

# MOOCS TO PROVIDE 21ST CENTURY SKILLS: LEARNERS PERSPECTIVE

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## Abstract

Massive Open Online Courses (MOOCs) are trending and became the “buzz word” in online learning since 2012. Although cMOOC (Connectivist MOOC) was existed since 2008, xMOOC becoming more popular while attracting many online students. xMOOCs in particular has common pedagogical features such as small chunked videos, quizzes, peer and self-assessments and forums. Although the design may vary with in the MOOC platform and also among the MOOCs platforms, researchers claim that it provide a sound pedagogical model and at some point reach higher gains in learning than in a face to face class room. However, it is still sceptical for some researchers, whether the model delivers the knowledge and the skills required to meet the challenges in 21st century. 21st Century skills are defined by many organizations yet commonly agreed upon skills, such as Collaboration, Communication, Creativity and Innovation. Timely we are moving from industrial society to information base society. It is important that students equip with the skills need in the information base society. At a massive number of enrolments in MOOCs, it is even vital to understand whether participants are gaining the skills required for future challenges. However, currently with the higher rate of emerging MOOCs into the field, it is facing quality challenges. Meeting the 21st century skill requirement is one of the challenges and research works lack towards this direction due to the fact that MOOC is still an emerging phenomena. Nevertheless, our research focused to identify whether the MOOCs are providing the 21st century skills from participants perspective. We conducted a survey using 391 MOOC participants and found that overall 78% of participants believe that MOOCs are lacking to provide the 21st skills. At the same time we conducted 30 semi structured interviews in order to deepen the analysis. While analysing qualitative and quantitative statistics, we empathize the requirement of designing MOOCs where it will result participants with the not just mastery base skills but with well-timed skills to meet the challenges in 21st century.

Keywords: MOOCs, effectiveness, 21<sup>st</sup> century skills, pedagogy.

## 1 INTRODUCTION

Massive Open Online Course (MOOC) is a technology which provides educational courses via online to a massive crowd for free of charge or at an affordable cost. It is open to any interest student and commonly offered via a web based platform. There are two types of MOOCs – cMOOCs and xMOOCs. Commonly, xMOOC consist of short video lectures, quizzes, self graded/ peer graded assignments and forum to facilitate the communications and collaborations. Typically this kind of a course expands 4-8 weeks and could be taken on scheduled dates or self phased. In 2012, many MOOC platforms emerged and therefore it was stated the “Year of MOOC” by the Ney York Times [14]. It was emerged with a promising future for the higher education and some researchers even stated it will be the next disruption in the online education [19]. Many students who followed the courses gained knowledge and in some occasions it was found that MOOC students outperformed the in house college students [4].

In the mean time, real world situation which is moving from industrial sociality to information society demanding for the students to be equipped with the 21<sup>st</sup> century skills. The common skills identified by various states or non for profit organizations are creative thinking/ imagination skills, critical thinking skills, problem solving skills/ communication skills and collaboration skills with working in teams [1]. Education institutions are attempting and even obligated by the state authorities to provide student the educational skills which meets the challenges in the 21<sup>st</sup> century. Among many organizations, the partnership for 21<sup>st</sup> century skills argues that the traditional high school curriculum does not include those aspects which are required for success in a career or postsecondary education in the 21st century, and that there has been little or no consideration of such aspects in measuring the results that are essential to high school students today [13]. Traditional metrics such as attendance, graduation,

and college matriculation are no longer sufficient indicators of student achievement after graduation, “high schools must be designed, organized, and managed with a relentless focus on the results that matter in the 21st century.”

Since arrival of MOOCs, educationalists were excited and many have voiced highly spirited claims that a new formula of education in the form of MOOCs (Massive Open Online Courses) was going to revolutionize higher education [11]. The claim was that ample access to new technologies would make possible for anybody to obtain a quality college education for free through the Internet. A lot of individuals and institutions became very excited about this possibility and the conversation about it ranged from editorial articles in the media to extremely optimistic assertions by people associated with politics, education, government and industry. One aspect of MOOCs from the beginning that gave respectability to this initiative was their relationship with big-time universities such as Stanford, University of California at Berkeley, The University of Texas at Austin, Harvard and the Massachusetts Institute of Technology. Further, many of these initiatives gained the financial support of big-time organizations, such as the Bill & Melinda Gates Foundation, the MacArthur Foundation, the National Science Foundation and the American Council on Education [16].

