Educators as creators: lessons from a mechanical MOOC on educational dialogue for local facilitators

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ABSTRACT
This paper explores possible affordances of technology and online professional learning to develop and support communities of practice in which educational practitioners develop, share and build on one another’s reflections and learning. Evidence is presented from a design-based research study that iteratively designed and developed a mechanical MOOC on educational dialogue for local facilitators. Local facilitators are practitioners who take on a leadership role whereby they coordinate and support peers in their setting in developing their dialogic practices. The research employs mixed methods for collection and analysis of data from course participants, exploring the successes and challenges of online professional development courses within 10 thematic areas. Design principles are offered for each of these 10 themes for scalable and sustainable online professional learning programmes that promote practitioner reflection, agency and empowerment, and view educators as valuable creators and contributors to professional learning resources and environments.

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Introduction

Educational dialogue involves co-constructing knowledge where learners build on each other’s dialogue and ideas through posing open questions, reasoning, justifying and critically evaluating (Alexander 2008). This allows learners to understand from seeing others’ points of view and fosters collaborative learning. A growing body of international research has emerged over the last five decades that indicates dialogic methods in the classroom lead to improved performance in learners’ content knowledge, text comprehension, and reasoning capabilities (Clarke et al. 2016). Furthermore, evidence indicates that dialogic teaching can increase learners’ capacity for dialogue and reflective thought as well as develop subject-specific knowledge (Alexander et al. 2017; Howe et al. 2019) and critical reasoning skills (Mercer 2008; Wegerif, Mercer, and Dawes 1999). Compelling evidence about the impact of teacher-led dialogue has also recently been produced by a team at the University of Cambridge. Data from detailed analyses of 144 lessons by 72 teachers in 48 English primary schools demonstrated the strong link between features of
whole-class dialogue and student learning and positive attitudes to school (Howe et al. 2019). The research importantly concluded that ‘developing a supportive classroom ethos, with active participation ideally supported by agreed ground rules, provides the foundation for dialogue to flourish’. In classrooms where ideas were frequently elaborated and queried/challenged under these conditions, some significant student learning gains occurred.

Teacher professional development (TPD) programmes offer an opportunity to strengthen the quality of teaching and through this, the educational outcomes of learners (Hattie 2009). TPD programmes can therefore be an effective avenue to support teachers to develop dialogic approaches in their classroom practices. The format of TPD, however, deserves consideration and the role of technology mediation and online learning for the provision of TPD stands to be better understood. This study is based on the premise that technology presents new affordances and potential benefits to professional learning, including wider access, opportunities for reflection, and more effective collaboration (Dille and Røkenes 2021). As a result there is considerable urgency with respect to the current context of COVID-19 where a significant amount of professional learning has pivoted to be online, to better understand the ways in which technology can be leveraged to develop effective TPD regarding educational dialogue and supportive practitioner communities.

Massive Open Online Courses (MOOCs) are one such opportunity for online professional development for teachers that offer open access and collaboration between an unlimited number of practitioners internationally. They are the subject of heated debate in educational research, presenting many potential benefits alongside significant challenges and barriers in practice. To understand the main concerns regarding MOOCs, it is important to differentiate between the two dominant conceptualisations: extended MOOCs (xMOOCs) and connectivist MOOCs (cMOOCs). xMOOCs often closely resemble traditional courses where there is a pre-formed syllabus, recorded lectures by the instructor who is the expert that ‘provides’ the knowledge, quizzes or tests to be self-administered by the participant, and often limited opportunities for communication with other students. These are the more common type of MOOC, offered via the more recognisable MOOC platforms such as Coursera, edX, and Udacity. cMOOCs offer a much different approach and were the original conceived form of MOOC by Downes and Siemens who intended to create an entirely new network-based pedagogy that Downes (2008) defined as connectivism. cMOOCs are based on this pedagogy, which theorises that learning consists of constructing and navigating through networks of connections (Downes 2008). In practice, however, MOOCs (particularly xMOOCs) have been met with considerable criticism for not meeting their purported objectives. The literature presents a number of potential challenges that require consideration: (i) The new digital literacies needed, varied prior experiences with technology, and a lack of technical support in gaining the necessary digital skills (Major et al. 2018). (ii) Infrastructure constraints and unequal access to technology, particularly in low-resource contexts (Haßler, Hennessy, and Hofmann 2018). (iii) Challenges regarding the translation and localisation of materials, with pre-determined and inflexible content that is not localised for users (Knox 2013; MacDonald 2008; Major et al. 2018; Partridge, Ponting, and McCay 2011).

