td>7</td>
<td>0.15</td>
</tr>
</tbody>
</table>
4. Design rationales for SKANI101x

Most of the MOOCs follow the pattern of having weekly videos, assessment quizzes, and active discussion forums (Bali 2014). SKANI101x being a course on skill development, needed some modifications in these strategies. Therefore, we tried some modifications to create the content and

4.1 Content creation strategies

These strategies were based on standard processes instructors follow to create MOOCs. Slides have bulleted details, videos have face+screen, and quizzes have MCQs. Few modifications done to the process, considering the software demonstration components are as follows:

Videos: Generally, MOOC videos are a combination of slides and instructor’s face video (talking head). Software demonstration videos are mostly screen-capture, with talking head video used sparingly (mostly using picture-in-picture: PIP). For SKANI101x, we shot the faculty video using a green screen backdrop. This enabled the editors/compositors to place the instructor’s video (using Chroma removal effect) at a convenient position, without obstructing the screen capture/slides.

Slides: Textual explanation of the concept with examples, or stepwise (software) process with screenshots was added to the slides. Highlights were used to amplify the important areas on screen (Graphic design principle). The objective was to facilitate the users to perform processes, in case video is not accessible, by referring to the slides.

4.2 Pedagogic strategies

Pedagogic strategies applied to the course structure and the assessments created for OF2 are:

4.2.1 Selection of course structure

The structure of SKANI101x is a combination of concepts and skills in animation film making. In order to keep the interest levels high, the concept lectures were interspersed with the skill/software demonstration lecture videos. The challenge was to retain the interest level of the first time learners (FLs) and experienced learners (ELs), by having an equally interesting line up of the topics in the course. The strategy used was to have a level wise full loop of start-finish of the 3D content creation. Then take it to the higher level, and have another loop, and go on. This strategy helps in giving a feeling of completeness at the end of every loop, rather than the anxiety of ‘how much more before I can make my own model/video’.

4.2.2 Designing of quizzes and assignments

Quizzes: As a strategy, the quizzes were placed in the subsequent week, in order to provide sufficient time for practicing the skills. The quizzes have three types of assessment questions: (a) Recall shortcuts used in Blender, (b) Locate the particular icons/windows in the given screenshots and (c) Select the correct steps to perform a particular action in Blender

Assignments: The assignments were not graded; however, the submissions were often uploaded on the discussion forum, to encourage participation (Bali, 2014). In the first three assignments, an image was provided for the participants as a ‘key’, which they had to match. Later, the instructors removed the image and gave just the description. This made the submissions open ended, and participants were able to visualize freely.

4.2.3 Discussion forum activities

Indian language usage (Hindi) was tried to encourage the participants who didn’t have confidence in English communication. Using the personalization strategy, attempts of involving the participants were made, such as: asking for introductions in the beginning of the course, asking to post ‘selfies’ at the end of course etc. As done in most of the xMOOCs, the forums were moderated to disable discussions related to the assignments/quiz questions.
4.2.4 Additional interaction strategies
Different channels of interactions were offered for various types of participants (see Interaction options for the various stakeholdersFigure 1). Individuals were contacted through eMails and phones. Small groups had an option of a Skype call, in addition to the options for the individuals. Classrooms and communities (participants enrolled in a town) used Google hangouts in addition to other options mentioned above.

Figure 1: Interaction options for the various stakeholders

5. Evaluation study

We conducted an evaluation study of the two offerings of SKANI101x with an objective to understand effectiveness of our content creation and pedagogic decisions taken. The entry survey response indicated that a considerable proportion of the enrolled participants were first time online learners. Hence we wanted to evaluate whether the decisions taken to design and implement the course helped both groups, the First-time Online Learners (FL) and the Experienced Online Learners (EL), to develop their animation skills. In this section we elaborate the method of study and present the results.

5.1 Research Questions
The study has the following research questions:
Considering FL and EL during the second offering of SKANI101x
1. Are there differences in the learning performances of the two groups?
   a. Are there differences in their scores of graded component?
   b. Are there differences in perceptions of learning achievement?

2. Are there differences in perceptions regarding contributions of various MOOC components towards learning of 3D animation skill for both groups of learners?

