Massive open online course adoption amongst newly graduated health care providers

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Abstract
Massive Open Online Courses (MOOCs) are flexible offerings that deliver content to a large audience in a virtual platform. MOOCs are increasingly accessed by health professionals to support their own professional development. Despite the agreed usefulness of MOOCs, the rates of adoption are still extremely low. This study sought to understand the personal and social factors associated with MOOC adoption. Participants were newly graduated occupational therapists who registered for a leadership skills development MOOC. Qualitative interviews were conducted to understand unique perspectives of participants who did and did not complete the MOOC. Data were analyzed using the Unified Theory of Acceptance and Use of Technology (UTAUT) framework. Participants reported they found the MOOC content beneficial in providing a foundational framework on which to develop their leadership skills. Even though MOOC content was organized into multiple small components, participants shared that they would engage with the material once a week for up to two hours. Participants reported a high level of comfort accessing the technology to complete the MOOC, however they reported that they would have preferred more interactive or synchronous learning opportunities. MOOCs are an efficient way to offer a wide variety of educational offerings to health professionals. Despite their asynchronous nature, MOOC developers should consider maximizing opportunities for learner interaction and content application learning opportunities within MOOCs to increase their overall adoption.

Keywords Massive open online course · MOOC adoption · Unified theory of Acceptance and Use of Technology · Online education · Health professional education
Massive Open Online Courses (MOOCs) are web-based educational courses that offer flexible ways to deliver content to a larger audience. MOOCs utilize didactic content videos and interactive features, such as quizzes, discussion boards and peer reviewed assignments, to improve participation and consolidate the content learned (edX, 2021; Mubarak et al., 2021). MOOCs differ from traditional online courses as they tend to be free, open sourced and learning is typically asynchronous, while online courses are restricted to learners who have paid tuition or course fees and offer synchronous periods of learning (University of Colorado, 2022). Despite the significant rise and enthusiasm for MOOC creation and offerings (Rowe et al., 2019) one of the most prominent problems with MOOCs is the high dropout rate (Ma & Lee, 2019; Mubarak et al., 2021), an issue that has not improved over the past six years (Reich & Ruípèrez-Valiente, 2019). Present literature highlights that MOOC completion rates typically average seven to ten% (Fu et al., 2021; Gütl et al., 2014) with completion rates rarely exceeding 25% (Jordan, 2015).

This paradigm has caused an influx of research on MOOCs, with over two thirds of this evidence base dedicated to understanding learner behaviour and MOOC adoption (Meet & Kala, 2021). Successful MOOC adoption has been linked to learners’ perceived usefulness and performance-to-cost value, while barriers have been identified as insufficient time, poor instruction, difficulty with subject matter, lack of internet accessibility and under challenging assignments (Gütl et al., 2014; Ma & Lee, 2019, 2020). Learner self-regulation has been identified as both an enabler and barrier to MOOC adoption, depending on the learner (Ma & Lee, 2019).

Specific to health professionals, educators have displayed great enthusiasm for MOOC development and there has been a rapid rise of continuing educational offerings targeted at health professionals (Longhini et al., 2021; Milligan & Littlejohn, 2016). MOOCs have been embraced as it is believed that MOOCs can empower health professionals with knowledge (Schütte et al., 2018). Despite the rise in offerings, the evidence on MOOCs for health professionals specifically is still quite limited and where it does exist, strong methodology has not been observed (Longhini et al., 2021; Rowe et al., 2019). Studies are reportedly predominantly prospective or review based, while there is a dearth of longitudinal studies measuring impact or effectiveness (Longhini et al., 2021).

