# ANALYSIS OF NEED BASED DESIGN FRAMEWORK OF MOOCS

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## ABSTRACT

*MOOCs means massively open online courses. MOOCs require specialized skills to conduct courses; these skills include teaching techniques, pedagogical techniques, network skills, and understanding of computers, multimedia, internet plus many more. Since design of MOOC courses requires many skills and courses shows various characteristics it is very important that design of MOOC is done very precisely. There are various types of MOOCs, but if we inspect them closely we can derive a few characteristics that are common to all MOOCs. Similarly we can derive certain pedagogical issues that are common to all MOOCs. This paper discusses various such issues effecting MOOCs. This paper also discusses various designing principles of MOOC courses and MOOC canvas framework for designing courses. It concludes giving gist of MOOC canvas and proposing other methods for designing courses. of technology.*

**Keyword :** *Online Courses, Content, Pedagogy, Technology*

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## 1 INTRODUCTION

MOOCs or massive open online courses are gaining both popularity and importance day by day. They are very convenient and affordable alternative to students with geographical and financial barriers. As the name applies MOOCs are open in nature that means anyone can use (learn/teach/alter) it for free. To add to this MOOCs are also massive in size compare to convention e-learning system since they offer entire subject instead of a lesson/objective, thus it has to offer coherent learning sequence covering various aspects of subject, various integrated learning material and a formative assessment system. Most of popular MOOCs are designed, created and controlled by faculties of high repute and associated with world class institutions. Since MOOCs are perceived to be high quality and low cost and offering courses from such reputed institutions and faculties massive number of students are interested in joining MOOCs. MOOCs have proven to be bridging gap between students; privileged students of first rate countries/institution and disadvantaged students of third world countries. [1]

MOOCs besides students are equally useful for faculties, researchers, administrators. MOOCs are supported by various facets of society viz. teachers, faculties, students, open source activist, educators, governments and above all educational institutes. MOOCs are way to provide quality education. MOOC requires students to have only two necessities, access to computer & internet. If student has access to both he can easily join any course on MOOC and take advantage of learning & studying. Some MOOCs also offer certification which is an added advantage.

### 1.1 MOOCs – Classification & Definition

To define one can say that MOOCs are massive collection of similar learning material; organized as such in various forms and formats; of precise pedagogy with object to learn a specific skill, subject or technique. [2] Popular MOOCs these days are coursera, udacity, edX, Google course builder, Class2go, udemy etc. There are three types of MOOCs, xMOOCs, cMOOCs and tMOOCs. xMOOCs are traditional university type MOOCs, they use traditional techniques and course structure and are instructor lead. cMOOCs are personal MOOCs which leads to learning

specific theme or technique, they encourage self learning and managed by community thru discussion and debate. tMOOCs are task based MOOCs which lets you complete a task and based on that you learn, with help from user community. [3]

## 2 DESIGN FRAMEWORKS OF MOOCS

The motive of any MOOC is to facilitate learning, thus design of MOOC is essentially based on perspective of learning design. Learning design is meant by tools and methods for articulating and representing the design process of learning experiences, making them more explicit and sharable. [4] MOOCs can be designed based upon two aspects pedagogic aspects and technical aspects. MOOCs facilitate learning thus pedagogy is essential; MOOCs facilitate massive number of students with massive transfer to data online thus technical aspects are also essential.

## 3 MOOC FUNCTIONALITY FRAMEWORK

As we have discussed earlier MOOCs can be divided in three broad categories. Each category of MOOC have it's own functionality and framework needs.
If any MOOC can be looked upon and inspected there would be twelve common aspects of the MOOC, they are open, massive, use of multimedia, degree of communication, degree of collaboration, learning pathway, quality assurance, amount of reflection, certification, formal learning, autonomy, and diversity. [5] There are multiple aspects of MOOC design, so we would extract certain universal principles that are applicable across all MOOCs. These principles are conceptual development and information systems. The conceptual development specifies structural components of design which facilitates learning viz. components of learning, principles of instruction, course design and delivery. [6] Information system specifies components for development of information system and technology to deliver the courses. [7]

## 4 PEDAGOGICAL THEORY

There are two theories of learning assimilation and rote. Assimilation learning is a cognitive theory which emphasizes conceptual development in learning. This theory leads to continuous, meaningful, deep understanding of new facts and concept. This method helps remembering and applying concepts and thoughts to new problems and contexts. Rote theory on other hand leads remembering facts, which cannot be applied to new problem. [8]

Meaningful learning of concepts takes place when four things happen: 1) concepts are clearly defined, 2) clear exemplars are provides 3) concepts are integrated with existing knowledge, and 4) students are properly motivated to learn. [9] It is more or less similar with active learning but it is not active learning. A novel theory of education named objectivist education also identifies three things in learning to be helpful they are motivation (of students & teachers), integration (of course contents) and structure (of the course & syllabi) which can be related to above four happenings.