This is the 4<sup>th</sup> year since many xMOOCs emerged. With the experiences and growing research results, some educationalists express the skeptics about this technology claiming that it accelerate the cognitive ability and promote the didactic nature [10],[2],[6]. They argue MOOCs are merely playing a media role in transformations of information. Students have very limited interactions which will not lead much of the communications or active knowledge generation while in the study. Researchers argue that the pedagogical design in MOOCs has less space in promote active collaborations and interactions [6]. There are 4500+ courses in end of the year 2015 and it is timely a problem that not all the MOOCs meeting the quality requirements or the needs of the students to meet the future challenges. It is essential to explore the learners’ perspective about MOOCs in meeting the 21<sup>st</sup> century skill demand. Researching towards this direction, firstly, we explain the background of 21<sup>st</sup> century skills by different organizations and a comparison to identify most commonly identified 21<sup>st</sup> century skills. Next we explain our methodology of selecting samples and collection of data conducting the research. Then we analyze results and explain with the discussion. We conclude with the key findings and emphasizing the need of MOOCs meeting the 21<sup>st</sup> century skill demand.

## **2 BACKGROUND**

Prior to understand whether MOOCs proving the 21<sup>st</sup> century skills, it is important to understand what is the requirement of 21<sup>st</sup> century skills. The different lies between 20th and 21st centuries are the capabilities that people need to work. With the emergence of sophisticated information and communication technologies people needed different set of skills than 20<sup>th</sup> century. For example, the types of work done by people—as opposed to the kinds of labor done by machines—are continually shifting as computers and telecommunications expand their capabilities to accomplish human tasks [3],[12].

### **2.1 21<sup>st</sup> century skills**

There are few organizations who initiated 21<sup>st</sup> century skill projects. Such as Partnership for 21st Century Skills, Tony Wagner’s Global Achievement Gap Seven Survival Skills, enGauge, Iowa Essential Concepts and Skills – 21st Century Skills, Connecticut Department of Education’s 21st Century Skills, Assessment and Teaching of 21st Century Skills (ATC21S) [7]. However, most school districts or state departments of education implementing 21st century skills now rely on the Partnership for 21st Century Skills’ list or some variation of it, though there are exceptions. At the same time ATC21S also emerging by explaining key competencies and the assessment methods to evaluate competencies. In summary, all these 21st century skills frameworks are generally consistent with each other [7]. According to [20], the comparison of many 21<sup>st</sup> century frameworks resulted Collaboration and teamwork, Creativity, imagination, Critical thinking and Problem solving in common to all. Measuring the 21<sup>st</sup> century skills are explained by many researchers in different methods [18],[12],[17] and specifically a validated tool described by Jason Ravitz in his instrument [15].

## 2.2 MOOCs and 21<sup>st</sup> century skills

Most of key xMOOCs platforms were introduced in 2012, since then the researchers began claiming it the next generation eLearning [9]. Researchers claimed MOOCs provide sound pedagogical development where it enhances the learning [11]. However, the question arises from many researchers whether MOOCs fit to the future requirement of skills. Researchers claim that MOOC model limited the interactions via forums yet they claim that MOOCs also provide opportunities for thousands of learners to interact with each other, especially in discussion forums, and to build a kind of learning community [22]. At the same time some researchers' states it is important to understand better measurement to discover the interactivity and the learning experience [5]. However, many researchers have its evidence of students claiming they have improved their skills using MOOCs [21]. Yet it is unclear that these skills are the needed skills for 21<sup>st</sup> century as many students refer to the subject mastery skills or cognitive skills.

## 3 METHODOLOGY

In order to identify whether the MOOCs provide 21<sup>st</sup> century skills, we derived factors from 21<sup>st</sup> century assessing framework which has statistically proven to be confident and reliable [24],[18],[15]. Analyzing the frameworks for 21<sup>st</sup> century provided 4 main skills which needed to be assessed against the MOOCs. The instrument is capturing all the common features agreed upon many organizations and industry. At the same time, the selected instrument has demonstrated excellent reliability, improving on reliable measures from previous studies (std. alpha > .90, inter-item correlations > .58). Support for content validity is based on review of existing frameworks and measures.