Of the published evidence to date, there have been multiple theoretical frameworks and conceptual models embraced and applied (Longhini et al., 2021). One longer standing conceptual model is the Unified Theory of Acceptance and Use of Technology (UTAUT) which is understood to be a tool to help evaluate drivers of acceptance and adoption and aims to explain user behaviour (Venkatesh et al., 2003). The UTAUT is grounded in eight separate theories and models of user acceptance literature, which include “the theory of reasoned action, the technology acceptance model, the motivational model, the theory of planned behaviour, a model combining the theory acceptance model and the theory of planned behaviour, the model of PC utilization, the innovation diffusion theory, and the social cognitive theory” (Venkatesh et al., 2003). The UTAUT presents four unified key constructs of technology acceptance: performance expectancy, effort expectancy, social influence, and facilitating conditions (Venkatesh et al., 2003). Venkatesh et al.’s (2003) definition of these constructs are presented in Table 1.
While the UTAUT has been in circulation for almost two decades, it continues to be embraced by other researchers as an acceptable foundation on which to evaluate and understand MOOC adoption (Fianu et al., 2018; Mendoza et al., 2017). Additionally, the definitions of the four constructs within this model have been expanded as the evidence base has grown. As an example, Mendoza et al. (2017) expanded the construct of facilitating conditions to include preferred learning styles and language competencies.

With an appreciation that MOOC adoption is a concern for educators, an understanding that there is a lack of evidence on MOOC adoption for health care professionals, and armed with a well-established conceptual model, we were interested to understand the enablers and barriers to MOOC adoption amongst newly graduated occupational therapists. Specifically, this study sought to understand the personal and social factors associated with MOOC adoption for a leadership skill development course. While this study was targeted to one health care discipline we were keen to contribute to the literature on MOOC adoption for all health sciences education.

Leadership skills development MOOC

Despite our limited evidence base for MOOC effectiveness, there is an increasing level of acceptance that MOOCs can offer a vital method of education within public health emergencies (Longhini et al., 2021). Health care providers who graduated in 2020 were impacted by the COVID-19 pandemic. Specific to the occupational therapy profession, the 2020 graduates experienced a transition to online learning for their final academic semesters and many students were forced to complete their clinical internships in non-traditional approaches, such as virtual clinical experiences or project-based placements. As educators we have pondered if graduates had a fulsome opportunity to fully develop their leadership skills within this context.

To address a potential gap in competency development caused by the pandemic, in Fall 2020, we created and offered a Leadership Skills Development MOOC specifically targeted at newly graduated occupational therapists in Canada. This discipline specific four-week MOOC included topics on (1) What is leadership?, (2) What does leadership look like?, (3) What makes you a leader? and (4) What does leadership mean for a new grad? Each week presented two or three didactic recorded videos that were up to ten minutes in length. Each video had an associated assignment, which included quizzes, discussion boards, self-assessments, peer reviewed exercises and recorded video submissions. The course was designed with MOOC best practices in mind (Longhini et al., 2021) by creating online asynchronous learner to learner and learner to instructor interactions throughout the course. Additionally, the MOOC embraced Bloom’s Taxonomy as its pedagogical underpinning (Adams, 2015) in that the educational content sought to teach learners to comprehend concepts and theories, while the assignments pushed learners to apply, analyze, synthesis and create. All elements were designed with a typical MOOC offering in mind.

MOOC learners were recruited via email through the fourteen occupational therapy programs in Canada and the OT Students & Grads Canada Facebook group. Learners were informed at time of recruitment that successful completion of the MOOC would result in a Leadership Skills Development Certificate. During the four-week course, learners were
sent weekly reminders to watch their videos and complete their assignments. The instructor monitored the discussion forum and was available to answer questions via email.

In total, \( n = 104 \) learners registered for the Leadership Skills Development MOOC, with a completion rate of 55% (\( n = 57 \)), which was significantly higher than other MOOCs (Jordan, 2015). Learners were deemed to successfully complete the entire MOOC if they viewed all videos and completed all assignments. These MOOC registrants represented ideal potential participants for our study.

**Methods**

**Study design**

We employed a qualitative descriptive design in this study (Creswell, 2014) as we sought to gain a rich understanding of the learners’ experience with MOOC adoption. All learners who registered for the Leadership Skills Development MOOC were invited to participate in this research study via email. The email invitation came directly from members of the research team who were not the MOOC instructor in an attempt to limit coercion. Learners who had and had not completed the MOOC were equally recruited to participate in the study.