In response to this, mechanical MOOCs, although more closely aligned with connectivism, offer a different model to both their cMOOC and xMOOC counterparts. A bespoke separate platform is built for each course with the use of open source software
and it is conceptualised as a community home base for learning. The model uses constructionism as its conceptual framework, which builds on Jean Piaget’s epistemological theory of constructivism and advocates for student-centred, discovery learning where students use information they already know to acquire more knowledge. For example, Seymour Papert’s constructivist theories of psychology take a view of learning as a reconstruction rather than a transmission of knowledge. This suggests that learning is most effective when learners are tasked with activities that involve constructing a meaningful product or artefact.

The focus for this paper is specifically on using technology to create and support practitioner communities of practice through designing TPD for local facilitators of these communities. Local facilitators are practitioners who take on a leadership role to coordinate and support colleagues in developing their dialogic practices. They facilitate local communities of practice within their own settings, while simultaneously engaging in and building their own through online TPD. The research reported here builds on recent research conducted by the Teacher Scheme for Educational Dialogue Analysis (T-SEDA)\(^1\) collective on the critical role of the local facilitator (Hennessy et al. 2021). Offering a course for local facilitators serves to strengthen the scalability and sustainability of impact based on the evidence from Hennessy et al. (2021), which indicates that facilitators help to establish and support learning communities in their own institutions where they: (i) set their own contextualised accountability mechanisms with the teachers they convene, (ii) are well placed to translate resources based on the needs of their colleagues and their context, (iii) can help to embed dialogic pedagogy in the school culture through increasing teacher buy-in, and (iv) effectively bridge the gap between research and practice.

This paper asks how a mechanical MOOC on educational dialogue can afford new, sustainable and scalable opportunities for local facilitators and practitioners to collaborate, reflect together, support one another and share their learning and practice. Drawing on the findings from three related course trials, 10 design principles are offered in the discussion section for scalable and sustainable online professional development course models and communities of practice that promote practitioner reflection, agency and empowerment, and that view educators as valuable creators and contributors to professional learning resources.

**Materials and methods**

To address the research questions, this paper draws on the evidence from a design-based research study that iteratively developed and tested a mechanical MOOC on educational dialogue for local facilitators entitled ‘Educational dialogue: Supporting your colleagues through facilitation’.\(^2\) The MOOC was developed using open source software and offers 6 weeks of sub-modules for local facilitators to complete either during one of the live offerings or at their own pace. The same structure is offered for each sub-module of the MOOC: an introduction to the week at the top of the page, a ‘thematic focus’ section with video content that reviews the sub-module’s theme and weekly objectives, relevant readings and resources, activities to complete, and a discussion topic for the week for participants to contribute to on the forum. The discussion forum is accessible via another website, edudialogue.org, which was designed in part for this study and
which offers additional resources and tools for practitioners interested in applying dialogic approaches in their teaching.

As noted above, the content, resources and activities of the MOOC draw on the materials and learning from T-SEDA, a resource pack that provides practical guidance and customisable templates for practitioners to systematically analyse the use of dialogue in their settings, reflecting on their own and their peers’ practices. In recent research by the T-SEDA collective, it was found that local facilitators offer a critical pathway to the sustainability of impact. The MOOC builds on this learning in its development of targeted resources and spaces for collaboration and reflection between local facilitators. It also draws on T-SEDA’s approach of reflective inquiry, which can and should be differentiated from conventional teacher professional development. Inquiry-based learning is practitioner-centred and practitioner-led. It offers sustainability through its cyclical learning activities, whereby the exploration of a question leads to the generation of new ideas and further questions to explore.

Data for this paper are derived from: (i) the first two live trials of the MOOC; (ii) the MOOC taken as a self-paced module (i.e. available data from outside of the live cohorts); and (iii) a pilot study involving an online Practitioner Professional Development (PPD) course run through the Faculty of Education at the University of Cambridge. The two live MOOC cohorts ran for 6 weeks each, the first in February–March 2021, and the second in October–November 2021. The course was available as a self-paced module between March and October 2021 and following the completion of the second live trial, all materials will remain on the site as a self-paced series until the next live cohort. The PPD course that this paper draws on was run from October 2020–January 2021 and was used as an opportunity to launch digital materials and activities and test the discussion forum structure.

The study uses design-based research (DBR), a research methodology that iteratively develops and trials theory-informed interventions to address problems of practice to improve learning (Bakker 2018). DBR was selected in order to address the complexity of the study and the need for multiple iterations and sources of data. In addition, the cycles of designing, trialling and refining activities were well suited to this study and conceptually align with mechanical MOOCs via building communities of practice through participatory design. T-SEDA exemplifies this through designing the resources to support practitioners to adapt their dialogic approaches (Hennessy et al. 2021), on which the MOOC seeks to build, and using feedback to improve the resources.

