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Co-creation of a massive open online course: An exploration of the motives and motive fulfillment of a faculty member and student co-instructors

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We present a case study of a “by learners, for learners” approach to the co-design of a massive open online course (MOOC), on climate change. To learn about the motivations of a faculty member and students who participated in this process, we collected data through focus groups, interviews, and questionnaires. Three main motivations emerged: (1) The faculty member and student co-instructors sought to create accessible and practical resources to help individuals take action on climate change and (2) believed creating a MOOC was critical to career advancement. (3) The faculty member also hoped to involve students to improve their knowledge and skills, while creating a learner-centered MOOC on an ambitious timeline. Participants reported that the majority of their motivations were fulfilled and were generally satisfied with the resulting MOOC and overall co-design experience. This study offers new insights into the motivations that drive instructors to create MOOCs as well as into adopting the “student as partners” model for MOOC co-design.

KEYWORDS

MOOC, co-design, motivations, motivation fulfillment, students as partners

Introduction

Proponents of massive open online courses (MOOCs) focus on their potential to democratize higher education, reducing cost and geographic barriers to the world's leading academic institutions (Schmid et al., 2015). Others raise concerns that MOOCs have been oversold, suggesting that they have not lived up to the initial hype that surrounded their introduction (cf, Head, 2017). For example, MOOCs are not accessible to everyone due to technological limitations (Moura et al., 2017), and MOOCs on major platforms such as Coursera and edX are taught by a relatively homogeneous group of instructors from mostly elite institutions who may not be relatable to a broad audience

(Behrmann et al., 2015). This is because MOOC providers such as Coursera (Coursera Inc, 2022) and Udacity (Udacity Inc, 2022) partnered with prestigious universities to offer MOOCs to students wanting to learn from highly respected professors (Toven-Lindsey et al., 2015). A promising avenue for overcoming the limited representation and variety of perspectives seen in traditional MOOCs and for helping realize their potential may be through designing MOOCs in partnership with students.

Collaborating with “Students as Partners” (SaP) is, in fact, an innovative pedagogy and form of co-design that is increasingly employed by institutions of higher education (Mercer-Mapstone et al., 2017). In this approach, students and faculty work collaboratively to improve experiences for both instructors and learners (Healey et al., 2016; Mercer-Mapstone et al., 2017). SaP challenges some of the tenets of traditional higher education: hierarchical structures, predetermined learning outcomes, and the perception of students as clients or consumers. SaP turns learning from a one-way, top-down experience to a two-way approach in which students are active rather than passive learners (Cook-Sather et al., 2014; Cook-Sather and Motz-Storey, 2016). SaP has been effective in improving teaching and learning in a range of educational settings (Healey et al., 2016; Mercer-Mapstone et al., 2017) but little is known about this approach to MOOC design. For example, while a number of studies have examined university faculty members’ motivations for teaching MOOCs (Kolowich, 2013; Hew and Cheung, 2014; Zheng et al., 2016; Kleinman, 2018; Zhu et al., 2019), to the best of our knowledge, none have studied students’ motivations for taking on a MOOC “instructor” role. Our study seeks to help fill this gap by describing (1) the case of a “by learners, for learners” MOOC co-design process, (2) students’ and a faculty member’s motivations for participating, as well as (3) their motive fulfillment and satisfaction with the process and its outcome.

In presenting an alternative vision for MOOC design, one which involves undergraduate, master’s, and doctoral students, we challenge the view that quality MOOCs can only be created by super-star instructors from elite institutions (Ross et al., 2014). After a review of relevant literature, we describe the motivations of one faculty member and ten students for co-designing the MOOC *Act on Climate: Steps to Individual, Community, and Political Action* (AoC). Participants co-designed and co-developed this MOOC during a semester-long residential project-driven seminar at a public research university for which the students received course credits. We document their motivations and experiences (i.e., motivation fulfillment and satisfaction), drawing on data from focus groups, questionnaires, interviews,

and design artifacts to answer the following research questions:

(1) *What were the faculty member’s motivations for co-creating the MOOC AoC and to what extent were they fulfilled?*

(2) *What were the students’ motivations for co-creating the MOOC AoC and to what extent were they fulfilled?*

To the best of our knowledge, this is the first study seeking to understand an instructors’ motivations for co-creating a MOOC and extending inquiries of MOOC instructor motivations to students. As such, we also advance research on student involvement in the process of course design in higher education.

Background

What are massive open online courses?

Massive open online courses are a form of technology-enhanced learning that have evolved over the past decade. MOOCs aim to provide free, accessible instruction to anyone, regardless of their financial means or geographic location. Despite variation in pedagogy, structure, and overall design, all MOOCs essentially possess four core characteristics: they (i) focus on a particular content area, (ii) include assignments and assessments, (iii) are available online, and (iv) lack enrollment criteria (Major and Blackmon, 2016). The majority of MOOCs are hosted on centralized platforms such as Coursera (Coursera Inc, 2022) with about 8,250 courses and edX (EdX Inc, 2022) with about 3,550 courses in 2022 (Class Central, 2022). These platforms allow course designers to create, publish, and deliver the digital courses that they produce. Many MOOCs closely mirror the structure of conventional, residential courses in higher education, with video recordings replacing face to face lectures (Hood et al., 2015).

What are the roles of massive open online course instructors?

The role of the MOOC instructor differs from residential educational contexts, where teachers can know their students personally and engage with them directly (Ross et al., 2014). On campus, instructors may be known for their excellent teaching abilities (Behrmann et al., 2015) and for their passion and enthusiasm for their subject (Hew, 2018). Yet, the qualities that make an instructor successful in a residential education context may be difficult to replicate online and at scale.