This study received REB approval from the University of Toronto with Protocol #39,558.

**Data collection**

Consenting participants engaged in an individual semi-structured interview over Zoom. All interviewers were members of the research team who were not the MOOC instructor. The semi-structured interview focused on understanding the participants’ personal perspectives of participating in the MOOC, the efficacy of the course content, views on if and how leadership skills were developed, impactful pedagogical course elements and areas of improvement for future delivery. Participants were provided a $25 Amazon gift card as a thank you for participating in the study. All interviews were recorded and an automated transcription within Microsoft Word was used. Transcribed data were managed using NVivo software (QSR International, 1999).

**Data analysis**

Once all of the interviews were complete, we embraced a deductive content analysis approach to data analysis (Cho & Lee, 2014; Creswell, 2014). Specifically, we used the key constructs of Unified Theory of Acceptance and Use of Technology (UTAUT) conceptual framework on which to inform our data coding: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) (Mendoza et al., 2017; Venkatesh et al., 2003). We began by reviewing other studies (Fianu et al., 2018; Mendoza et al., 2017) to further our understanding of how to apply this conceptual model. This led to the development of a preliminary codebook. One author began by coding two interviews using the four UTAUT themes and then the research team met to review the coding in detail. As a research team, we discussed the application of the coding until consensus was
reached. The codebook was updated to reflect these nuanced shifts in the coding approach. We also discussed if there was a need to engage in inductive coding, but it was agreed that the UTAUT themes captured the participant reflections sufficiently. Next the remaining interviews were coded using these four themes and informed by our consensus discussions. Lastly, we reviewed the data within each code, which was discussed as we sought to understand thematic patterns within each code. These themes were refined as we formulated our final conclusions (Nowell et al., 2017).

Throughout the study, and most specifically during the data collection and analysis stages, we discussed our own reflexivity in an attempt to control quality and understand how, as researchers, we were impacting the research conclusions (Berger, 2015). The two researchers responsible for data collection shared personal experiences of being MScOT students with the study participants as part of the consent process. This was thought to support the participants in feeling understood and comfortable sharing their own experiences. Additionally, the researcher who created and taught the MOOC regularly checked in with the other two members of the research team, especially around data analysis, to ensure that researcher biases were challenged and addressed.

**Results**

There were fourteen consenting participants in this study. All study participants were individuals who had completed an MScOT degree within the past six months and had registered for the *Leadership Skills Development* MOOC. Of the fourteen study participants, ten had successfully completed the MOOC and four had abandoned the course after initiating some of the learning material. The age range was 24–37 with the average age of 27 years old. In terms of gender, eleven participants identified as female, two as male and one as non-binary.

**Performance expectancy**

Performance expectancy highlights that users perceive that participating in a MOOC will improve their skills and job performance (Mendoza et al., 2017; Venkatesh et al., 2003). For the *Leadership Skills Development* MOOC, all study participants indicated that they registered for the course as they felt that it would lead to the development of their professional leadership skills. Many reflected that they perceived that leadership skills are an essential skill to possess, especially in health care and social services sectors. Additionally, a few participants highlighted that they were also interested in their own personal growth and development, not just solely professional skill development.

... another thing that motivated me to take this course was, I started a new job ... so I wanted to know how to advocate and use my leadership skills and bring forth that I’m the only OT on my team, so I wanted to know how to do that (Participant 9).

In general, participants were predominantly positive about their experience of participating in the MOOC; however, there were a few mixed reports on the impact of the MOOC on their leadership skill development. More specifically, many participants reported that they really enjoyed learning further about leadership, found the content engaging and that they
were able to apply the learnings to their new career. However other participants shared that they would have liked more information on exactly how to develop leadership skills and present themselves as leaders.

*Take on a leadership position, especially within my organization, ... to take that and to be able to actually kind of promote myself like I kind of climb the ladder. I liked that.* (Participant 10)

*To be perfectly honest with you like I thought, I don’t know what I expected really, but it seemed to be more just like learning about what leadership is, not as much skill building.* (Participant 3)

Despite these mixed views, many participants discussed a change in mindset over the course of the MOOC, and that the course helped them develop a view that they already possessed leadership skills and potential, despite being newly graduated occupational therapists.

