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Developing Student's Global Competencies at Scale in an Affordable MOOC K12 Outreach Initiative

Chi-Un Lei
The University of Hong Kong
Hong Kong
culei@hku.hk

Hong Qiang Wei
CCC Kei Yuen College
Hong Kong
whq@ms.ccckyc.edu.hk

ABSTRACT

Global education for cultivating global citizens is an essential educational topic for communities today. However, the standardized public curriculum has limited opportunities to cultivate K12 students to become global citizens. Currently, a MOOC outreach initiative has been launched in Hong Kong, facilitating students to access MOOCs from world-renowned universities. Students' learning is assessed by online assignments in MOOCs, and accompanied by feedback from other MOOC learners. Through learning MOOCs, students can gain global learning experiences based on their interests, and develop global competencies. In this work-in-progress paper, we will discuss how the initiative has been implemented, how the initiative has influenced students and how the initiative can influence K12 education and United Nations Sustainable Development Goal (UN SDG) Education.

CCS CONCEPTS

• Social and professional topics → Professional topics → Computing education → K-12 education

KEYWORDS

K12, MOOC, Outreach, Global education

1 Introduction

In the era of global uncertainty, people have to thrive in a complex and interdependent world with diversified cultures, and solve both local and international issues. Therefore, global citizens are

in huge demand today [1, 2, 3]. Being a global citizen can provide more opportunities for youth's future personal growth: They have the flexibility to choose what they can achieve, instead of just following the social norm. Furthermore, due to the recent dynamic changes around the world, there is an urgent need of understanding, accepting and unifying different stakeholders. Furthermore, global competence is necessary for students to communicate and learn effectively and responsibly. Therefore, there are needs of helping students to develop global competencies in an integrative and experiential manner, and eventually become global citizens. Different global education curriculum (e.g., project-based learning and service learning) has been proposed and developed [2].

However, there are limited opportunities for students in local secondary schools to enrich further. Unlike universities, K12 schools often have to follow a standardized curriculum created by the government. Students often can only access structured quality education from prestigious universities and cultural interactions with foreign communities through high-cost study tours in the summer and international competitions. In other words, students are challenged to take a state-of-the-art STEM course or an uncommon humanitarian course as they are often not available at local schools. Furthermore, for students with diverse learning needs, teachers' support may be scarce and not timely. Therefore, students may not be well informed about possible learning opportunities and career paths before entering the university.

Due to the high demand for global citizens, we launched a cost-effective MOOC outreach initiative in Hong Kong since 2016, for cultivating global citizens in local K12 schools. The initiative aims to achieve the following outcomes: **i) Facilitate students to gain global learning experiences based on their own interests; and ii) Facilitate students to develop global competencies**.

In this work-in-progress paper, we will discuss the uniqueness of the initiative (Section 2), how it has been implemented (Section 3), how it has influenced students (Section 4) and how it can influence K12 education and United Nations Sustainable Development Goal (UN SDG) Education (Section 5).

2 MOOC Learning in Global Education

Starting from MIT in 2012 [4], more than 900 universities have announced or launched more than 19,400 MOOCs on all kinds of subjects in 2021. Due to the recent commercialization of Coursera and edX, the technical and pedagogical development of MOOCs

have become mature. This makes MOOCs become a long-term sustainable channel for global education.

Through leveraging the support of free contents and peer learners in MOOCs, several effective pedagogies can be adopted:

- Personalized learning: MOOCs' variety and flexible scope allow students to choose their own interested courses other than their standardized secondary school education. This helps to nurture their curiosity, develop their interests, and stimulate their motivation [9].
- Multicultural peer learning: Students can interact with learners in forum discussions. By exchanging ideas with peers (who are often professionals worldwide), students can construct their knowledge through new perspectives and evaluate their prior knowledge to develop critical thinking skills [9, 10].
- Self-directed/Self-regulated learning: Students can learn how to manage their learning process: Set goals, control learning pace, organize and self-evaluate their knowledge growth. Instant feedback through automatically graded MOOC assessments helps guide students towards what they can achieve promptly. Meanwhile, students with less proficiency in English can also consume content and attempt questions several times for mastering the concept [11].

2.2 MOOCs for K12 Outreach and Education

We used "K12 MOOC" and "MOOC outreach" as a keyword to look for literature in databases (e.g. IEEE Xplore, ACM Digital Library, Elsevier ScienceDirect, and SpringerLink) as well as a systematic literature review report [5]. However, we only found limited studies about this topic. For example, MOOCs have been used for university student recruitment [6]. However, the study is focused on promoting computer science discipline in one local university only. Behaviors of K12 MOOC learners have been studied in a dinosaur MOOC [7] and a CS MOOC [8]. But there are no studies on how students have been impacted longitudinally through studying multiple MOOCs. Meanwhile, this initiative is conducting research into the root causes of providing a cost-effective way for cultivating global citizens. Furthermore, MOOC learning support programs, such as student MOOC induction workshops and teacher mentor training, have been offered in the initiative. This support has not been discussed in the literature.