The research collected and analysed mixed-methods data from participants, including: (i) MOOC website analytics, collected from all site users between February-November 2021 (377 unique users) and analysed using descriptive statistics and heat maps of website traffic to explore user behaviour. In both MOOC trials and the PPD course, additional data sources included (ii) a pre-course questionnaire (n = 63) and post-course questionnaire (n = 26), (iii) discussion forum contributions (185 posts from 25 participants in three separate forums for each trial), and (iv) key informant interviews with course participants (n = 12).

The pre-course questionnaires included items regarding participants’ demographic data, their prior experiences with the use of technology for their professional learning, and their familiarity with educational dialogue. The post-course questionnaires sought information regarding participants’ experiences in the course, key successes and barriers
for their participation, and the impact of the course on their practice. The PPD course and the first trial of the MOOC included participants who were not local facilitators, however they were included in the data collection as part of a wider study to test the structure and content for future courses. Their insights were particularly valuable because these participants are well-positioned to eventually become local facilitators therefore making the data collection an important avenue for capturing their perspectives while also mobilising interest in the MOOC. A self-audit was included in the questionnaires for these non-facilitator participants in order to capture changes in practice following the completion of the course in which they conducted a reflective inquiry into their practice. All questionnaire responses were analysed using descriptive statistics and triangulated with the other data sources to explore participant demographics, their behavioural and cognitive engagement in the course, and recommendations for course improvement.

Discussion forum contributions comprised original contributions from participants, their responses to others’ posts, and their ‘likes’ of posts. These were analysed using frequency counting and thematically using constant comparison methods. Key informant interviews with participants were conducted to ascertain further usage, engagement and impact data and were again analysed thematically using constant comparison methods. This was inductive, exploring the data for patterns, themes and categories and deriving codes from the data rather than having a predetermined set (Guest, MacQueen, and Namey 2012; Hilliard 2013; Teddlie and Tashakkori 2009). Triangulation was performed between the different data sources through cross-examining themes between data sources and exploring connections and contradictions.

Findings

Course participation

The PPD course had 15 participants, all of whom were educational practitioners of some kind, working at school or higher education level. Demographic and engagement data from the PPD course were analysed for this study to form user profiles, which informed the design of the MOOC. These analyses focused on prior experiences with technology, perceptions of the use of technology for professional learning, and engagement in

| Participant information from the PPD course | % Participants (n = 15) |
|-------------------------------------------|------------------------|
| Gender | Female | 60% |
|       | Male   | 40% |
| Age   | 25 or younger | 7% |
|       | 26–35 | 40% |
|       | 36–45 | 20% |
|       | 46–55 | 20% |
|       | 56–65 | 7% |
|       | 66 and older | 7% |
| Role  | Primary/elementary teacher | 33% |
|       | Secondary/A-level teacher | 40% |
|       | Higher education lecturer | 27% |
| Prior experience with online professional learning | Yes | 46% |
|       | No | 54% |
The first trial of the mechanical MOOC in February/March 2021 had 39 registered participants, 6 of whom completed all course requirements and were issued Certificates of Completion. The second trial in October/November 2021 had 28 participants register through completing the pre-course survey and at the time of writing, 6 participants had completed the course requirements and will gain certificates. Because the surveys were not mandatory to complete in order to access the materials, it is difficult to ascertain whether there were other users who engaged in and completed the course materials, without their data being collected. Indeed, the MOOC user analytics suggest that significantly more new users (over 300 unique users) accessed the weekly materials than those who completed registrations. In addition, there were examples of course participants who were actively engaged in the discussion forum and live events and yet did not submit their final learning products in time to receive a certificate. One of these participants was interviewed in order to capture their perspective and the impact of the course on their practice despite not having fulfilled the formal obligations to receive certification. Their insights offer an important perspective for the design principles of the course. It will also be important, however, for future research to engage with the experience of the ‘inactive’ participant and the impact of the course on their practice in further detail.

The pre-course registration questionnaires for the MOOC showed that participants came from a range of backgrounds and had different motivations for taking the MOOC. These include developing skills for facilitation (referenced by 75% of participants), gaining a deeper understanding of educational dialogue and applying more theory into their practice (46%), obtaining certification and participating in continuing professional development more generally (17%), networking and engaging with other professionals (21%), and an interest in exploring a mechanical MOOC (17%). All participants who completed the course cited gaining a deeper understanding of educational dialogue as a motivation for them taking the course. Participant demographics from the MOOC are presented in Table 2.

Most participants were female (57%) and between the ages of 26 and 35 (38%). Participants were based in many different countries globally and were educators at different levels (ECE, primary/elementary, secondary/A-level, higher education) and the subjects they taught ranged considerably although there appeared to be a considerable number of mathematics and science teachers (approximately 50% of participants). Most (46%) reported that they had taken a MOOC before, including one for their professional development although a considerable number of participants had not taken a MOOC and were unfamiliar with them (21%). The participants who completed the course requirements all had taken a MOOC before, including one for their professional development.