Each section of the survey instrument provides a small definition about the skill as which makes it easier for the participants to understand subjective ideas (for example critical thinking refer to students being able to analyze complex problems, investigate questions for which there are no clear-cut answers). Then, it proceeds with questions relating to the skills, assessed according to their perceptions during the time they take the course. Response choices were 1 'Never during the course'; 2 'only once during the course'; 3 'Sometimes'; 4 'Few times during the course'; 5 'Every week during the courses'.

In addition to the questions in the survey, we asked few open ended questions from selected participants through online interviews conducted via Skype and Google Hangout. Such as a) How do they see critical thinking skills/collaborative skills/ creativity and innovation in an online course? b) What are the experiences that you came in those skills with examples? c) What skills did you achieved or gained by MOOCs?

### 3.1 Instrument fields

#### 3.1.1 Critical Thinking skills

This is refer to students being able to analyze complex problems, investigate questions for which there are no clear-cut answers, evaluate different points of view or sources of information, and draw appropriate conclusions based on evidence and reasoning.

In your (MOOC) course, how often they have asked you to do the following

- a. Compare information from different sources before completing a task or assignment?
- b. Draw own conclusions based on analysis of numbers, facts, or relevant information?
- c. Summarize or create your own interpretation of what you have read or been taught?
- d. Analyze competing arguments, perspectives or solutions to a problem?
- e. Develop a persuasive argument based on supporting evidence or reasoning?
- f. Try to solve complex problems or answer questions that have no single correct solution or answer?

### 3.1.2 Collaboration skills

Refer to students being able to work together to solve problems or answer questions, to work effectively and respectfully in teams to accomplish a common goal and to assume shares responsibility for complementing a task.

In the MOOC course, how often have you being asked to do the following
a. Work in pairs or small groups to complete a task together?
b. Work with other students to set goals and create a plan for their team?
c. Create joint products using contributions from each student?
d. Present their group work to the course?
e. Work as a team to incorporate feedback on group tasks or products?
f. Give feedback to peers or assess other students' work

### 3.1.3 Communication Skills

This refers to students being able to organize their thoughts, data and findings and share these effectively through a variety of media, as well as orally and in writing.

How often have you being asked to do the following in the MOOC course you took
a. Structure data for use in written products or presentations (e.g., creating charts, tables or graphs)?
b. Convey their ideas using media (e.g., posters, video, blogs, etc.)
c. Prepare and deliver an oral presentation to the teacher or others via technology
d. Answer questions in front of an audience?
e. Decide how they will present their work or demonstrate their learning?

### 3.1.4 Creativity and innovation skills

This refers to students being able to generate and refine solutions to complex problems or tasks based on synthesis, analysis and then combining or presenting what they have learned in new and original ways.

In your MOOC course, how often have you being asked to do the following
a. Use idea creation techniques such as brainstorming or concept mapping?
b. Generate your own ideas about how to confront a problem or question?
c. Test out different ideas and work to improve them?
d. Invent a solution to a complex, open-ended question or problem?
e. Create an original product or performance to express their ideas?

## 3.2 Sample and data collection

Since the study is to identify whether MOOCs comply to teach 21<sup>st</sup> century skills, our sample is derived from student who use MOOCs. We practised purposive sampling technique and collected data

directly from students who already taking MOOCs by enrolling many MOOCs as possible. We used the platforms – Coursera, edX, Open2study, NovoEd, Iversity and OpenLearn. Broadcasted the computer aided surveys via forums and reached our MOOC network communities. We received 391 filled surveys in return. In addition to the electronic surveys, we conducted 30 online semi structured interviews via skype and Google hangouts. We asked the questions using the survey and mostly explained the descriptions such as what is critical thinking in words. We possibly kept the conversations openend to discuss so the students which come to the interviews share their experience and express their needs desires.

## 4 RESULTS AND DISCUSSION

The instrument carried 22 questions under 4 themes – critical thinking, collaboration skills, communication skills and creative thinking. Results are explained under four themes.

### 4.1 Critical thinking skills in MOOCs

The survey answered by 391 students, reflected that majority believes critical thinking skills were never been tested or less opportunities provided to improve the skills during the course. However, majority (over 75%) answered that they agree that sometime MOOCs provide to solve complex problems or answer questions that have no single correct solution or answer. Fig.1 explains the distribution of the critical thinking skills behaviours. Summering, interpreting own thoughts were never or only once been tested. In the broader aspects, it is clear that many MOOCs tested the cognitive ability based on the lecture scheduled for each week. However, MOOCs which contained peer reviews opened spaces to provide different solutions where it promoted critical thinking skills.