Ross et al. (2014) offer a typology of three styles of MOOC instructor. The *distant “rock star”* lecturer, a highly qualified

academic from an elite institution with celebrity status at their university and within their academic discipline. This typology presents an exaggerated view of the instructor. The second style is the *automated “instructor,”* providing feedback through automatically marked quizzes and assignments. The role of teacher is essentially “abandoned” and left to a set of processes and feedback that is determined in advance, without the possibility of personalization or tailored responses. The third style is the *co-participant*, a facilitator of a peer learning network. The latter has been primarily associated with connectivist MOOCs, or “cMOOCs” (Siemens, 2005), which are characterized as a loosely structured network of resources, with learning goals articulated and sustained by the community and with the instructor viewed primarily as a role model and resource for learning (Downes, 2008). These cMOOCs stand in contrast with the more didactic pedagogical approach of common MOOCs, sometimes referred to as “xMOOCs” (Daniel, 2012), characterized by their explicit organization and tightly structured resources, typically residing on centralized MOOC platforms such as Coursera, Udacity, and edX (Downes, 2008).

Unsurprisingly, MOOC learners value instructors who have engaging personalities, who make themselves available to learners on discussion forums and in synchronous video events, and who demonstrate a passion for their subject (Hew, 2016, 2018). In this work we present an alternative vision of the MOOC instructor, that of students as content creators and domain experts. Moving forward, “students” refers to the MOOC co-designers whereas “learners” refers to individuals enrolled in the MOOC through the Coursera platform.

What motivates instructors to develop massive open online courses?

Motivation is critical to initiating, guiding, and maintaining goal-oriented behavior, determining to what extent individuals engage in an activity (Stage and Williams, 1990; Maehr and Meyer, 1997; Ryan and Deci, 2000; Bandura, 2006). Compared to scholars’ typical focus on MOOC learners’ motivations, relatively little attention has been paid to motivations of MOOC instructors (Zheng et al., 2016). Nevertheless, we know that MOOC instructors are typically full-time professors who take on this task in addition to other academic responsibilities (cf. Zhu et al., 2019; Doo et al., 2020). It is therefore reasonable to ask what would motivate faculty to voluntarily engage in additional work that is known to take time away from other responsibilities, such as research, that are required for promotion (Kleinman, 2018).

Hew and Cheung (2014) were the first to synthesize MOOC instructors’ motivations and challenges based on findings from 25 articles. They grouped MOOC instructors’ motivations into (1) “a sense of intrigue,” (p. 48) such as wanting to have the experience of connecting to a large and diverse audience

in ways that are not possible in a campus-based course, (2) egoistic reasons, such as the potential for an increase in personal reputation, being among the first in their peer group to teach a MOOC, and revenue generation for themselves, and (3) altruistic reasons, such as increasing global access to higher education. Relatedly, faculty found it motivating that their MOOC learners are engaging on a volunteer basis (Zheng et al., 2016). Since Hew and Cheung (2014), a number of additional studies on instructor motivations have been conducted that support their findings, including one which showed that faculty typically have multiple motivations for creating a MOOC (Kleinman, 2018).

Most recently, a mixed methods study of 143 MOOC instructors world-wide by Zhu et al. (2019) categorized faculty motivations into *growth needs* and *relatedness needs*. “Growth needs” center around developing competencies. Associated motivations include curiosity about MOOCs, interest in non-traditional ways of teaching, a desire to experiment within the MOOC space, and intentions to learn about innovative course design. “Relatedness needs” focus on relationships between faculty and learners. Associated motivations include the potential to reach large and diverse audiences throughout the world, the possibility of increasing learners’ access to higher education, and enhancing personal reputation by showing off research, teaching, and home institutions. Similar motivations were identified by prior studies (e.g., Belanger and Thornton, 2013; Hollands and Tirthali, 2014; Kleinman, 2018).

To the best of our knowledge, no one has explored what may motivate university students to take on the role of MOOC designer and developer. It may be that students have not had the opportunity to take on this role, or researchers have not yet explored this phenomenon. One primary goal of this study was to contribute to advancing scholarship on MOOC instructor motivations by exploring what differences may exist between faculty and student instructors.

To what extent are massive open online courses instructors’ motivations fulfilled?

The limited research that exists on the extent to which MOOC instructors’ motivations are fulfilled suggests that faculty have found teaching MOOCs rewarding, but also time consuming and distracting from normal academic commitments. For example, Kleinman (2018) found that faculty learned about ways to improve their residential teaching through the process of creating and teaching MOOCs. Some switched to flipped classrooms while others divided lectures into shorter segments to accommodate the attention span of students. At the same time, there was variability in faculty members’ experiences, often with simultaneous pros and cons. Some found that MOOCs allowed them to make

the desired connections they sought with learners, while others felt isolated in their offices without the direct face-to-face interactions in traditional, residential courses. Similarly, while faculty benefited from increased visibility due to their MOOCs, for some this led to awkwardness and discomfort (Kleinman, 2018). Concerns have also been expressed that developing MOOCs may become yet one more task that faculty are required to take on to advance professionally (Kolowich, 2013).

Massive open online courses design processes

The instructor typology elucidated by Ross et al. (2014) paints a picture of a lone MOOC instructor. In reality, MOOCs are designed and produced by a multidisciplinary team (Zheng et al., 2016), an ecosystem of “behind the scenes” experts who assume various, coordinated roles (Doherty et al., 2015). Although single instructors typically appear to be the “face” of a MOOC and learners may perceive themselves in direct experience with this individual, it is likely that the instructor was supported by a number of professionals including learning experience designers, media producers, animators, and social media specialists. Copyright specialists, marketing experts, and legal professionals may have been involved as well (Doherty et al., 2015). Although there may be some instances in which instructors are operating on their own, working directly with platform consultants and producing their own instructional assets (e.g., videos), the majority of instructors receive systematic, research-based support from service units devoted to MOOC production within their respective universities (cf. Najafi et al., 2015). Indeed, the sheer scale of MOOCs necessitates collaboration, resulting in logistical and other challenges (Zheng et al., 2016).