The materials were also available as a self-paced module in between the two MOOC trials, however user site analytics suggest mild traffic that engaged with the course sub-modules and even lower traffic that indicates transitions from one sub-module to the next (i.e. participants moving through the sub-modules in order). There were limited posts on the discussion forum (five posts from five participants) reserved for self-paced participants, however six participants completed the registration form in the Week 1 materials. The form responses showed similar variation in participants’ levels
and subjects of teaching, their prior experiences with MOOCs, as well as their geographical location, as in the PPD course and live MOOC cohort, as shown in Table 3. None of the respondents shared their gender on the questionnaire.

They described their motivations for taking the course as developing skills for facilitation (referenced by 50% of participants), gaining a deeper understanding of educational dialogue and applying more theory into their practice (33%), and obtaining certification and participating in continuing professional development more generally (67%). Regardless of the desire to obtain a certificate, no participants who selected this as their motivation for taking the course received certificates of completion from either the self-paced version or the live cohort.

One of the core findings in the study was the importance of collecting and documenting information regarding participants’ demographics and prior experiences with technology and educational dialogue in order to ensure that the structure and materials were relevant (see Design Principles 6 and 7). Analysis regarding relevance was conducted using all data sources following each trial of the course in order to capitalise on the intervention cycles, using findings to make adjustments to the course structure and materials.

| Table 2. Participant information from the MOOC (trial 2). |
|----------------------------------------------------------|
| % Participants (n = 24)                                   |
| Gender                                                   |
| Female                                                   | 57% |
| Male                                                     | 43% |
| Age                                                      |
| 25 or younger                                            | 4%  |
| 26–35                                                    | 38% |
| 36–45                                                    | 17% |
| 46–55                                                    | 21% |
| 56–65                                                    | 4%  |
| 66 and older                                              | 13% |
| Role                                                     |
| Primary/elementary teacher                                | 17% |
| Secondary/A-level teacher                                 | 17% |
| Higher education teacher                                  | 33% |
| Researcher                                                | 29% |
| Geographical location                                    |
| Africa                                                   | 25% |
| East Asia and the Pacific                                | 13% |
| Europe and Central Asia                                  | 42% |
| Middle East                                              | 13% |
| North America                                            | 4%  |
| South Asia                                               | 4%  |
| Prior experience with MOOCs                              |
| Taken a MOOC, including one for professional development | 46% |
| Taken a MOOC, but unrelated to profession                | 4%  |
| Not taken a MOOC previously but familiar with them       | 29% |
| Not taken a MOOC before and not familiar with them       | 21% |

| Table 3. Participant information from the self-paced version of the MOOC. |
|--------------------------------------------------------------------------|
| % Participants (n = 6)                                                   |
| Role                                                                     |
| Primary/elementary teacher                                               | 33% |
| Secondary/A-level teacher                                                | 50% |
| Higher education teacher                                                 | 17% |
| Geographical location                                                    |
| Africa                                                                   | 67% |
| Europe & Central Asia                                                   | 33% |
| Prior experience with MOOCs                                              |
| Not taken a MOOC previously but familiar with them                      | 50% |
| Not taken a MOOC before and not familiar with them                       | 50% |
Course engagement

Across the three trials, participants engaged in the courses in different ways, which were analysed using all available data sources. The analysis of course engagement data resulted in 10 themes which emerged as important findings and areas for consideration regarding the course structure, materials and conceptual framework. These themes are accompanied by 10 associated design principles which are presented in the following discussion section.

**Theme 1. Motivation and accountability**

The reliance on learner self-motivation to consistently engage in the course materials each week was a challenge throughout all trials. Integrated accountability mechanisms that were considered particularly successful by participants in the post-course questionnaires and interviews were the weekly emails and personalised check-ins, as well as the development of internal learning communities, although this took place at a micro level because of the small size of the cohorts. MOOC site analytics indicate a significantly higher volume of traffic and clicks on all elements of the course during live trials than during the self-paced period. Participants mentioned via questionnaires and interviews that the live cohorts provided them with momentum in completing course components. Success was linked with the course facilitator providing ad hoc support and adjusting the weekly resources and tools based on their unique needs for strengthening retention through establishing a relationship with the participants. Participants in the trials who shared their learning with others also noted this as contributing to their momentum: ‘Knowing that posts were read carefully and responded to thoughtfully meant that I invested more time in clarifying my thinking before submitting’ (Participant, MOOC trial 1).