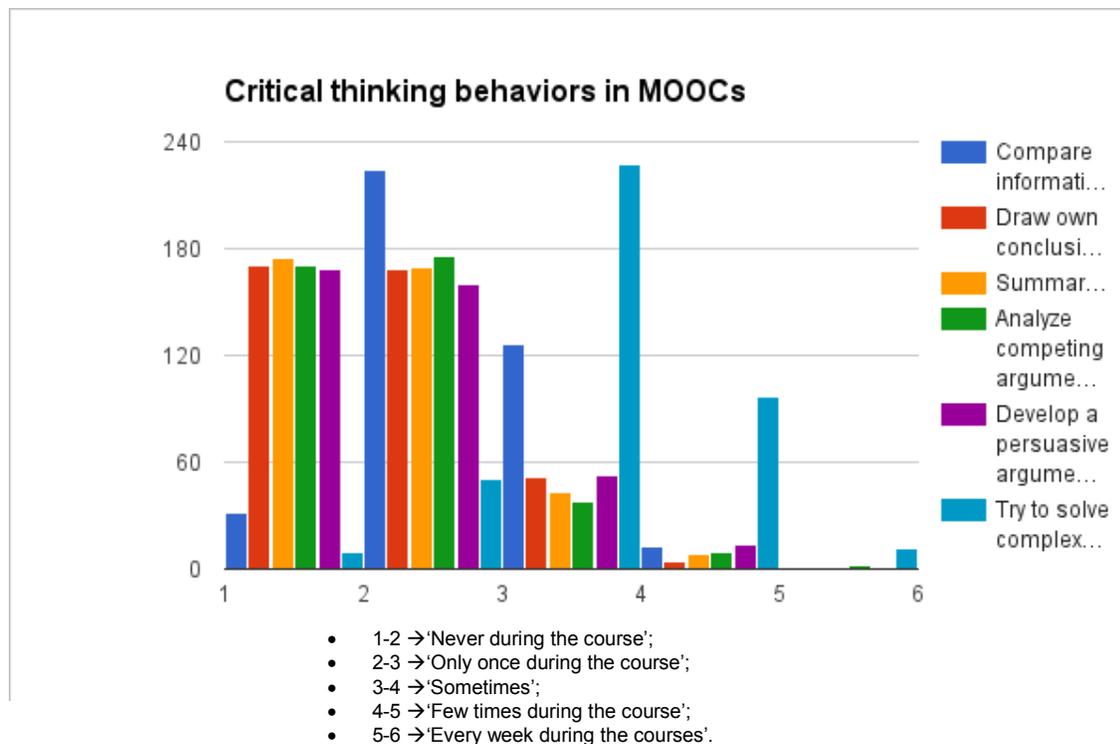


Fig. 1: Distribution of Critical thinking behaviour in MOOCs

### 4.2 Collaboration skills in MOOCs

Examining the collaboration skills distributions in Fig.2, it is visible that majority of the MOOCs are not driven to promote the collaborative structure. 90% or more of the students claim that they have never been paired or grouped to complete a task. At the same time, the surprisingly some platforms have the code of conduct which discouraging the collaborative work. However, many courses offered in the

NovoEd platform facilitated the team work and task completion with a team. At the same time MOOCs which did not facilitated collaboration, however incorporated third party tools where they can establish group works and many times forums were used in facilitating tool. Yet again more than 90% claim that it is not common that MOOCs encourage the group work and present to the audience. Among the structure interviews some of the students claimed following statements.

*“It is hard to find anyone interested to collaborate on the assignments or tasks as many of them are occupied in their own pace in the courses”*

*“When I wrote in the forum that I wanted someone to be able to work with me in this assignment, or even a simple forum question, it took sometimes more than a week to get a reply. But I use to get it answered more quickly than this with Coursera before.”*

*“I cannot seems to find anyone interested in doing collaborative work, everyone busy with their own time schedules”*

In the collaborative effort, yet the results produced more than 90% MOOCs provide facility to give feedback to peers or assess other students’ work. However, it is the default pedagogy behind the MOOC technology.