Massive open online course teams have approached the design process in various ways, but common themes are that it is important to plan carefully, develop workflows, and clearly delineate roles given the complexity of the MOOC design and delivery process (Najafi et al., 2015; Zheng et al., 2016; Law et al., 2017; Lin and Cantoni, 2018). Instructional teams may need to use platform features strategically (Najafi et al., 2015), make compromises and concessions, and deviate from original goals (Head, 2017). Teams may also need to adjust curricular resources to fit the MOOC format. For instance, Borthwick (2018) described how one design team reconceptualized how they delivered lecture content, creating “bite-sized” components (i.e., short videos), rather than longer presentations. Overall, designing a MOOC is a non-trivial, demanding, and time-consuming task, one that typically requires over 100 h of involvement, including preparatory work and asset creation (e.g., video production, quiz development) (Kolowich, 2013; Alario-Hoyos et al., 2014).

Case study: The case of co-creating the massive open online course, *Act on Climate*

Premise

We examined the motivations and experiences of one faculty member and her interdisciplinary team of one undergraduate and nine graduate students enrolled in a residential course in which they co-designed the MOOC *Act on Climate: Steps to Individual, Community, and Political Action (AoC)* using the case study method (Yin, 2018). A case study is an empirical method that investigates a contemporary case in depth within its real-world context (Yin, 2018). Case studies are ideal when the researcher is unable to impose a treatment but is able to make direct observations and interview participants who are actively involved in the event under study (Yin, 2018). We used multiple modes of inquiry: focus groups with students and an open-ended survey with the faculty member at the conclusion of the course, in addition to anonymous student surveys distributed immediately after the course and three months after the launch of the MOOC. The faculty member (the third author) in this case was willing to experiment with a new kind of instructional model, that of co-creating a MOOC on climate change with students, to address multiple perceived needs. For one, the faculty member was concerned about traditional “talking head” approaches to MOOC design that she felt were unlikely to meet learners’ needs. Moreover, she doubted that existing MOOCs on climate science would empower learners to act on this complex and critical societal challenge. By collaborating with undergraduate and graduate students (i.e., ones concerned about climate change and representative of target learners), she hoped that the MOOC they would create together would be more accessible and inspiring for learners than one created on her own. Further, the faculty member was eager to provide her students with an opportunity to learn about digital education, with a focus on climate education. The experience of co-designing a MOOC on climate change action would thus not only benefit her local, residential students by providing a unique curriculum design experience but also provide an accessible, empowering climate education experience for learners across the world.

To date, research on MOOCs co-designed by students has been solely descriptive of the process (Davidson, 2017; Dean, 2017, 2018; Ogilvie, 2017; van Zijl, 2018). In some cases, students created MOOCs as partners (Mercer-Mapstone et al., 2017; Potter et al., 2017; Ricci et al., 2018) and at least one MOOC was developed solely by students (Breevaart et al., 2018). Könings et al. (2014) included students in the co-design of curriculum innovations, and Bovill and Bulley (2011) collaborated with students in designing curricula to promote social justice and civic engagement. Our case study, in which the faculty member

embraced the SaP approach and co-designed a MOOC with students to promote engagement around climate change, builds on this previous work, providing an example of how SaP and co-design might be combined.

Unlike traditional SaP approaches in which students work with faculty to improve existing courses and curriculum, this case took SaP a step further by facilitating co-design of a course from its inception. In our case study, students learned about digital education and co-designed the MOOC along with the faculty member. The topic of the MOOC, for example, was developed collaboratively. Although the faculty member presented the students with the overarching topic of climate change, a consensus process was used to decide on an action-oriented MOOC with four themes: food, energy, transportation, and the built environment. This decision was based on the well-documented disconnect between climate knowledge and behavior, and that even those who care about climate change do not know what actions to take and lack the necessary support (Gifford, 2011). The MOOC designers sought to overcome these barriers to mitigation and adaptation actions at the individual, community, and political level.

Act on Climate course description

Act on Climate is a seven-week MOOC available on the Coursera platform. The AoC MOOC consists of an introductory module, four modules focused on food, energy, transportation, and the built environment, and a concluding module. Learners are asked to respond to multiple choice questions, discussion prompts, and to complete a peer-reviewed personal climate action plan (PCAP). Content is shared through video interviews with experts and readings including case studies. The goal of AoC is to provide learners with practical, actionable knowledge on each theme area, to encourage and support learners addressing climate change through mitigation and adaptation at the individual, community, and political levels. AoC is distinct from other climate change MOOCs that focus on climate science or policy rather than on climate actions that individuals can engage in alone or with others. AoC learners have reported high levels of satisfaction with a 4.8/5 average course rating and 99% “Likes” across course content.

Course co-creation process

Recruiting and selecting the student co-designers

The MOOC, AoC, was created at a large public research university in the United States. Over the course of an academic year (September 2016–April 2017), the faculty member, ten students (one is the first author), and a project manager (a recent alumna from the author’s program), henceforth referred

to as “co-designers,” enacted a co-design and development process through an interdisciplinary, project-driven seminar called “Creating Innovative Digital Learning and Teaching Opportunities to Foster Climate Literacy.” The two-semester course was advertised to Ph.D., Masters, and advanced undergraduate students, suggesting that participants would gain tangible and marketable digital education and leadership skills through a hands-on, interdisciplinary, and professional experience that would result in a publicly available MOOC. Students had to apply and were selected in part based on their interdisciplinary experience with climate change science or social science.

Preparing to co-design the massive open online course

The first semester (September–December 2016) functioned similarly to a traditional seminar, with weekly readings and writing assignments as well as in-class lectures and discussions. Students learned about digital and environmental/climate education from the faculty member and digital education specialists at the university. Once a final decision was made to co-create a MOOC, brainstorming sessions were used to determine the MOOC’s topic, content themes, and pedagogical approach. Toward the end of the first semester (November–December 2016), students also worked collaboratively with the faculty member and learning specialists to prepare a funding proposal for the MOOC. Revenues generated by MOOCs are typically shared between the institution and the faculty member. However, since this MOOC was co-designed, the faculty member and students agreed that any resulting revenue would go to a scholarship fund for future students in the host school. In the second semester (January–April 2017), the faculty member, students, and project manager worked with additional staff consisting of learning experience and media designers, among others, from a digital innovation office within the university to develop the MOOC. The project manager played a critical role and ensured co-designers had what they needed throughout the process to complete tasks and meet deadlines.