## 5 INFORMATION SYSTEM THEORY

MOOCs are based on internet, computers and information technology. Thus information theory defines essence of MOOCs' technical framework. MOOC too being a type of software, SDLC also applies to MOOCs. But redefining the stages and clubbing development process based on nature of activity MOOCs can be developed in four phases, they are planning, analysis, design and implementation. Planning focuses on feasibility and development plan, analysis focuses needs of system, design focuses on how system will function and implementation actually deploys and runs the system. [10]

## 6 MOOC DESIGN PRINCIPLES

Since we have discussed the theories effecting MOOC and MOOC methods, and understood the framework of MOOC, following five principles are derived, fulfilling which a MOOC can prove to be an amazing tool for leaning. These principles can help achieve better impact with same course material. [11]

## 6.1 Meaningful Course Content

Course contents have to be meaningful, integrated and clear. The ideas presented in course shall not be too many or too vague. The contents should be interrelated and in precise order. There should be clear path to achieve learning goal, there should not be any boring, non required course material. Various tools like quizzes, cognitive prompts, short lectures, quizzes, guides, maps, notes, presentation, discussion board, open ended chat etc. can be used to deliver course.

## 6.2 Engagement

It is a fact that MOOCs are massive but, out of 100 students registering for course only 5 complete the course, thus engagement is an essential factor while MOOC is designed. Students enroll for various reason to MOOCs, similarly reasons to left the course are. It is difficult for instructors do have the energy and time to interact with students in such massive classes. There can be two types of engagement. Cognitive engagement can be achieved by things like lectures, slide shows, practicum etc. Regular day by day lecture principles also applies here. Social engagement adds little bit more spice here, what students feels in regular class room i.e. peer groups, friends, and a feel of institute can not be achieved here, thus MOOCs must facilitate all potential interaction thru technologies. Tools like discussion board, chat, video conference etc shall be used to engage students with each other and instructor.

## 6.3 Measurable

When student enrolls in a class he has certain level of understanding of subject, completing a course over MOOC shall help him increase that level of understanding. To find out how much a student has excel in the subject, there must be measurable assessment of student taking place in MOOC. MOOC storing each interaction and generating large sets of data can be used to measure progress. There are two types of perspective one student perspective how much he learnt and two instructor perspective when looking at student/class's progress. To do so there should be feedback mechanism, progress reports, evolution sheets etc. Quiz and exams based on course contents should form part of MOOC.

## 6.4 Accessible

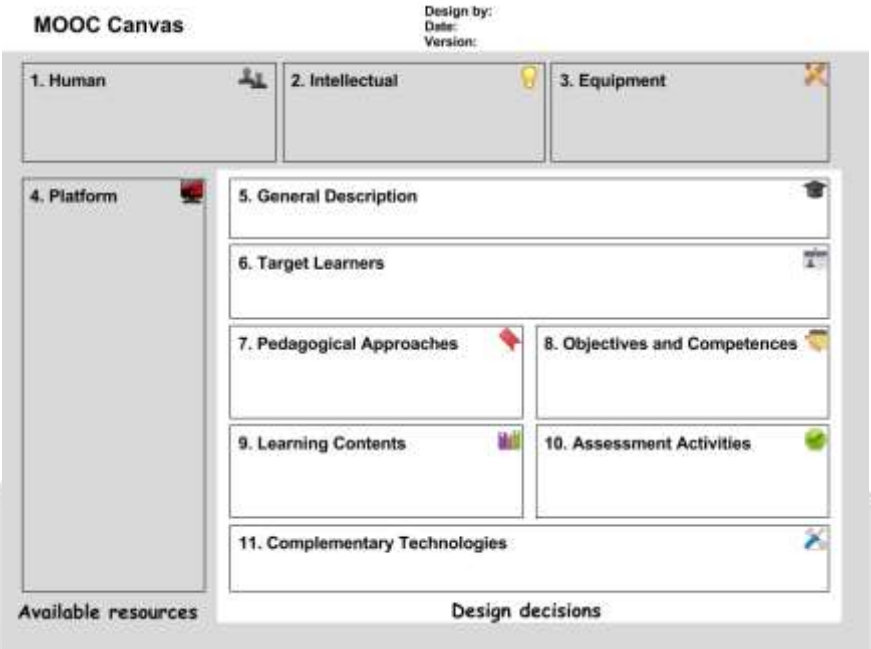
MOOCs are open in nature, so it shall be accessible to all students, across the globe. Students joining course can be from any country, any institute or of any level (school to university). Motives to join MOOCs can be different for same course. Most motives are to learn new subject, learn a skill, job promotion and many more. Since MOOCs are spread all across, it shall be available for both high bandwidth and low bandwidth connection. Aspects like pre-requisites (knowledge/experience) in related field can make MOOC more accessible and easy to handle.

## 6.5 Scalable

MOOCs are designed for thousands of students, many students may opt for the course at same time, so MOOCs have to be scalable to accommodate all the students. Scalability adds capability to handle more students easily. Discussions, chats and peer learning types of activities have to be restricted to some extent if thousands are to be catered together. Sometimes assistant teachers can also be hired. There should be three points of contact between instructor, student and system. 1) content creation 2) operations and 3) assessment.