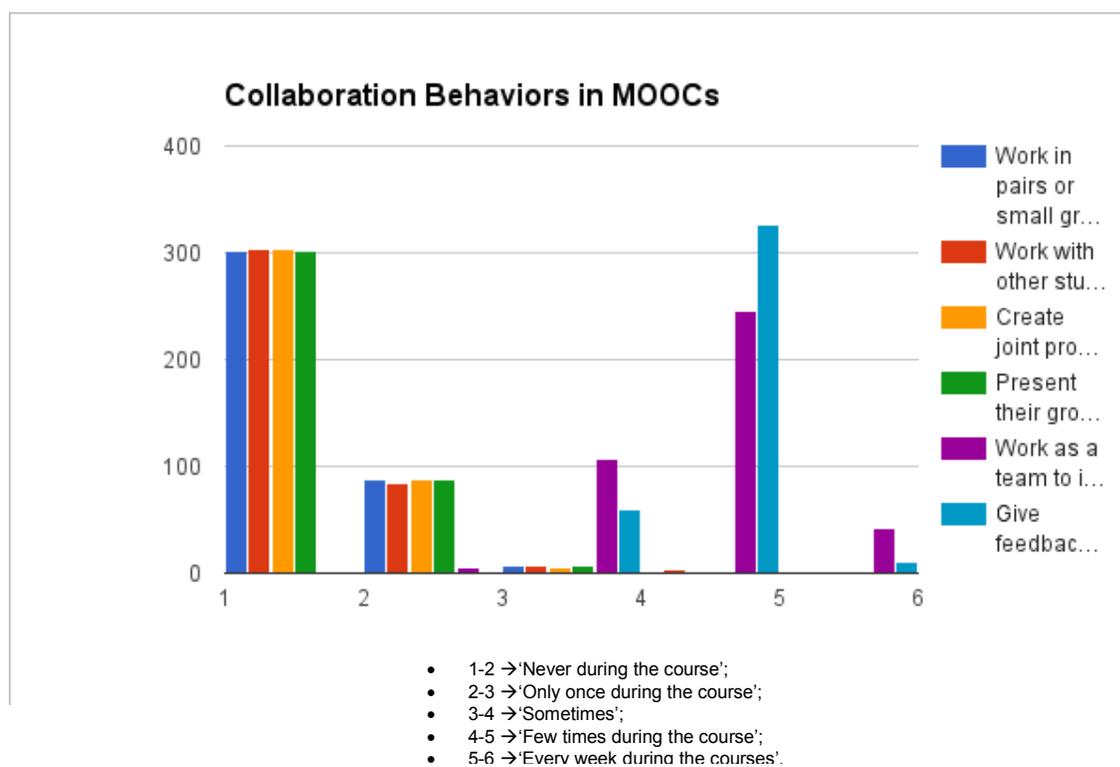


Fig. 2: Collaboration skills behaviour in MOOCs

### 4.3 Communication skills in MOOCs

Communication skills distribution is depicted in Fig.3. More than 80% agrees upon MOOCs to provide ability to produce presentation or written products few times during the course. Majority agreed upon that they can convey their ideas using posters videos and blogs sometimes. However more than 85% claim that they never used oral presentations in front of a any student or teacher using technology. However, during the open ended interview, we found occasions which courses enabled presentations via tools (soundcloud, youtube). However, we found more than 80% of students’ claim at least one time they have answered questions in front of audience in MOOCs. The results were more explained during the structured interview and it reflected as follows.

*“ I always communicate with the diverse people in the course, and use forum tool most of the time to assist this”*

*“ I have taken Google hangouts assigned in our MOOC and within the timeslot I assigned, I had few people that I could do a conversation. Most importantly the conversation was guided with a template where we had to present our findings and in return the peers comment of the idea”*

Through the interview it was revealed that students claim to communicate with someone at least once during a course and answered a question. In depth conversations with the students who were taking the open ended questions explained more the situation as they have other form of groups created such a Facebook groups and MeetUp groups where they keep communicating with each other and those gathering lead them to answer many doubts and questions about lessons they follow.