Co-designing and developing the massive open online course

The ambitious time frame (4 months), dictated by the academic calendar, demanded a highly structured process. Each seminar session followed a predetermined agenda to maximize collaboration between the faculty member, students, project manager, and learning experience designer (the second author) and media designers. Between sessions, all partners communicated among and between each other regularly about production deadlines and course logistics, meeting in small working groups, and utilizing collaborative cloud-based tools. The process of co-designing and developing the MOOC for the centralized platform, Coursera, involved defining learning

outcomes, creating instructional content, and developing learner assessments, among many other tasks.

The entire process was team-based, with multiple small groups working simultaneously. The leadership team, guiding the direction of the course, consisted of the faculty member, project manager, as well as learning experience and media designers. The student team consisted of an interdisciplinary group of one junior undergraduate, seven master's students, and two PhD students from multiple academic departments including social and physical sciences, economics, and education. Student sub-teams of 3–4 students worked outside of class time to design and develop instructional content, drawing on natural science research to identify effective strategies for mitigating and adapting to climate change and a range of social science disciplines for insights into supporting learners to change their personal behaviors, influence community behaviors, and advocate for policy change. Instructional content was informed by the faculty member, interviews with residential faculty from across the university, and secondary research conducted by the student co-designers.

Throughout the second semester (January–April 2017), students periodically discussed and contributed to each other's drafts and assumed specialized additional responsibilities. Many of these responsibilities were closer to that of workplace tasks than those traditionally taken up by students. For example, one student worked closely with the learning experience designer to develop the peer-graded capstone assignment and rubric; another student focused on exploring ways to incorporate social media to help meet MOOC promotion goals; yet another student took responsibility for overseeing that all external resources used in the MOOC (e.g., images) adhered to copyright requirements. Students planned for and conducted interviews with local, national, and international experts as one means of sharing content with MOOC learners (rather than recording traditional lectures). Thematic content was supplemented by students sharing their own personal experiences about reducing their impact on the planet in the form of videos of personal stories and written case studies.

Course co-design roles

Although many individuals were involved in envisioning and creating AoC, here we focus on the motivations and experiences of the faculty member and her students as MOOC co-designers. The faculty member assumed a multi-dimensional role including securing initial support for the project, hiring a project manager, and guiding and supporting all aspects of students' work. She convened weekly planning meetings with the project manager and learning experience designer to strategize about the learning objectives and activities for the weekly residential class sessions and to address issues related to MOOC development as they arose. The faculty

member assumed the role of a traditional seminar instructor and facilitator during both semesters in addition to serving as the official, designated instructor for the MOOC as required by Coursera. During the weekly class session, she provided students with ideas regarding the direction of the MOOC and resources to inform content development and suitable pedagogies. She worked to balance students' desire for a MOOC that provided practical, action-oriented activities for learners with a course that was grounded in theory and empirical research. At the same time, she strove to ensure that students had as much control as possible, including to ensure they developed a sense of ownership over the MOOC.

The students similarly took on multifaceted roles, including that of students enrolled in a residential graduate-level course and that of content creators and co-instructors for the MOOC. The students brought a high level of enthusiasm, a focus on learner perspectives, content expertise from a range of fields, and a variety of personal experiences to the seminar and to the pedagogical design of the MOOC. Students worked in collaboration with each other, the faculty member, and the learning experience designers to make decisions about the MOOC's structure, thereby ensuring that the course's subunits had a consistent approach, such as filming introductions to each topic and creating learner self-assessments. Students also interacted individually with the learning experience designer and media designers, who coached them on how to create clear and engaging content as well as supporting resources.

Materials and methods

We used the case study method (Yin, 2018) to explore the motivations and experiences (i.e., motive fulfillment and satisfaction) of the faculty member and students who took on the MOOC's co-design and development. This case study is classified as 'revelatory' (Yin, 2018) because it investigated a phenomenon not previously studied by social scientists (i.e., the motivations and motive fulfillment of faculty-student MOOC co-creators). We relied on multiple sources of evidence, including focus groups and surveys completed by students and the faculty member. An external facilitator led the focus groups and student surveys were anonymous.

During the week following the completion of the co-design process, an external facilitator conducted two 1-h focus groups with students using open-ended questions designed to spur discussion among the co-designers about their motivation to participate in the process, what they learned through the process, and how they perceived the process as beneficial (Supplementary material 1). Participation in the focus groups was optional and dependent on student availability. Nine of the ten students who took the course participated in the focus groups. After each focus group, student co-designers completed a survey with six questions about their experiences

prior to the course, group dynamics, and motivation to complete group work. The survey asked students to respond to a Likert scale ranging from 1 (strongly disagree) to 7 (strongly agree). The survey also included two open-ended questions about their motivations for participating in collaborative work ([Supplementary material 2](#)).

Given that the first focus groups and surveys were conducted at the end of the semester when students had competing deadlines and responsibilities, we decided to administer a follow-up online survey ([Supplementary material 3](#)) five months later to ask students what they thought about the co-design experience retrospectively. Specifically, we asked them to consider how their original motivations for taking the class had (not) been fulfilled, using Likert scale and open-ended questions. At this point, the MOOC had been published online for three months, thus students were able to form an impression of the initial impact of their MOOC. During the summer, following the course design process, the faculty member reflected on the experience, through a written survey about motivations and the extent to which they were fulfilled and satisfied ([Supplementary material 4](#)).