**Theme 2. Flexibility and structure**

Balancing flexibility and structure emerged as a critical component of the course design and materials. Participants acknowledged that the flexibility whereby they could access a ladder of support where needed (e.g. through additional reading materials and links, the discussion forum, joining the live events like the virtual co-working spaces, via email with the course facilitator) equipped them to apply the learning from the course to their own setting. There was also a balance of flexibility and structure within accountability structures where participants were able to set their own timescales over the weekly sub-modules but maintain momentum through the 6-week cohorts. Balancing structure and flexibility also related to the course materials and resources. In the initial course design, activities and templates were left relatively unstructured to invite participants to dictate the shape depending on their contexts. However, while half of the survey respondents said that they preferred the unstructured template, the other half wanted something significantly more structured. This tension resulted in the development of a semi-structured toolkit in the second trial with open-ended questioning so that the learning outputs could be unique to individual settings. These structured yet customisable tools and resources were pivotal in stimulating and supporting the development of the participants’ facilitation plans, and they were cited as a key strength of the course by participants from varied geographies and contexts.
Theme 3. Dialogue and collaboration amongst course peers

Participants in all trials noted a strong desire to collaborate and communicate with their course peers, connecting practices across geographies and different contexts. A common response to the post-course survey for all trials was a request for more opportunities for collaboration between course peers. Yet, there remained much to be desired from the engagement in the communication and collaborative features by participants, particularly regarding spontaneous dialogue. Communication channels for the course included the discussion forum, live events such as coding tutorials and virtual coworking spaces, and personalised communications with the course facilitator. The forum was used at different levels of intensity between the different courses; however, there was limited use of the forum overall with particularly low use for spontaneous dialogue. Most posts were in response to questions posed by the course facilitator. Yet for those participants that used the forum, they felt that their contributions were useful to their overall learning in the course through the use of questions posed by the course facilitator related to the weekly thematic foci. This was articulated by one participant as follows:

I like how each week there was an expectation of what I should post on the forum but also how I felt I was also able to stray ‘off-topic’ if needed. I enjoyed reading posts from other participants to learn from their experience and hear about their projects. (Participant, MOOC trial 1)

A participant from the PPD course agreed that the discussion forum acted as an avenue for exchange: ‘It was the “place” where I most exchanged with my classmates and that was enriching’ (Participant, PPD course). Participants who disagreed that the forum was helpful to their learning shared that they did not spend a lot of time engaging with it and when exploring the post records, had not posted at all. Despite the poor use of the forum, areas of success included having both synchronous and asynchronous modes of communication available between course participants and between participants and the course facilitator, accommodating different preferences, as well as having these communication tools and activities articulated explicitly as part of the course. Explicit inclusion in the course also enabled the systematic monitoring of their successes and challenges to be more streamlined.

Theme 4. Practitioners as reflective professionals

Reflective activities for participants were considered a key success of the course by participants, who noted that their opportunity to reflect via the course activities and tools had significant impact on their practice. This in large part drew on the conceptual framework of T-SEDA, in which reflective inquiry is central, but also emerged independently of explicit reflective activities, suggesting that the practitioners were able to use the course materials to develop their own methods of active reflection. Examples included the uses of the self-audit tool and discussion forum. The self-audit was designed as a tool for the non-facilitator participants to monitor changes in dialogic practice through asking practitioners the same questions before and after they complete a reflective inquiry. It is also a tool that the local facilitators were encouraged to use with the colleagues they were facilitating. Results indicated that it offered a reflective activity in itself because many participants rated themselves as using fewer forms of dialogic teaching after taking the course; upon being asked to compare their own pre- and post-course self-audits, participants


speculated that through the course they had become more aware of what dialogic teaching was and that their earlier understandings had been more superficial. The discussion forum emerged as another space for reflection. It offered different channels for discussing each week’s theme for both the PPD course and the MOOC. Questions were posed to the group for participants to address in their posts, however several participants at the end of the course who were significant contributors to the forum noted an additional benefit, that their posts served as reflective journaling: ‘It helped me reflect regularly of the new notions I had learned or papers I had read, probably more in depth that I would have on my reflective journal as there was interaction with the others’ (Participant, PPD course).

**Theme 5. Practitioners as creators**

Participants in all trials of the course shared their need for accessing contextualised resources specific to their settings. They felt that the course would benefit from a dedicated resource bank providing a range of subject- and age-specific resources for them to draw and – importantly – build on. As part of the course requirements to receive a certificate of completion, participants were asked to develop an artefact; for local facilitators this was a comprehensive facilitation plan that addressed each of the weekly themes and considerations (e.g. how they gain teacher buy-in, how they will support teachers throughout the reflective inquiry process, etc.), and for non-facilitator participants this was a completed reflective inquiry. These completed learning products, with participant permission, acted as new resources for the next trial. As the course continues to run, more artefacts will be added to this resource base where new participants can build on them and share their own learning products. Participants noted that creating research projects and products impacted their practice, which many continued to lead themselves following the end of the course. For example, ‘this course has prompted a joint project between myself and my course director and I feel that I will be able to contribute to make an impact on our course going forward’ (Participant, MOOC trial 1).