*... just to have the mindset that we can make a really big impact even though you know we don’t have that title, I think. That is empowering in a lot of ways to know that you know it’s not like we’re lacking ... like a specific set of traits that someone needs to have to be a leader, but rather think all types of leaders are valued and it’s more just being in tune.* (Participant 12)

*Especially the manager versus leader lecture. I think that was really a good lecture to understand the difference between those two and understanding, like personally, I want to work more towards being a leader and not a manager in my future or so understanding those different roles* (Participant 14).

**Social influence**

Social influence is the construct that highlights that users adopt a MOOC when they perceive that others believe the MOOC will enhance their skills and build their network (Mendzoza et al., 2017; Venkatesh et al., 2003). Consistent with the findings that participants believed that the MOOC would develop their leadership skills, participants also highlighted that they believed that completing the MOOC would allow them to be more marketable as they sought employment. Participants indicated that receiving a certificate of completion was a strong motivator. Additionally, the fact that the course was being offered by a reputable university was a positive element.

Further to the social influence, participants reported that they were keen to register for the MOOC because they received a recruitment email from their own school or because other peers informed them that they were signing up to complete the MOOC.

Within the MOOC itself, participants shared that they really enjoyed listening to the interviews with occupational therapy leaders.

*My favorite part was the interviews. You know it was more tangible because you got to see leaders who are OTs who are in so many different fields. And I think it’s so important for people to see it to believe it.* (Participant 9)
Additionally, participants consistently shared that they felt most engaged in the assignments that had some level of interactivity with other learners. Specifically, most shared positive reflections about the assignment where they were asked to post a video of their leadership vision.

*I liked how there was the, you know, postings like in the forums, and I like how there was the video component at the end too. So, you can actually see people’s faces considering it’s all online. You know guest speakers, all of that kind of thing that really.* (Participant 6)

Furthermore, a few participants shared that they valued the assignment where they received feedback from a peer learner on their leadership plans for the future.

*You know, like the peer review stuff felt like I was able to engage a little bit with other people and material, which was nice.* (Participant 11)

However, it was very interesting to understand that most participants voiced a strong interest in having increased opportunities to interact with other learners. Specifically, they expressed interest in group assignments, panel discussions, more interviews, and more opportunities for peer-to-peer interaction. Even though MOOC’s traditionally do not offer significant levels of interaction and/or synchronous learning times (Reich & Ruipérez-Valiente, 2019), participants shared a consistent sentiment that they would have liked more opportunities to interact with the other individuals in the course.

*... if there were things where you are maybe participating with other people a little bit more like it might have been a little bit more engaging ... Where we’re talking to another person ... I felt it like a little bit more like engaging when kind of having a back and forth with someone else in the program* (Participant 1)

*I honestly find that I learn best when I’m in a setting where I am talking to other people at the same time and is more like a conversation. Back and forward rather than typing in the chat. ... I feel like if it was something that was like ... once every week and then you meet like certain cohorts or group and meet up. And actually, I don’t know even create like a project together like, I feel if there’s an end goal that is actually better.* (Participant 10)

**Effort expectancy**

Effort expectancy is understood to be the elements of skill, effort and time with adopting the MOOC (Mendoza et al., 2017; Venkatesh et al., 2003). In general, many study participants reflected that the MOOC was well organized and that they did not have issue with accessing the material nor completing the assignments. Participants who successfully completed the MOOC stated that the course was not excessively demanding in terms of effort or time. Participants who were not successful at completing the entire MOOC to receive a certificate cited time demands outside of the MOOC, such as a new baby, new job or studying for the national certification exam, as reasons for not completing the course.
Facilitating conditions

Facilitating conditions refer to the conditions that can lead to success or a barrier promoting MOOC adoption; including elements such as network connections or support from the workplace to engage in the MOOC (Mendoza et al., 2017; Venkatesh et al., 2003). Mendoza et al. (2017) built on Venkatesh et al.’s version of the UTAUT conceptual model to include learner variables, which refers to the learner’s preferred method of learning, and language competencies.