We analyzed qualitative data collected through these survey instruments using thematic coding, following [Thomas \(2006\)](#) and described in more detail below. Student focus group data were transcribed and uploaded into a software that enables web-based, collaborative qualitative coding. An inductive approach was used to identify core patterns and themes ([Creswell and Poth, 2018](#)). The first and second authors independently coded the data into thematic parent codes with descriptive child codes which were then written into a codebook ([Supplementary material 5](#)) that was agreed upon by both researchers through a consensus process in which both coded individually and then came together to agree on each code. Coding focused on the following themes: student motivations for enrolling in the residential seminar and for actively creating content and completing assigned tasks during the MOOC design process, challenges and opportunities associated with the design process, and knowledge and skills gained as a result of the process. Within these larger themes, we coded 5–15 subcategories describing students' motivations. Responses to the two student surveys were entered and organized in a spreadsheet. Responses from the focus groups and first survey were compared to the survey conducted five months later, to help assess (changes in) motivations, motive fulfillment, and satisfaction. The faculty survey results were also entered and organized in Excel and analyzed to assess motivations, motive fulfillment, and satisfaction using the same coding process described above.

Results and discussion

This study examined faculty and student motivations for co-creating the MOOC, *AoC*, as well as their motive

fulfillment and satisfaction at the end of the process. Three themes emerged from the data as the primary motivations of the faculty member and students: (1) The desire to create accessible and practical resources for individuals to take action on climate change due to a sense of urgency to address this challenge and in light of the lack of relevant existing MOOCs, (2) the belief that learning about digital education was critical to continued career development, and (3) the faculty member also sought to develop students' content knowledge and higher order thinking skills while developing a learner-centered MOOC on an ambitious timeline. [Table 1](#) provides an overview of the faculty member's and students' motivations as well as motive fulfillment, organized by results from prior scholarship on MOOC instructor motivations.

The faculty member's motivations for creating the massive open online course, *Act on Climate*

Creation of climate change education resources

One of the faculty member's main motivations for creating *AoC* consisted of filling the gap in accessible educational resources to empower individuals to act on climate change. Her review of online learning experiences available at the time, including MOOCs on Coursera and edX, revealed a relatively large number of courses on climate science and some on climate policy. These courses, however, generally did not follow best environmental and climate education practices. For example, few identified actions individuals could engage in to effectively address (i.e., mitigation) and respond to (i.e., adaption) climate change:

“Based [on] my expertise on applying social science theories to bring about change, including my research on pedagogies that can bring about environmental behaviors, I thought we could make a real difference by developing a MOOC focused on climate relevant actions.”

Relatedly, and consistent with recent climate predictions (e.g., [Intergovernmental Panel on Climate Change \[IPCC\], 2014](#)), the faculty member felt a sense of urgency to educate a large, diverse audience ([Kolowich, 2013](#)) about a topic she cared about personally. She hoped that the MOOC would ultimately reach a large number of learners, thus contributing to bringing about societal change by equipping individuals with tools for engaging in climate actions including activism. These motivations are consistent with prior research that found faculty develop MOOCs to seek out wider and more diverse audiences on societal topics that they are passionate about, to broaden impact ([Kleinman, 2018](#)).

TABLE 1 Co-instructors' motivations for developing the MOOC *Act on Climate* and motive fulfillment, organized by motivations identified by prior scholarship (cited in "References" column).

	Motivations for teaching a MOOC	References	Faculty member		Students	
			Motives	Motive fulfillment	Motives	Motive fulfillment
Growth needs	Curiosity about this type of course, interest in non-traditional ways of teaching, desire to experiment (with new pedagogies, technologies, teaching styles) in MOOC space	- Zhu et al., 2019 - Kleinman, 2018	✓	✓	✓	
	Learn about course design and development based on MOOC experience	- Zhu et al., 2019	✓	✓	✓	✓
	Improve MOOC design	None	✓	✓		
	Career development, greater employability	- Kleinman, 2018	✓	✓	✓	✓
Relatedness needs	Potential to reach large and diverse audiences throughout the world (i.e., not possible through on-campus course) on topic passionate about	- Hew and Cheung, 2014 - Kleinman, 2018 - Kolowich, 2013	✓	✓	✓	✓
	Increasing learner access to higher education who would otherwise be excluded (i.e., altruism)	- Hew and Cheung, 2014 - Kleinman, 2018 - Kolowich, 2013	✓	✓	✓	✓
	Enhancing reputation, notoriety, recognition or prestige for self (e.g., first among peers to teach MOOC), institution, field	- Hew and Cheung, 2014 - Kleinman, 2018 - Kolowich, 2013	✓	✓		
	Sharing message of social importance to broaden impact (i.e., increase knowledge about critical topic)	- Kleinman, 2018	✓	✓	✓	✓
	Opportunity to engage with "volunteer" learners	- Zheng et al., 2016				

Check marks indicate that the motive/motive fulfillment was found in the majority of responses while blank cells indicate it was not found.

Interest in digital education and professional development

Another motivation for the faculty member was being intrigued by digital education. She recognized the growing importance of digital education in higher education, even prior to COVID-19, and wanted to become proficient in this form of education, to be better situated as a faculty member and potential future administrator. This finding is similar to existing research results showing that faculty are motivated to create MOOCs as a result of their interest in experimentation (Kleinman, 2018), including with new pedagogies, technologies, and teaching styles (Zhu et al., 2019). This finding is new in terms of the professional career development aspect.

Co-design and co-development with students

The faculty member was motivated to co-design the MOOC with students for a variety of reasons. First, she believed student involvement would improve the quality of the MOOC. Students would have more in common with target MOOC learners, thus providing insights into learners' needs in ways that they would find relatable.

“My review of a range of existing MOOCs suggested that many consisted of ‘talking heads’ that I did not feel were likely to hold the learner’s attention or support their learning. They did not appear learner-centered. That was something I wanted to avoid.”