**Theme 6. The role of the participant in shaping the learning environment**

Success was seen in collaborating with participants in all phases of the research; during the pilot phase, the design of the course, the live cohorts, and during and after each subsequent trial. It was also critical for the research to capture the continued experiences from prior participants in order to document the intended and catalytic impact of the course. This data was used to inform further iterations of the course structure and materials and the course continues to be informed by participants’ data. Collaboration was also used to direct the content of live events, where the focus was decided in conversation with participants and weekly materials were adapted by the course facilitator where needed. This enhanced accountability through creating highly relevant materials based on participants’ goals for the course (see Design Principles 1 and 6).

**Theme 7. Accessibility**

The concept of accessibility presented in this theme encompasses a range of constraints felt by participants in participating in and completing the course: (i) participants with disabilities, (ii) varied prior experiences with technology, (iii) varied levels of familiarity with concepts related to educational dialogue, and (iv) issues regarding available
infrastructure and internet connectivity. This was primarily analysed through data from the pre-course questionnaire, key informant interviews, and user testing by a participant with a disability. The data informed the design of the MOOC platform and led to the development of a user guide for the course and detailed guidance regarding the use of the online course components. It was also considered necessary to have a highly simplified and easy-to-navigate platform, which resulted in the removal of peripheral information, having the same predictable and streamlined format for each weekly sub-module, and ensuring that site analytics were monitored to make changes as required. Course participants had varied levels of familiarity with educational dialogue, which necessitated a ladder of support from the course facilitator. This demanded significant ad hoc support in the live cohorts, however this will be scaled back following the launch of two other courses that will serve as foundational for the local facilitator’s course. Accessibility also included constraints associated with available infrastructure, including poor internet connectivity. While this course was not specifically designed for individuals who do not have access to reliable internet connectivity and infrastructure to participate, the research necessarily sought to explore the extent to which this course is inclusive. To address this, a case study is currently in development regarding a group of teachers from Sierra Leone, for whom a bespoke version of the course and toolkit is being developed and trialled, including offline versions of activities and tools. This will be reported in future.

**Theme 8. Conceptual framework of the course**

This course was never designed or run as a ‘training’, but rather it intends to be inquiry-based and an opportunity for reflective learning within a community of practitioners. A key component of the mechanical MOOC model and the use of the T-SEDA inquiry framework was therefore to rework the idea of traditional professional development. The conceptual framework of the course design is integral to sustainability and scalability of impact, but participants also noted that this framework was presented in a way that allowed them to enact it in their own practice as local facilitators. The practical outworking of this meant that they were able to reflect more deeply, individually and with their colleagues, on their practice and how they are best placed to research this.

**Theme 9. Sustainability and scalability**

Sustainability and scalability were central considerations for the course from the outset of the study, integrating associated questions in all data collection tools. Many of the prior themes mentioned in this section contribute to the potential sustainability and scalability of the course (e.g. ensuring that there are integrated accountability mechanisms, having flexible yet structured activities and tools, offering opportunities for meaningful dialogue, etc.), however the data suggest that this will take a considerable amount of time as it directly relates to establishing a community of practice in tandem with running the course and attracting more participants. The strongest related finding is the integral need for a course facilitator as participants were (mostly) unable to direct the learning themselves, although they showed considerable interest in doing so in future and in directing learning in their own contexts. This is an area in which upcoming research will engage in greater depth in order to better understand ways in which scaling back support can be systematised.
Theme 10. Monitoring and evaluation
Monitoring and evaluation was a significant component of the course design in order to ensure that appropriate methods were in place to capture detailed and relevant information that address the research questions. This included systematic feedback from participants, which informed adaptations to the course, and which recognises the participants as reflective professionals. These systematic feedback loops and detailed user experiences and engagement resulted in an efficient system of leveraging learning for new iterations of the course.

Discussion
Drawing on the above thematic findings, 10 design principles have been drafted for scalable and sustainable online professional development programmes for local facilitators that promote practitioner reflection, agency and empowerment, and view educators as valuable creators and contributors to professional learning resources and environments. Design principles offer guidance and key considerations regarding areas of success and challenges to inform future iterations of the current course, as well as other similar courses, noting of course that no two courses are identical, and that adaptation is key (Bakker 2018). The design principles use van den Akker’s (1999) format through offering characteristics and procedures for the course in order to design an online professional development intervention for the purpose of building and sustaining educator communities of practice globally in which teachers are considered and used as reflective creators.