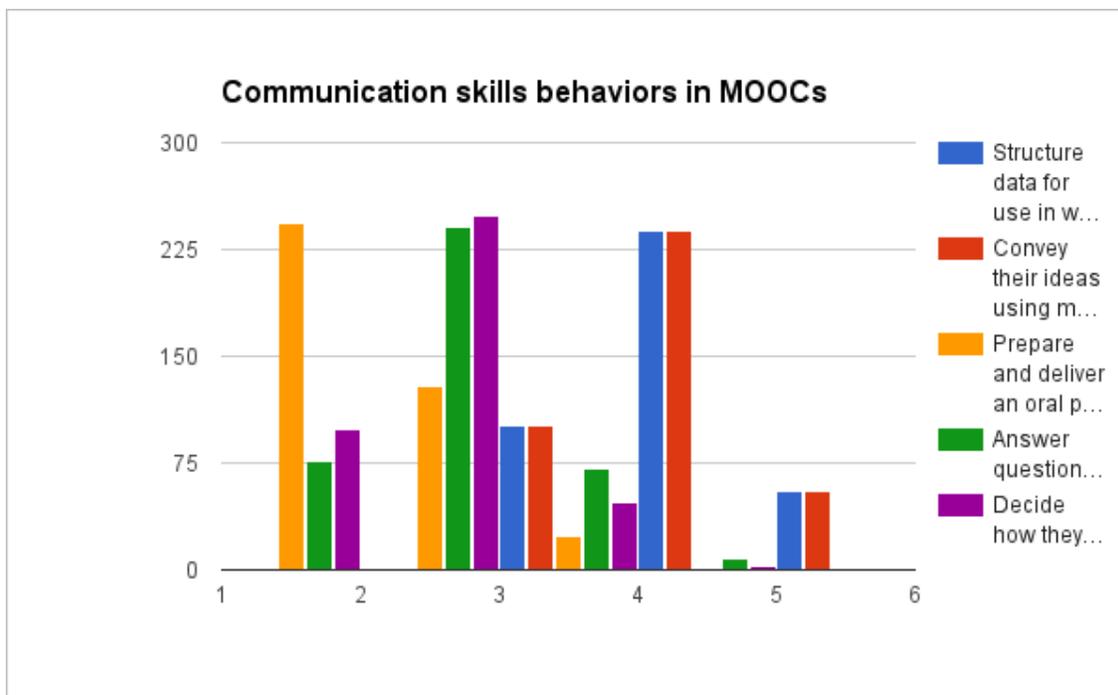


Fig. 3: Communication Behaviours in MOOCs

#### 4.4 Creativity and Innovation Skills in MOOCs

Fig 4 describes the creativity and innovation skills distribution in MOOCs. Creativity and Innovation tested as if the students get opportunities to brainstorm solutions. Generate many ideas as possible. However, the results indicated that more than 60% of the students claim they do not get opportunities to brainstorm. At the same time often it is found that MOOCs provide less (~75%) opportunities to generate own ideas about how to confront a problem or question. Testing out different ideas and creating original products were claimed as never been able to experience. However, inventing solutions for open ended questions found slightly more than 50% at least once given opportunity during the course. This was mainly due to the open ended assignments provided by many MOOCs. According to the interviews with the students we discovered that some MOOCs has given real

flexibility to co-create content, Such as provide the explanations via blog post or to be creative in presenting their complex ideas.

*“ I have never had a chance to take any MOOCs which allow me to be creative in my answers, because most of them had quizzes or problems had well defined answers. It is straight forward from the lecture materials and videos”...*

*“...MOOC that I took provided great content to be creative, but I wish there were real opportunities for me to work with someone so I can assure my creativity level “..*