3. How did the engagement levels of the participants change across the two offerings?

5.2 Research Methods
Overall methodology of the study is mixed methods. We had collected quantitative data of the participant’s performance, engagement and perception during the course. Additionally we have open-ended participant feedback and interviews of sampled learners. In this paper we report the analysis of the quantitative data collected across the offerings.

5.2.1 Instruments
We designed questionnaires to elicit participants’ response of their perception and preferences. For the former there were 5-point Likert scale questions (with 5 being most desirable) and the later had multiple-choice questions. From the entry survey, we selected the enrolled participants response regarding their prior exposure to online learning. The exit survey collected the participants’ perception after participating in the course. The constructs, language and style of 3 of the questions were adopted from the validated SALG survey (Seymour, 1997). The first two questions elicit the perception regarding learning gain and ease of learning during the course. The third question inquire the degree to which different components of the course has enabled learning. For the first offering we considered 5 components of the MOOC: videos, slides, quizzes, assignments, and discussion forums. For the second offering we added the component of instructor interaction.
Apart from the surveys the course assessment quizzes and certification criteria were instruments to measure the learner performance. Additionally we analyzed activity logs recorded by the IITBombayX platform and the number of submissions of the 9 ungraded assignments to understand learner engagement.

5.2.2 Analysis methods

Based on the Entry survey response we first segregated the two groups of First-time (FL) and Experienced Online Learners (EL). We analyzed the first two RQs from the perspective of these two groups. To answer RQ1a, we compared the quiz performance of the participants and the proportion in each group who got the certificate of completion. Further for RQ1b the difference in the perception of learning achievement of the two groups are tested for statistical significance by Mann-Whitney Test. To answer RQ2 we analyzed the distribution of learners’ self-reported perception of help in learning for each 5 components of the MOOCs respectively. Videos and slides were the MOOC resource components, quizzes and assignments were the activity components and interactions were facilitated either on discussion forums or outside the MOOC platform through multiple channels with the instructor and his team. We investigated the ordinal response and significance of the statistical differences between groups by conducting Mann-Whitney Test for two independent samples. Within each group we carried out a pair wise chi-square ($\chi^2$) test to determine whether the perceived helpfulness of each component has dependence on others.

5.2.3 Participant Sample

In the second offering of the course 2367 participants filled in the entry survey and 564 filled the exit survey. 514 participants filled at least one question in both entry and exit survey. Among them 458 participants were certified. We have considered the number of participants who logged in more than the minimum number of days required for completion of the course as active participants. For the first offering it was 4 days (Referring to Figure 3) and there are 298 (21% of enrolled) active participants and for second offering it was 2 days (Figure 3) with 2167 (43% of enrolled) active participants.

5.2.4 Results

2313 participants gave their status of prior exposure to online learning. 835 (36.1%) of them got certified. 582 (35.2%) FL and 253 (38.4%) EL got certified. Considering the grades of 63 FTL and 30 EL who got certification at the end we found that the differences are not statistically significant (median: FL 0.945, EL 0.945; U=899; p=0.35). Figure 2 reports the distribution of perception of learning achievement for the two groups as collected in the exit survey. Statistical tests confirm that there is no significant difference in them (median: FTL, EL 3; U=9124.5; p=0.4421). This answers our RQ1 that the second offering of SKAN101x also had similar learning achievements for the first time and the experienced learners.

Table 2 reports the mean value of the perception response regarding the degree of helpfulness of the MOOC components and the Mann-Whitney test results for the two groups of learners. Mean response of both the groups were above the moderate help (value: 3) for videos, slides and quizzes. The mean value for the discussion forum is above the little help (value: 2). For the EL group the

![Figure 2: Perception of Learning achievement for First-time and Experienced Learners](image-url)
Interaction with instructor had \textit{much help}. But overall for each component, between the FL and EL groups, the differences were not statistically significant.