These design principles directly relate to each of the 10 themes that emerged from the data regarding the ways in which participants engaged in the course structure, materials and conceptual framework. Each design principle provides key characteristics that courses should incorporate, the processes by which these characteristics can be incorporated, and the evidence that supports this. It is noteworthy that while these design principles are based on the evidence provided by the two trials of the MOOC and the PPD course pilot study, they will continue to be refined over the next year of research. Note also that these design principles have been developed specifically for courses designed for local facilitators, however they can also be considered during the development of other similar courses. Indeed, they have been used to inform the design of two new mechanical MOOCs that are currently in development for educators who are not local facilitators, but who are practitioners interested in learning more about educational dialogue. These courses are set to launch in early 2022, and there will be associated research to build on the following design principles.

Design Principle 1. Integrate accountability mechanisms in the design of the course
There is a clear need for integrated accountability mechanisms in the design of the course for participants to consistently engage in and complete the materials. While the data for this course and the literature more widely (e.g. see Rodriguez, Armellini, and Nieto 2020) shows that retention continues to be a significant challenge for MOOCs, the learning communities afforded by the mechanical MOOC model should be leveraged for
courses with a growing number of participants. This model acts as a community hub in which learning communities can be easily derived and scaled as an explicit part of the course. The data from this course also suggest that accountability can be enhanced through offering a mixture of live and self-paced options, offering meaningful opportunities for participants to interact and collaborate (see Design Principle 3), and establishing a relationship with participants, which aids in successfully implementing all design principles. For their course, Lay et al. (2020) similarly found that the measures they put in place to get to know participants resulted in an increase in participant retention and completion. However, research by Reparaz, Aznárez-Sanado, and Mendoza (2020) suggests that instructor support is not a relevant factor for MOOC retention so it may therefore be what instructor support can impact that creates further retention.

**Design Principle 2. Provide a balance of flexibility and structure in the design of learning pathways and materials**

The varied backgrounds and prior experiences participants had using educational dialogue in their practice necessitated a flexible course design that is accessible for different settings alongside individualised needs assessments. This allowed for the selection of appropriate learning pathways with a ladder of support for participants to access as needed (e.g. supporting participants in the challenges they are met with via the discussion forum, live events, email, etc.). This is in line with research from Dille and Røkenes (2021) who note that ‘a “one size fits all” design is an illusion for [online] TPD. To capture their internal factors in relation to the activity, a key finding from our review is that scaffolding is critical in teachers’ professional development phases’ (14). The course materials and resources should also offer a blend of structure and flexibility with customisable options. In their review, Dille and Røkenes (2021) similarly found that while some teachers preferred more structure, several studies indicated the strong preference of teachers to have a space to experiment (e.g. Brennan et al. 2018, as cited in Dille and Røkenes 2021). They go on to state that ‘enhanced flexibility can balance individual needs with online programmes’ contents, thus meeting the diversity between the participants in the same online programmes’ (15). This was in line with the data for this study where participants from diverse contexts were able to engage with the flexible content.

**Design Principle 3. Offer opportunities for meaningful dialogue and collaboration amongst participants**

Participants were keen to share their knowledge and learn from others in the course, yet there was poor engagement with most of the communication and collaborative features in the course. This lack of meaningful dialogue and learning through dialogue is a challenge shared by many online courses and traditional learning platforms, which makes the role of the local facilitator integral in creating those dialogues within their own settings amongst the colleagues they intend to support and convene. Successful methods for encouraging dialogue and collaboration include having synchronous and asynchronous modes of communication explicitly as part of the course design and leveraging
technology to support interactive learning by developing new forms of dialogue and opening a ‘dialogic space for reflection’ (Wegerif et al. 2017).

**Design Principle 4. Incorporate reflective activities for both local facilitators and their colleagues**

Inquiry-based learning positions teacher agency and empowerment as central in the design and implementation of the course. Rather than a TPD programme with a designated ‘expert’ imparting knowledge on subject or pedagogical content, a key component of the course is that it is a continuous process in which dialogue-focused, explicitly contextualised inquiry is led by practitioners themselves supported by local facilitators. The course provided tools for local facilitators to use while convening their colleagues that promote continued reflection and include ways that practitioners can continually reassess and adapt their practice. The course also benefited from the inclusion of reflective activities for local facilitators themselves, through the discussion forum contributions and customisable templates, in which they reflected on their practice in detail.

**Design Principle 5. Offer opportunities for participants to create and share artefacts**

The mechanical MOOC model aligns with the trend towards more creator platforms that are emerging in online professional learning, which empowers individuals to create learning resources through acknowledging their expertise (Dille and Røkenes 2021). Participants in both trials of the MOOC and the PPD course noted the benefit of creating research products relevant to their contexts, and also shared their desire for accessing learning from others through the use of a resource bank. In order to keep the course materials on the platform streamlined, this is ideally done through building on the resources already available on the edudialogue.org site and adding in an easily operated filter system as more resources are added. This should additionally provide functionality in which practitioners can build on the available resources and share adapted versions in a meaningful way. This refers to the local facilitator participants in the MOOC as well as the teachers that they intend to convene in their settings, in order to enable the growth of an educational dialogue community of practice that emphasises collaboration and the co-construction of knowledge.