The faculty member thought diverse students' perspectives and their digital expertise would be particularly helpful, as would be their help in completing the MOOC in a relatively short amount of time (four months to meet a Coursera deadline). This belief is consistent with Ferguson et al. (2015) who have suggested that “by 2030, a MOOC educator will be a member of a skilled team that works together to build on the subject knowledge and professional expertise of all team members” (p. 319).

Importantly, the faculty member also believed that the co-design process would greatly benefit the students, herself, as well as her school and university:

“MOOCs in particular, and especially when co-designed with students, can provide valuable learning opportunities and resources for students on campus. I think they will also play an important role in attracting and recruiting top students in future, if they are not already.”

Key aspects of these results are consistent with prior research that faculty have a desire to raise the profile of either themselves, their program, field, or institution (Kleinman, 2018). However, the faculty member also wanted to benefit her residential students who participated as partners in the co-design process, a new finding from our case study. More

specifically, she believed co-designing a MOOC would benefit students, by enabling them to gain content expertise (e.g., identify effective mitigation/adaptation actions, increase higher order learning skills (e.g., applying social science change theories to support climate actions) and mastering critical digital education, communication, and other professional skills:

“The job market is so incredibly competitive, and I thought creating a MOOC would set them apart. The PhD students could demonstrate that they’ve developed a course, even one in the digital space. MOOCs are of great interest to many universities. For the students in our [Sustainability] school, communication and education skills, including digital ones, are key. Studies, such as our own alumni surveys, have shown this. Then, there are the students from other schools [within the university]. I know many are really interested in learning more about climate change and what to do about it. By having to teach about the topic, I knew they would learn more about it than through any other way.”

The faculty member’s motive fulfillment

After the project ended, the faculty member felt that her motivations to support students in their education about climate change adaptation and mitigation and career development were mostly fulfilled. However, she noted that her students came to the project with a more limited understanding than she expected:

“they were not [initially] able to apply what they knew about these theories to the course—its design or content. They needed a lot of support with this. It goes to show how important application is. While they may not recognize it, I know they learned a tremendous amount about fostering action based on what we know from the social sciences, something I think they didn’t really know before [co-developing the course].”

This was validated by the student co-designers, who indicated that they learned about the social science for supporting action on climate change and built their expertise in course content creation and enactment.

The faculty member's goal to produce a high-quality MOOC on a short time scale also proved a success. By working collaboratively with students, the course was developed relatively quickly and launched on schedule, allowing it to be included in Coursera's Social Impact Initiative. The latter advertised the course to a mass learner audience, increasing exposure and awareness about “acting on climate.” After the completion of the co-design process, the faculty member concluded that “By working together, we made sure there was

just the right type of content and resources for learners.” Further, we used Margaryan et al.’s (2015) checklist for MOOC quality and Swan et al.’s (2014) AMP instrument to evaluate the AoC MOOC, finding positive pedagogical outcomes for MOOC learners (Bressler et al., 2019). Further, the university reported that the AoC MOOC has consistently been ranked in the top 10% of MOOCs produced by the institution. The faculty member went on to say:

“Many of the students knew a lot about the climate science and other topics that I didn’t know as much about and that was very valuable. We learned a lot from each other’s ideas and as a result of our collaboration the MOOC is so much better than anything I could have created on my own, or they could have ever created on their own.”

Further, as anticipated by the faculty member, the students turned out to be more technologically savvy, using social media and digital resources to promote the course and connect learners with others in their communities, beyond online participants.

Faculty’s satisfaction

The faculty member found that co-designing the MOOC with students and professional staff (learning specialists and media designers) was extremely challenging but also one of the most exciting teaching experiences of her professional career:

“In the end, the co-design process and completing the MOOC was probably still one the most challenging teaching experiences I have engaged in. At the same time it was also one of the most exciting and fun ones. Totally different from the typical, relatively lonely task of developing and teaching a course on my own.”

She felt that the resulting MOOC met rigorous academic standards and filled the intended resource gap among climate change MOOCs. AoC’s content was theory based, scientifically accurate, and applied environmental and climate education best practices.

With two relatively minor exceptions, the faculty member expressed strong satisfaction with the overall process and the resulting MOOC. One concern was that time constraints limited the efficacy of democratic decision making:

“We had a conversation early on about how we were going to make decisions through voting, discussions, and taking breaks to reflect before making final decisions. Due to time pressures, we did not always follow this process and there were times when I or the students wished we could have spent more time to reflect.”

The other concern was with the students’ course evaluations of the residential seminar.

While the university administered student evaluations of teaching were very good, they were not outstanding. The faculty member was surprised by this because she expected that the innovative nature of the learning experience and the fact that the course ultimately succeeded in producing a high-quality MOOC would result in outstanding evaluations for her residential seminar.

Students’ motivations to create the massive open online course: Act on Climate

Educational resources about climate change

Like the faculty member, students felt a sense of urgency to educate a large number of individuals about actions they can take to mitigate and adapt to climate change, demonstrating altruistic motivations (Zheng et al., 2016). In the survey distributed after the focus groups, students ranked their motivations to work on this project. Students reported that they were most motivated to work on the project because it would result in a public MOOC and they wanted to make a difference by addressing an actual environmental problem. In the followup survey administered five months after creating the MOOC, students reported that creating a MOOC of value, making a difference outside of academia while in graduate school, and making education accessible to a general audience beyond those who can pay for a conventional education were their top three motivations for participating as co-designers of the MOOC. In the focus groups, students similarly reported a sense of urgency as particularly salient due to the consequences of inaction on their future:

“[I] wanted to see how I could be involved in, or help facilitate or support advocacy and activism outside of academia, and this course represented a really great opportunity to try and do that.”

“When we were at the [Conference of the Parties to the UN Framework Convention on Climate Change (COP-UNFCCC)] we spent a lot of time talking...How do we engage people outside of the traditional realm of classes?...How do we think about taking action on climate through other avenues?”

[The MOOC co-design experience] “was an interesting opportunity to see how you can use technology to reach different communities...I was thinking about a way to use technology to introduce kids to climate education and climate action.”