<table>
<thead>
<tr>
<th>Video</th>
<th>Slides</th>
<th>Quizzes</th>
<th>Assignments</th>
<th>Discussion forums</th>
<th>Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>mean</td>
<td>std</td>
<td>mean</td>
<td>std</td>
<td>mean</td>
<td>std</td>
</tr>
<tr>
<td>First-time</td>
<td>3.6</td>
<td>0.7</td>
<td>3.2</td>
<td>1.2</td>
<td>3.6</td>
</tr>
<tr>
<td>Experienced</td>
<td>3.7</td>
<td>0.6</td>
<td>3.4</td>
<td>1.2</td>
<td>3.3</td>
</tr>
<tr>
<td>U</td>
<td>885</td>
<td>836</td>
<td>742</td>
<td>869.5</td>
<td>850</td>
</tr>
<tr>
<td>p</td>
<td>0.296</td>
<td>0.178</td>
<td>0.038</td>
<td>0.255</td>
<td>0.216</td>
</tr>
</tbody>
</table>

Within the FL group there is a significant dependence between perception of assignment and quiz ($\chi^2=32.35$, \( p=0.001 \), \( \text{dof}=12 \)), slide and quiz ($\chi^2=32.11$, \( p=0.006 \), \( \text{dof}=15 \)) and video and quizzes ($\chi^2=16.99$, \( p=0.04 \), \( \text{dof}=9 \)) on their helpfulness on learning. For the EL group slides and quizzes components had significant dependence on perceived helpfulness on learning ($\chi^2=19.541$, \( p=0.012 \), \( \text{dof}=8 \)).

The participants’ login activities during the period of the course shows on average 66 (5% of total enrollment) participants logged in everyday during the first offering, which increased to 308 (6% of total enrollment) in the second offering. Figure 3 presents the histogram of the number of participants who visited the courseware page for any number of days. It also indicates the participants who were certified as green and the ones who did not get certificates as red.

![Figure 3: Engagement and certification across two offerings](image)

<table>
<thead>
<tr>
<th>Video Category</th>
<th>Count</th>
<th>Sum of total video length</th>
<th>Sum of views 2015</th>
<th>Avg. view duration in 2015</th>
<th>Sum of views 2016</th>
<th>Avg. view duration in 2016</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animation concept</td>
<td>4</td>
<td>43:17</td>
<td>706</td>
<td>51.3%</td>
<td>3591</td>
<td>45.2%</td>
</tr>
<tr>
<td>Blender operations</td>
<td>4</td>
<td>33:57</td>
<td>426</td>
<td>44.9%</td>
<td>1867</td>
<td>41.7%</td>
</tr>
<tr>
<td>Blender User Interface</td>
<td>6</td>
<td>52:02</td>
<td>982</td>
<td>49.8%</td>
<td>4956</td>
<td>49.1%</td>
</tr>
<tr>
<td>Concepts explained in Blender</td>
<td>13</td>
<td>29:03</td>
<td>1222</td>
<td>48.1%</td>
<td>6851</td>
<td>41.1%</td>
</tr>
<tr>
<td>Examples</td>
<td>7</td>
<td>03:22</td>
<td>499</td>
<td>54.1%</td>
<td>2465</td>
<td>42.9%</td>
</tr>
<tr>
<td>Intro &amp; Wrap up</td>
<td>10</td>
<td>30:35</td>
<td>1416</td>
<td>48.8%</td>
<td>5457</td>
<td>41.2%</td>
</tr>
<tr>
<td>Blender Installation</td>
<td>4</td>
<td>09:40</td>
<td>454</td>
<td>44.6%</td>
<td>1948</td>
<td>37.7%</td>
</tr>
<tr>
<td>Grand Total / Avg.*</td>
<td>48</td>
<td>07:21:36</td>
<td>5705</td>
<td>49.0%*</td>
<td>27135</td>
<td>42.5%*</td>
</tr>
</tbody>
</table>
Considering the 9 ungraded assignments of the course, the participants submitted a total of 454 assignments in the first offering (405 unique) that went up to 2633 (2339) during the second offering. There was an average 485% more number of assignments being submitted during the second offering. 8 group-mini-projects were submitted in the first offering and 7 during the second offering.

### 4.2.5 Instructor’s reflections

One of the distinguishing features in this MOOC was the interaction options for the participants. It was observed that many participants were enjoying the ‘wow’ factor of interacting with the MOOC instructor/s informally. Many interactions had queries about career options in 3D animation, or advanced concepts in Blender. Table 4 shows the various interaction mediums and the actual number of participants who interacted.