3 Mechanism of the MOOC Learning

The initiative focuses on cultivating global citizens through aligning MOOC learning with the 3-A framework [3]:

- Academic: Global affairs;
- Action: Use knowledge to solve practical problems; and
- Affect: Lead people to take actions for global ethical purposes.

In the initiative, students attending the initiative should complete at least one MOOC. To justify the learning achievement, students should complete MOOCs and earn a certificate of course completion

from edX, Coursera, FutureLearn or other MOOC platforms. Reimbursement of the course registration was provided to students for applying for their verified MOOC certificate. The team also partnered with MOOC providers and universities on providing free MOOC enrollment.

Before studying a MOOC, students are expected to undertake around 6 hours of training on MOOC learning. In the briefing session, students learned about the basics of MOOCs, including registering their accounts, selecting MOOCs that fit their level and interest, and completing learning/assessment items in MOOCs. Furthermore, students have been explained the potential benefits of completing MOOCs for their further studies and career advancement. For facilitating them studying MOOCs at home, students learned skills for improving self-efficacy and self-directed learning shown in [9]. Students also learned about others' personal experiences in exploring and studying MOOCs.

Throughout the initiative, consultation sessions have been arranged. Students discussed their MOOC learning experience with teachers. Teachers can holistically coach students, such as facilitating them to complete MOOCs in the early stage. For example, students with less proficiency in the language were encouraged to re-browse content and re-attempt the assessment for mastering the concept. This mentoring help to build students' self-efficacy, such that they can take on more challenges (e.g. taking advanced-level MOOCs) and persist in a longer MOOC learning journey [9]. However, one teacher cannot support a hundred of students. Therefore, the team designed a self-support mechanism for students. For example, a learning booklet, as shown in Figure 1, had been designed for students, covering the introduction of MOOCs, MOOC learning scheme, MOOC learning procedure, as well as highlights of MOOC learning experience of students in the past and MOOCs recommended by the team. Students were also assigned in the same Google Classroom or Microsoft Team sessions for efficient communications and prompt support.
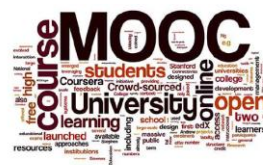
Figure 1: Cover of the MOOC learning booklet

4 Cohort Analysis: 2020 Summer Semester

Due to the threat of COVID-19 pandemic in the 2020 summer, for ensuring students maintain social distancing in completing their semester break assignments, the team launched a "MOOC-at-home" campaign for all students in the school. Since the school could not provide intensive one-to-one support for students during the

summer break, the team adopted a more self-directed learning approach for MOOC learning.

In the 2020 summer, 95 out of 101 secondary school Form 3 (K9) students in a school have completed 210 MOOCs: 45 students had completed one MOOC, which is the school requirement. Eight, four, one, and one student took 2-3 MOOCs, 4-10 MOOCs, 27 MOOCs, and 87 MOOCs, respectively. Students enrolled on all kinds of MOOCs that can incubate their global competencies. Examples of MOOCs enrolled by students are shown in Tables 1 and 2. In general, the learning pattern indicates that the variety of MOOCs allows students to enroll in their interested MOOCs. It is not easy for students to enjoy free well-structured courses or training in their K12 curriculum. Some observations are as follows:

1. Students completed MOOCs that could develop their foreign language skills. For example, they enrolled MOOCs from the University of Queensland (Australia), Yonsei University (South Korea) and Waseda University (Japan) to learn English (IELTS), Korean and Japanese, respectively. Students can enjoy low-cost language learning courses through MOOCs.
2. Students took MOOCs from global (e.g., Harvard University) and regional (e.g., Tsinghua University) well-renowned universities on STEM or humanities topics, which are difficult to be provided in K12 schools.
3. Students also took MOOCs from musical schools (e.g., Berklee College of Music), non-profit organizations (e.g., Catalyst, Amnesty, SmithsonianX) and companies (e.g., IBM, Microsoft). These courses offer students a chance to know more about global issues on a particular topic. These experiences are rare and valuable to K12 students.

We conducted exit surveys to collect feedback from students. Survey items and results are shown in Tables 3 and 4. In general, the initiative had achieved its purposes: supporting students gaining global learning experience and self-directed learning skills. Generally, students could identify their interested MOOCs for studying. In particular, students selected their MOOCs based on their interests and whether the MOOC can support their study (e.g., university application, public exam (DSE) study). Students can also learn courses that are beyond their K12 school curriculum.