Further, students who had learned about climate change mitigation and adaptation through their previous classes were inspired by a desire to make climate education more accessible,

demonstrating a “sense of intrigue” as a motivation (Hew and Cheung, 2014 p. 48). In particular, they noted that existing resources tended to focus on “academic ideas” and “jargon.” Hence, they wanted to make sure that the MOOC’s content was shared in a way that could be understood by a wide range of learners, especially ones with limited knowledge about climate science. In a focus group a student shared that this was a particular rewarding part of the process:

“As somebody who studies climate change in a very academic way, it helps a lot to go through the process of translating it and making it tractable for audiences who don’t spend 89% of their life thinking about climate change.”

Career development

Growth needs typically ascribed to faculty in the literature (Zhu et al., 2019) also influenced student motivations to participate in the MOOC design process. Students felt an even greater desire than the faculty member to develop skills to make them more competitive in the challenging job market. More specifically, students believed that the experience would improve their curriculum development, writing, and teaching skills, among others. Traditional graduate student teaching experiences, such as serving as a teaching assistant, typically involve following professors’ predefined syllabi, lectures, pedagogies, and assignments. Graduate students recognized this limitation of their professional preparation and took advantage of the opportunity to develop a new course, including articulating learning goals, creating a course outline and content, and developing a variety of assessment tools. In a focus group, one student said:

“I am a PhD student and probably in the pipeline to be a professor. I think having experience with [this type of] curriculum development is important especially as a lot of teaching is going in a digital direction.”

Students also felt that co-designing the MOOC would provide the opportunity to learn about digital education and how to interact with online teaching platforms like Coursera.

Students planning to pursue careers with non-profit, business, or government organizations were motivated to co-design the MOOC to gain professional skills, including communication skills (e.g., learning how to contact and communicate with experts, conducting interviews, writing thank you notes). They believed that by working on a “real-world” project as a team, they would be able to develop their collaboration skills. Students were also motivated to work with a range of professionals. They expected these interactions to provide them with a window into future working life,

including learning how to play different team roles, and work with others in various roles. In a focus group, one student said:

“I think what motivated me was the job prospects and career goals that drove me. I’m interested in this work and online education, so the networking we had with professionals and then other people I’ve met through creating the MOOC has been motivating me to keep going and to continue to build these relationships.”

Students’ motive fulfillment

At the end of the semester, during the focus groups, students reported that participating in the creation of a MOOC was a professional experience that taught them how to (i) work well with an interdisciplinary team on real-world problems that did not have a prescribed solution, (ii) organize their time and schedule meetings, (iii) delegate roles, (iv) conduct professional interviews, and (v) write thank you notes to experts, among other skills:

“I think it was a great professional experience...working with a team, scheduling meetings, organizing who is doing what, meeting with professionals, conducting professional interviews, sending follow-up emails. All of those little things culminating together.”

“Looking at job postings...usually I’ll see education/outreach, some sort of visual aspect...so it’s really nice to get this real experience. Also, I really wanted to have real practical skills from grad school and not just learning things in class...”

Students also felt that they learned about the process of developing an online course, how learners interact with MOOCs, and about the topics covered in the MOOC.

When students were surveyed again, three months after the course had launched on Coursera, they had had time to reflect on the product they created. Students shared that they felt they had made an impact on society by producing real resources that were being used by learners from all over the world, fulfilling their goal of making climate adaptation and mitigation education more accessible. Further, having worked as summer interns or in full-time positions that summer, students reported that creating the course had been important for their professional development by teaching them tangible skills about curriculum design, working effectively in teams, meeting strict, frequent deadlines, participating in decision making within a hierarchical structure, and engaging in productive peer to peer interactions (e.g., receiving feedback, providing validation). They attributed these outcomes to the open seminar structure,

compared to a predefined course. In the follow-up survey, students wrote:

“My learning in this course helped me in my profession as an educator and continues to drive me to think differently about how to deliver content to students.”

“I have more confidence knowing that I can work through a large amount of edits in a short timeframe while collaborating with a team.”

Therefore, participating in the MOOC co-design process allowed students to meet their “growth needs” (Zhu et al., 2019) through developing competencies that they were then later able to use in their subsequent jobs.

Students’ satisfaction in the process compared to traditional academic experiences

When interviewed in focus groups immediately after the course ended, students found the project-based experience more satisfying than traditional classroom assignments. Students appreciated working with a range of professors and professionals at the university to create a product that required input from diverse disciplines. However, students particularly valued that producing a MOOC was more impactful than passively sitting in a classroom and listening to traditional lectures:

“It was nice to take a course in which I was producing something of worth, rather than taking all of these classes where I am reading and writing and taking exams.”

“So much of a class is just writing a paper, you aren’t pushing your own agenda, you are just following someone else’s syllabus and this [MOOC co-design experience] was instead showing your expertise by creating your own syllabus, creating your own path, working with the hiccups.”

At that point in time, however, students also expressed dissatisfaction. Some students, for example, thought that they were going to learn technical skills that would allow them to build the MOOC through the online platform. Instead, that aspect of the process was largely completed by staff in the university’s MOOC production unit because of concerns about editing privileges and security of the online platform.

While several students came to the project with real-world experiences in collaborative workspaces, most were continuing education students with limited work experience and

accustomed to traditional grade-driven courses in which work is completed and evaluated individually. These students found the group work challenging and unproductive, and were frustrated by “free-riding,” with workloads not shared equally. In the focus group, one student said:

“I personally found the group structure very problematic, I felt like we had a lot of trouble meeting deadlines and holding each other accountable, and there were a lot of tragedy of the commons situations where everybody would assume that somebody else was going to do something or would use it as an excuse not to do something, and I was really frustrated with that.”

At the same time, both their initial and follow-up survey responses also revealed that students discovered that learning how to work with others to produce course content was an important skill and believed this skill would help them in future professional endeavors. Further, in the initial survey, students reported higher confidence in their ability to solve environmental problems with others than by themselves.