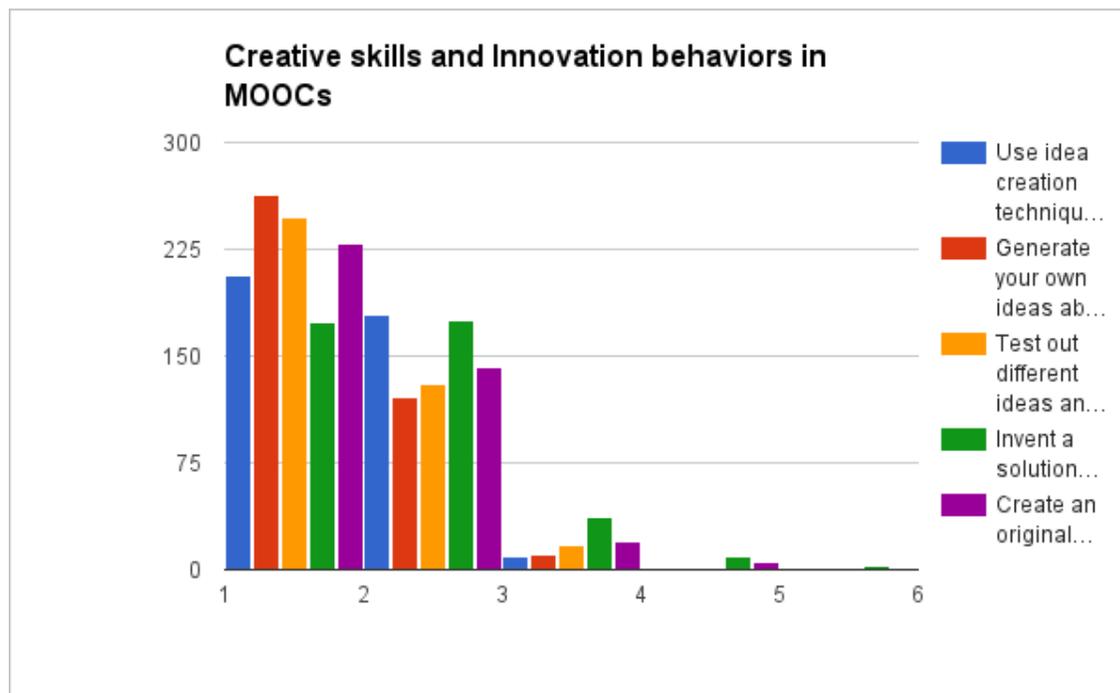


Fig. 4: Creativity and Innovation skills Behaviours in MOOCs

## 4.5 Discussion

According to the world economic forum [23], most demanded skills in 2020 are Complex Problem solving, Critical thinking, creativity, People management, Coordinating with others, Emotional intelligence, Judgment and decision making, service orientation and lastly, Cognitive flexibility. However, the results reflect that MOOCs often not arranged such that it facilitated these skills. Main reason to this is the pedagogy behind the MOOC which commonly drive toward didactic nature of education. At the same time [8], states that MOOCs could not meet the challenges it tried to address and it is merely proving cognitive skills to learners. The Author claims that MOOCs work well for self-motivated students who have a lot of technology at their fingertips, have been raised in stimulating intellectual environments all their lives, who have lots of support mechanisms within their grasp to help them learn the material, and who have the wherewithal to spend the time and energy required to learn deeply what is being taught in these MOOCs. However, the as a solution to the problem being not comply to the required skills, it proposes and advocate project base learning which covers many aspects of skills needed in the 21<sup>st</sup> century. It is also stated by researchers that MOOCs are skeptic and it is essential to include contributions in analyzing MOOCs from a learning science perspective and put them into a larger context with other approaches to learning and education [10]. Many researchers agree that MOOCs provide great content [21]. However, we argue that great content itself

will not make effective learning and geared to the skills needed for the next generation. It is essential that pedagogy is facilitating and courses designed in a way that it has opportunities to enhance the 21<sup>st</sup> century skills.

## 5 CONCLUSION

The 21<sup>st</sup> century skills being discussed and acknowledged as a key competence for the students who will face the challenges in future. Many educational institutions are attempting to provide these competencies to their students so that they outperform in the society. In this research, we tried to explore whether latest education technology- MOOCs provide the adequate competency in 21<sup>st</sup> century skills. This is mainly because in 2012, MOOC was the hype and it was found "the disruption of education". However, it has been 4 years and gradually researchers claim that MOOC hype is fading. Several factors resonate that MOOC are not effective as mainly on the fact that it is not being interactive and collaborative enough for students to gain the required next generation skills. 21<sup>st</sup> century skills such as Critical thinking, Communications, Collaboration, Creativity and Innovation is gradually incorporating to the face to face teaching and curricula's are being introduced to many schools and universities. Our research resulted that majority of the courses in xMOOC platforms do not facilitate adequate support to improve the 21<sup>st</sup> century skills. xMOOCs which follow most of the didactic pedagogies also required to cater to the demanding skills and the technology should facilitate to enhance those skills. At the same time universities and institutions who design xMOOCs needs to pay attention to their delivery so that the students experience effective learning which will assist them to face the 21<sup>st</sup> century challenges.

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