<table>
<thead>
<tr>
<th>Channel</th>
<th>A-view</th>
<th>Skype</th>
<th>Email</th>
<th>Telephone</th>
<th>Face2Face</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of interactions</td>
<td>13</td>
<td>8</td>
<td>6</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Number of participants</td>
<td>396</td>
<td>101</td>
<td>163</td>
<td>9</td>
<td>120</td>
</tr>
</tbody>
</table>

The other feature of this offering was the sustained effort to foster discussion forum by the team of instructors. Using interaction mediums apart from the discussion forum, helped in understanding the pulse of the participants. An experienced learner (who is also a teacher), submitted a video with advanced features. The instructor asked him to share his process with the class, by creating a spoken tutorial video. He did that, and was well appreciated by the fellow participants. This type of encouragement, made ELs feel responsible, at the same time, it kept the interest level intact for the FLs.

### 5 Discussion

The second offering had higher completion rates as indicated in table 1. Further analytics of the participant’s performance, perception and engagement data highlight that the second offering too was a success for both the FL and EL groups. The trends were comparable to the first offering though the number of participants scaled up from 1393 to 5033 (361%). This is indicative that the content creation and the pedagogy strategies generate interest for the FLs and kept it high for the ELs. Although the survey result indicated no statistical differences between the two groups regarding helpfulness of any MOOC components, there are intra group dependencies amongst the components. The effects of quiz on learning were dependent on the video, slides and assignments for the FL group while the EL group only had dependence on slides. Possibly the groups realized that the assistance of the Blender shortcut lists provided in the slide which would be helpful to answer quiz questions. This list was hence uploaded after the course. Similar to the first offering, content creation strategies (like video having faculty face + Screen cap, highlighting the area of action etc.) were appreciated by the participants. Considering the non-graded assignment submissions it showed the vast range of the creativity of the participants. It is also important to observe that the participants matched the necessary skills to create their visualized artifact. It indicates given the open-ended nature of the assignments, it encouraged the participants to think about the artifact they wanted to generate and not bound them to replicate a specific model or animation.

During the second offering, social presence of the instructional team helped retention of learners. Additional eMails were sent during week 6, and 7 to address the issue of final exams, which participants were bothered of. Additionally allowing extension of the quiz deadline saw that there was no drop in the number of submissions as compared to week 5. Discussion forum can be used in moderation to help additional engagement. Encouragement was provided to the submissions that surpassed expectations. The instructor observed an instance when asking to develop a spoken tutorial of the modeling process he could motivate the participant to do it. Also while opening up interaction through multiple channels it was observed encourage en-mass classroom enrollment facilitated Peer
interaction and appoint a Coordinator support for logistics. In this regard a college instructor participating in the course gave this view: “I’m an Asst. Professor and I and my 60+ students got registered for this (Basic 3D animation) course. Really I'm getting huge response from lot of them. They are learning lot... The video lecture is more informative and interactive, these are very helpful to understanding basic concept, and presentation of video lecture is very good and useful. The all resources which is proving by IITBombayX is really nice”.

**Challenges:** Auto grading of the assignments is a challenge. Each participant who submits an assignment do not receive any automated feedback regarding the quality of the assignment. Currently, technology is the barrier; however, whenever technology supports it, instructors will have to create a rubric for the assessment of the assignments, and mini projects.

6 Conclusions

SKAN1101x is a first of its kind offering. Over the two offerings it could reach out to 6457 registered participants of which 2465 were active in the course and 1132 were certified. Over the two offerings though the course registration has grown 3.6 times, still there were 8.6 times more certification during the second offering. In addition to following standard xMOOCs content creation strategies, sdMOOCs needed some more modifications in content creation and pedagogic strategies. Second offering validates that skill development is a community-based activity. Even if xMOOC platform was used, fostering community building activities by social presence of the instructors have resulted in Retention of FLs. Providing challenges for ELs so that they are involved higher certification overall

Acknowledgements

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Udacity website: [www.udacity.com](http://www.udacity.com)

Udemy website: [www.udemy.com](http://www.udemy.com)

IIT BombayX website: [www.iitbombayx.in](http://www.iitbombayx.in)