In summary, the faculty member and students were pleased with the co-design experience overall because it provided a unique professional experience and had real-world implications for global efforts to mitigate and adapt to climate change. Both also expressed dissatisfaction including misalignment with initial expectations and subsequent realities as well as the consequences of time pressures.

Comparing the faculty member’s and students’ motivations

The faculty member and students held similar motivations for co-creating the MOOC. For example, both types of co-instructors sought to create a learner-centered MOOC to provide participants across the world with practical tools for taking actions to mitigate and adapt to climate change. The students, being younger and climate activists, may have been even more intrinsically motivated by this factor than the faculty member and were deeply committed to reducing jargon and ensuring accessibility to the course. The faculty member and students also sought to strengthen professional skills to advance or be more competitive to fulfill their “growth needs” (Zhu et al., 2019). The faculty member was driven by academic goals such as adapting to a changing higher education environment. The students sought to increase their chances of being hired by learning about digital education, believing that it made them more attractive to potential employers. Finally, the faculty member was driven by motivations not shared by the students, such as seeking to improve students’ content knowledge as well as to “divide and conquer” to create a quality MOOC more quickly than she could on her own.

Comparing the faculty member's and students' motive fulfillment and satisfaction

The faculty member and students reported that the majority of their motivations were fulfilled and, for the most part, felt satisfied with the co-design process and resulting MOOC. For example, the faculty member and students were able to fulfill their motives to create a learner-centered, socially impactful MOOC. While the faculty member anticipated that the co-design progress would be difficult, students entered the experience with more “rosy” perspectives. For many students, this was their first professional experience, and they struggled with the transition from traditional coursework with predetermined assessments and rubrics to an open, uncertain format that required extensive collaborations, including with a team of professionals. Because the faculty member's expectations were more in line with the actual experience of the co-design process, the faculty member's motivations were largely fulfilled and even exceeded, with the exception of students' course evaluations. On the other hand, while students acknowledged that the process helped them grow in a variety of ways, some expressed frustrations that they did not have the experience they expected. As such their experience was consistent with prior findings by MOOC instructors who were surprised by the many pedagogical and logistical challenges associated with MOOC creation (Zhu et al., 2018).

Addressing challenges when involving students in massive open online course co-design

Here, we contribute to the existing literature on instructor motivations to (co-)create MOOCs, by focusing on the experience of a faculty member and students with no prior MOOC or curriculum development experience in the co-design process. Although co-designing with students as partners has many benefits, such as producing a quality MOOC (Bressler et al., 2019) in a short period of time, students found the process challenging and would have appreciated additional support to prepare them for experiences that fell outside traditional academic instructional approaches. For example, students would have benefited from additional information that more explicitly explained what they should expect the process to be like, with more disclaimers and reminders that the process would be more challenging and unpredictable than typical courses. Students would also have benefited from additional individual meetings with the faculty member at several points during the semester to discuss their respective progress, greater accountability to minimize free-riding and hold them more accountable for individual and group contributions.

Limitations

This exploratory case study about the co-creation of the AoC MOOC through a SaP approach focused on learning about the motivations and motive fulfillment of the course's co-designers and co-developers. As with many other case studies, our research is limited by the singular nature of the particular case as well as by the sole faculty member and the small number of students who were part of this particular co-creation process. It is therefore not possible to generalize findings. Nonetheless, we are confident that our study will support other faculty members and students seeking to engage in similar learning experiences, given the dearth of relevant research and growing interest in co-creation. It is also important to once again indicate that all three authors were involved in the co-design process: as the faculty member, one of the students, and one of the learning experience designers. To help mitigate how this case study data were interpreted, the manuscript was written more than a year after the AoC MOOC had launched on Coursera, distancing the authors from the experience through time. The many iterations of this manuscript and thanks to the input from many outside reviewers, we believe we have mitigated as many concerns as possible associated with this limitation. For example, one reviewer noted that they were surprised financial motivations were not addressed, since MOOC revenues are often one of the reasons instructors develop these online courses. In this particular case, the co-instructors agreed early on that any revenue would be donated to a future student scholarship fund, which may explain why financial motivations were not mentioned by the study's participants.

Conclusion

MOOCs can benefit learners across the world, the faculty who create them and their institutions, and as we show, residential students by engaging them in the co-design and co-development process. Given higher education trends (Davidson, 2017), the co-design of learning experiences such as MOOCs offers an innovative pedagogy that institutions can encourage faculty to adopt, to help students achieve higher order learning goals. Such student-faculty partnerships are likely to result in enhanced, learner-focused MOOCs. In the case of AoC, for example, we attribute its positive learner evaluations largely to the fact that the MOOC was co-designed and co-developed with students. As introduced in the discussion section, Ferguson et al. (2015) offer a highly collaborative vision of the design process for future MOOCs. We argue that such collaborations should include faculty members, learning experience designers, media producers, animators, social media specialists, project managers, and importantly, residential students. The approach we describe offers one model such instructional teams could adopt to ensure faculty and student instructors' motivations for

the time consuming and difficult task of MOOC development are fulfilled. Our study also makes a valuable contribution to the limited research on why instructors choose to develop MOOCs, including by offering the unique perspective of student co-instructors. We offer insights into the extent instructors' motivations can be fulfilled through the model we implemented; one we know resulted in the successful completion of a quality MOOC. Future research will focus on how AoC MOOC learners perceive themselves to have benefited from the co-instructor model, one that is quite distinct from traditional MOOCs where a well-known university faculty member is the only "face" of the MOOC.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving human participants were reviewed and approved by the University of Michigan Institutional Review Boards. The patients/participants provided their written informed consent to participate in this study.

Author contributions

MZ developed the research questions and design of the case study. AB and RQ performed the qualitative data transcription, coding, and interpretation. AB drafted the manuscript. All authors commented on and heavily edited each version of the manuscript and read and approved the final manuscript.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/feduc.2022.1010018/full#supplementary-material>

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