As above, a few participants related that the fact that the MOOC had no cost was an attractive element of the MOOC. Additionally, many participants reported that they found the weekly reminders helpful to remembering that they needed to complete their module for the week. Other participants reported that they found the structure flexible and that they did appreciate that there was time to catch up on the material if they fell behind one week.

Although the MOOC was segmented into short modules, that would allow learners to engage with the MOOC materials in brief periods of time over the week, participants predominantly reported viewing the videos and completing the assignments all at once, on a weekly basis. While participants did not reflect on any technological barriers to adopting the MOOC, there were two participants who indicated that they had issues recalling their log in password.

Specific to learner variables, study participants indicated that they really appreciated that the course was targeted to newly graduated occupational therapists.

"I feel like that’s definitely like a big gap between being a student and working is just, I think a lot of it is just the confidence and kind of getting our footing out with new professionals, so I think leadership is a good way to kind of approach that conversation." (Participant 11)

"Yeah, I think I I was intrigued to learn about how as a new grad you could be a leader because it seemed kind of almost contradictory." (Participant 12)

Lastly, one study participant disclosed that their first language is French, and therefore they used Google translate for a few assignments to facilitate MOOC adoption.

Discussion

This study sought to understand MOOC adoption perspectives from newly graduated occupational therapists in Canada. The Leadership Skills Development MOOC was offered in Fall 2020, with n=104 learners registering to take the course and resulting in 55% (n=57) of learners adopting the course requirements to completion. The participants in this study were representatives from both learner groups who had and had not successfully completed the MOOC. The study findings highlight participants registered for the Leadership Skills Development MOOC as they believed that is would develop their professional leadership skills and help them to be more marketable as a new grad. The participants were predominantly positive about the content and assignments within the MOOC, highlighting that they especially enjoyed the recorded interviews with leaders in their profession, discussion boards and opportunities to interact with peer learners.
Our findings are consistent with existing evidence on MOOC adoption. Specifically, Mendoza et al.’s findings highlighted that MOOC adoption is highest when participants are interested in “improving skills and deepening knowledge in specific areas” (Mendoza et al., 2017). Additionally, consistent with previous literature that identifies that learners are incentivized if the course has no cost and opt to enrolled in MOOCs to increase knowledge and skills and personal challenge (Hew & Cheung, 2014), our study also found that the “free” aspect and an opportunity to develop themselves personally were features that supported MOOC acceptance. Furthermore, other researchers have identified that MOOC adoption occurs when learners feel the learning is useful for career advancement (Ma & Lee, 2019; Shah & Khanna, 2021), which was reflected in our findings.

Since their inception, pedagogical leaders and researchers have advocated that MOOCs must create “real life context, encourage social interaction, provide hands-on activities, and encourage more student reflection” (Johnson & Aragon, 2003) and that MOOC developers and instructors must support learners in making connection with materials and their application (Bell, 2011). Discussion forums are viewed as an appropriate tool to allow learners to interact with other learners and the instructor (C. Zhang et al., 2018). Additionally, well designed quizzes can offer feedback to learners’ and assist them in navigating their learning (J. Zhang et al., 2021). Regardless of the specific techniques that are embraced, preliminary research supports that MOOCs can maximize effectiveness when grounded in sound pedagogical foundations (Longhini et al., 2021).

The Leadership Skills Development MOOC was developed with a strong pedagogical foundation and MOOC best practices for interaction in mind. Specifically, it offered multiple opportunities for connection, real world application and interaction, through discussion forums, quizzes, and peer feedback. Despite this approach, the most surprising finding in this study was that participants shared they would have preferred to have more interaction. This sentiment was shared by both participants who adopted the MOOC to completion and those who did not. A desire for group work, synchronous time with the instructor and other learners and more real-world opportunities for skill development was expressed. This finding leads to further quandary about how to maximize learner interaction and engagement, while still staying true to the foundations of a MOOC. Other researchers have attempted to tackle this line of inquiry by measuring MOOC social interaction through discussion forum posts. Their conclusions outline that instructors need to take initiative within the forum (Xu et al., 2021).