Subject area	No. of students enrolled
Language	35
Science	13
Technology and Engineering	6
Social Science	4
Humanities	4
Mathematics	3
Others	7

Table 1: Distribution of MOOCs Completed by Students: Subject Area

University / Organization	No. of MOOCs completed by students
Harvard University	30
University of Queensland	19
New York Institute of Finance	15
Tsinghua University	15
University of Michigan	14
Yonsei University	12
Waseda University	11
Massachusetts Institute of Technology	7

Table 2: Distribution of MOOCs Completed by Students: University

#	Item	Avg.	S.D.
1	It's my first time hearing about MOOCs.	3.47	1.38
1	It's my first time actually taking MOOCs.	4.19	1.23
2	I am interested to take MOOCs.	3.28	1.12
2	I am confident to take MOOCs.	3.36	0.92
2	I am language proficient to take MOOCs.	3.32	0.97
3	I had enough time to take MOOCs.	3.46	0.93
3	I had the "hard resources" (e.g., computer, tablet) to take MOOCs.	3.47	1.47
3	I had the "soft resources" (e.g., Internet connection) to take MOOCs.	3.78	1.01
3	The MOOCs platform is easy to operate.	3.53	0.96
4	Taking MOOCs is useful for my overall learning.	3.39	0.88
4	I gained international learning experiences through this scheme.	3.26	1.04
4	I developed my self-directed learning habits through the scheme.	3.15	1.12
5	I am engaged when learning in MOOCs.	3.31	1.04
5	I get a good performance in the MOOCs I took.	3.64	0.97
5	I found a MOOC that I am interested.	3.64	0.86
6	Since I had to study MOOCs, I was not bored to stay at home.	2.73	1.27
6	I will take MOOCs in the future.	2.79	1.28
6	I will recommend MOOCs to my friends.	2.81	1.17
6	I want to join the programme again in the future.	2.90	1.23

Table 3: Student Survey for the Initiative.
 # (Construct): 1: Previous MOOC learning experience; 2: Motivation of taking MOOCs; 3: Support for taking MOOCs; 4: Skills learned after taking MOOCs; 5: Outcome of taking MOOCs; 6: Perception of the summer initiative

Item	No. of students selected
Interesting	38
Subjects that cannot be learned in their study	22
Helpful for university degree application	16
Helpful for DSE	14
Light workload	6
Can communicate with other learners	4

Table 4: Criteria for Studying a MOOC (Multi-Select)

Based on Table 3, we observed that if students are entirely new to MOOCs, their MOOC learning experiences is less pleasant. They have better MOOC learning experiences once students agree MOOC learning is exciting and engaging. Therefore, supporting students in identifying relevant and exciting MOOCs are essential. In particular, a well-supported induction session should be provided to students in the early stage. Meanwhile, students were also primarily well-supported by "hard resources" and "soft resources" when attending MOOCs. In particular, virtual learning infrastructure (e.g., devices, internet connections) is now more mature for MOOC learning after the pandemic. The MOOC initiative is also well-designed and user friendly to young learners and K12 students.

5 Discussions

5.1 Impact on the Secondary School

The initiative has replaced the gifted education programme in the pilot school. In the past, only a limited number of students could be recommended to gifted education associations for enriched learning. We believe that there is a crucial need for exploiting the full potential of students through MOOCs. Furthermore, the school agreed that students' scores in participating MOOCs about the English language could be included as one of their assessments in the English curriculum, as this indicates their capability in listening in English. Furthermore, more students were interested in participating in the initiative, and their parents were interested in knowing more about the initiative, as they found their children interested in learning MOOCs. Due to the promising outcome, the scheme is currently replicated by one local aided K12 school in 2021 and another one in 2022.

5.1 Extension to United Nations Sustainable Development Goal (UN SDG) Education

We are expanding the initiative by introducing a structured global education MOOC curriculum for teaching content related to UNESCO Sustainable Development Goals [12]. There are adequate MOOC resources for learning SDGs:

1. For students who are interested in solving global issues, they can identify and study a series of MOOCs on a particular SDG. SDG Academy, a global initiative from the United Nations, has produced a series of MOOCs on various SDGs. For example, students can take courses on climate (e.g., "Climate Action: Solutions for a Changing Planet").

2. Students who are new to SDGs can use the SDG Index and Dashboards as a tool for understanding SDG progress in a region or city and identifying the current urgent needs in the community. Students who need motivation or inspiration can learn from global leaders about the current status and movement on sustainable development.

3. For students who want to translate their ideas into appropriate actions for benefiting the world, MOOCs from the SDG Academy also explain how to ethically achieve SDGs through technology and media, identify possible options, and plan actions for impact.

6 Conclusion

The MOOC outreach initiative started in 2016 in a K12 School. Until June 2021, 156 out of 526 participating students have completed more than 432 MOOCs produced by world-renowned institutes. We observed that the initiative had provided a cost-effective and high-impact mechanism for global education. In particular, the initiative has significantly influenced participating students and the participated school. Students have enrolled on all kinds of MOOCs that can incubate global competencies, including languages and international affairs. Furthermore, since the COVID-19 pandemic will still affect students (particularly students in Asian regions) travelling around in forthcoming years, the proposed approach is a feasible way to implement global education.

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