## 7 MOOC CANVAS FRAMEWORKS

**Figure 1** – MOOC Canvas
(adapted from https://docs.google.com/drawings/d/11ldMejrMj-RcP7pICYPbiHfIcY5RjKFF63gw4g-ltj8)




MOOC can be described by various frameworks, one such framework is MOOC canvas. It a simple and visual framework. MOOC can be designed from scratch using such framework. There are various aspects of MOOC design including logistical, technological, pedagogical and financial. [12] [13]

There are eleven issues described in MOOC canvas, further they are divided in two categories. They are available resources and design decisions. Available resources means are resources that the instructors have. There are four such issues. Whereas design decisions must be discussed between instructor or group of teachers, based upon available resources.

## 8 AVAILABLE RESOURCES

There are four issues that needs to be considered while designing the MOOC. They are 1) Human, 2) Intellectual, 3) Equipment and 4) Platform.

### 8.1 Human Resources

A MOOC requires atleast 100 hours before running a course plus it requires atleast 10 to 20 hours every week while running it. Thus man power or human resources are most important factor while designing a course for MOOC. Besides instructors or teachers MOOC may need network engineer, audio-video staff etc too.

### 8.2 Intellectual Resources

MOOCs are open and so as their license, so while course material is to be design it must be made sure that material is license free or publicly license for educational purposes. Sometimes external material is also used, so proper IPR management should be done in this regard.

### 8.3 Equipment

Equipments play essential role in conducting MOOCs, it includes both hardware and software. Equipment should be considered for following factors, already available, to be purchased/hired. MOOCs generally required computer, internet, basic audio-video system, routine office stationary etc.

### 8.4 Platform

Most of MOOCs are installed on central platform or server. It centralizes content and interaction along with storage and assessments.Further each institute have their own platform and team should be aware with that. Learning contents, assessment activities and pedagogical approaches are to be designed based upon platform available to the team. Otherwise if the team wants pedagogical standards of it's own platform can be restricted to just store links and material.

### 8.5 Design decisions

There are seven issues in designing decisions related to MOOCs. They are 5) General Description, 6) Target Learners, 7) Pedagogical Approaches, 8) Objectives and Competences, 9) Learning Contents, 10) Assessment Activities and 11) Complementary Technologies.

### 8.6 General Description

The General Description gives facts and figures about MOOC. It describes name of the MOOC, its estimated duration (in weeks) and the field/area of knowledge it will cover. The name of the MOOC can help attracting participants so it is recommended to choose a creative name to catch learners' attention. Description of MOOC should be short, lucid and easy to understand.

### 8.7 Target Learners

Although MOOCs are open by nature and anybody can register, it is always better to target your audience before launching the course. Audience should not be simple spectator, they must take part in MOOC activities and complete the course accordingly. Target audience helps deciding language of delivery, size of MOOC course, type of assessment, type of delivery system and so forth.

### 8.8 Pedagogical Approaches

Pedagogical approaches that instructor decides will be used during the course. Here pedagogical approach is not super centric, but flexible, where experimental approach may also be taken. But it has to be clearly defined before the course is launched. This includes teaching methods, quiz, assessment and other pertaining activities. This discussion forms the basis for defining the course structure.

### 8.9 Objectives and Competences:

The instructor shall define the Learning Objectives and Competences they expect learners to acquire. This section depends upon the pedagogical approaches, it may be the case that instructor expect some of the objectives or competences to emerge during the MOOC. In MOOC also Learning Objectives and Competences may affect the Learning Contents and the Assessment Activities.

### 8.10 Learning Contents

MOOCs are delivered by audio visual aids, like video lectures, presentations and multimedia in various forms. They can be complimented by other materials such as reports, hand outs, blogs, pdfs etc. So all the contents to be used

during course shall be properly selected and executed. Format and design of such structure and contents shall be made clear before starting the course. All such contents must be supported by the available platform.

### 8.11 Assessment Activities

Assessment can be done in two ways formative and summative, formative assessment promotes learners reflection and improves attainment where as summative assessment are various activities that focuses on final assessment and meant more or less like class room exam. Proper assessment method and activities shall be designed and defined. Such activities shall also be supported by platform.

### 8.12 Complementary Technologies

Technologies available other that MOOC platform are reffered as complementary technology. They can add to certain functions of platform and gives feel of extra dimension to students. For e.g. youtube can be used to store video lectures. This is more handy when links outside central servers are to be provided. Thus technology **available** besides platform can be used to give better feel to everyone.

## 9 CONCLUSION AND FUTURE WORK

Designing MOOC is not a easy job, it's a complex task. It is not only pedagogical but also ICT activity. MOOCs adds a new dimension in field of teaching and learning. The most important job in MOOC design is to understand platform capabilities so that pedagogy can be applied upon the same. MOOC canvas and such other framework can help design MOOC better and smarter. MOOC includes various interdisciplinary activities and requires a lot of skill and time.

This study is limited to study of MOOC canvas and facilities provided by it, in future other frameworks can be studied. The capacities of platforms offering MOOC can also be examined and surveyed. It is recommended when the first course of MOOC is designed, MOOC canvas can be used as first resource to design the course.
It is also proposed that more frameworks can be designed based upon the new and upcoming needs of MOOCs. Such framework can be designed for specific and general types of MOOCs.

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