Evidence on MOOCs is diverse and rapidly expanding, but stronger methodological approaches and more evidence is required (Longhini et al., 2021; Meet & Kala, 2021). Despite the fact that MOOC adoption has been increasingly considered within the literature in the past six years (Reich & Ruipérez-Valiente, 2019), approaches to increase rates of MOOC adoption are still poorly understood and this has been identified as an emerging research agenda for educational scholars (Meet & Kala, 2021). It is acknowledged that MOOCs are not likely to replace higher education but are unlikely to become obsolete, despite low levels of adoption (Reich & Ruipérez-Valiente, 2019). Specific to health professional education MOOCs have been publicized as the future of learning (Milligan & Littlejohn, 2016), however MOOC developers must be cautious, as further evidence is required (Rowe et al., 2019).

The Leadership Skills Development MOOC found a significantly higher than typical rate for MOOC completion (Jordan, 2015). We could hypothesize that this high rate of adoption
was due to the niche nature of this targeted educational offering and the appropriate “just in time” education. Additionally, this MOOC was offered in the time of a pandemic, which could have impacted rates of adoption observed. Newly graduated health professionals may have had more time to participate in continuing educational offers due to lock down protocols or may have been increasingly interested in the topic of leadership due to the present volatile nature of health and social services.

Limitations

The participants in this study were individuals who self-selected to participate in an individual interview after they had registered for the *Leadership Skills Development* MOOC. While attempts were made to have a balance of perspective from both learners who had and had not adopted, more interest was expressed from adopters. Therefore, the findings in this study could be more biased towards the views of learners who are more likely to be prone to adopting a MOOC than those who struggled to adopt. The study participants predominately identified as females, which may have skewed the results. Additionally, we used an automated transcription approach to the data. This may have caused minor errors in the sentiments expressed by the participants when data analysis was completed. Our analysis used a deductive content analysis approach, and an inductive analysis may have led to different conclusions. Lastly, the MOOC and interviews were all conducted in English. This may have biased MOOC registration and this study in that newly graduated health professionals who have French as their first language may not have felt comfortable participating in either.

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**Table 1 – Unified Theory of Acceptance and Use of Technology construct definition**

| Construct               | Definition                                                                                                                                 |
|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| Performance Expectancy  | Performance expectancy is defined as the degree to which an individual believes that using the system will help him or her to attain gains in job performance. The five constructs from the different models that pertain to performance expectancy are perceived usefulness, extrinsic motivation, job-fit, relative advantage, and outcome expectations. |
| Effort Expectancy       | Effort expectancy is defined as the degree of ease associated with the use of the system. Three constructs from the existing models capture the concept of effort expectancy: perceived ease of use, complexity, and ease of use. |
| Social Influence        | Social influence is defined as the degree to which an Individual perceives that important others believe he or she should use the new system. Social influence as a direct determinant of behavioral intention is represented as subjective norm, social factors, and image. |
| Facilitating Conditions | Facilitating conditions are defined as the degree to which an individual believes that an organizational and technical infrastructure exists to support use of the system. This definition captures concepts embodied by three different constructs: perceived behavioral control, facilitating conditions, and compatibility. |

(Venkatesh et al., 2003)
Conclusions

Our study sought to identify the personal and social factors associated with MOOC adoption amongst newly graduated health professionals. Study participants reported they found the MOOC content beneficial in providing a foundational framework on which to develop their professional skills. Even though MOOC content was organized into multiple small components, participants shared that they would engage with the material once a week for up to two hours. Participants reported a high level of comfort accessing the technology to complete the MOOC, however they reported that they would have preferred more interactive learning opportunities. MOOCs are an efficient way to offer a wide variety of educational offerings to health professionals. Despite their asynchronous nature, MOOC developers should consider maximizing opportunities for learner interaction and content application learning opportunities within MOOCs to increase their overall adoption.

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