**Design Principle 6. Consider the role of the participant in shaping the learning environment**

Collaboration with participants was actively and systematically conducted during the course design, implementation and evaluation, which resulted in a more relevant and engaging course and a stronger sense of agency and empowerment for the participants. This is in line with findings from Dille and Røkenes’ (2021) review that note teachers who have agency within online professional development courses and can help shape the development processes will likely have more extensive engagement in their professional development (e.g. Lowe and Holton III 2005, and Engeström and Sannino 2010, as cited in Dille and Røkenes 2021). The mechanical MOOC model builds on constructivist
learning theories and emphasises the importance of participants in shaping learning spaces. In the case of this course for local facilitators, the learning space extends from the online course to their settings.

**Design Principle 7. Position accessibility centrally in the design of the course**

Access was cited as a barrier for participants to engage in and complete the course. This includes challenges associated with infrastructure and internet connectivity, digital literacy and varied prior experiences with technology, and different levels of familiarity with educational dialogue. This is a common challenge for MOOCs, and a lack of access may further exacerbate a digital divide and continue to marginalise the global south (e.g. see Liyanagunawardena, Williams, and Adams 2013). Through positioning accessibility as central during the course design process, many of these factors can be mitigated. The course benefited from requesting accessibility considerations during the registration process as well as capturing prior experiences taking online courses and concerns regarding accessing professional development online. This helped to ensure appropriate support methods were established for participants to be able to engage fully in the course.

**Design Principle 8. Align the course model and platform with the pedagogy of focus**

There is significant synergy between the model of the mechanical MOOC, the open source platform developed to host the course, the inquiry-based approach of T-SEDA, the focus on local facilitators as the primary participants in the course, and the principles and theory of educational dialogue. Specifically, these components interact well to emphasise facilitating teacher agency through establishing a sustainable and scalable community of practice in which practitioners from a range of contexts can access resources to adapt according to their setting. The MOOC, T-SEDA and dialogic principles also all emphasise teachers as valuable creators and reflective professionals who learn through collaboration and connection of practice. This design principle ensures that the pedagogy is of central focus, rather than the technology.

**Design Principle 9. Be intentional regarding the future of the course and consider whether and how scaffolding should be reduced for future iterations**

The underpinning theoretical framework of mechanical MOOCs posits that courses should not be run as traditional training structures with experts, but rather run by a course facilitator who comes secondary to the community in directing the learning. Success has been seen in other similar mechanical MOOCs whereby highly engaged prior participants (often referred to as ‘champions’) organised learning communities to direct their foci within the course. There will likely always be a need for a course facilitator to run live cohorts, and the data from this study support this, but the support from the course facilitator can be scaled back once the community of practice is more established. This is similarly reported by Dille and Røkenes (2021), who notes the importance of withdrawing support once participants understand and are able to take on the learning
activities either individually or with peers (e.g. Wittek 2012, as cited by Dille and Røkenes 2021).

**Design Principle 10. Build systematic monitoring and evaluation of the course into its structure**

The course benefitted from integrating monitoring and evaluation in the course design in order to ensure that future iterations of the course were informed by the experiences of participants. Questions for future participants should include details regarding teacher agency, empowerment, access, equity, sustainability and scalability. These questions and evaluation processes should also require very little input from research staff, e.g. through the use of integrated survey software with closed questions. It is imperative that the design of the research tools considers sustainability and scalability carefully, as noted in Theme 9 and Design Principle 9.

**Conclusions and implications**

The initial results from this study have implications and design considerations for future iterations of the course as well as other online courses both within the educational dialogue course series and beyond. These findings point to a number of key theoretical and operational components of online professional development designed to offer sustainable and scalable opportunities for local facilitators and practitioners to collaborate, reflect together, support one another and share their learning and practice. The thematic findings suggest the need for a balance of flexibility and structure in the course syllabus and materials, as well as systematic and consistent engagement with participants throughout the design, implementation and evaluation of online courses. It was clear that participants sought opportunities to shape their learning spaces and create their own artefacts, and that this had a positive impact on the sustainability and scalability of the course. The themes also indicate a strong desire from participants to participate in an established community of practice in which participants can collaborate, discuss, share, and reflect with one another. Findings also show that accessibility continues to remain a significant barrier in engagement in online learning, although there are ways to mitigate for some of these challenges and this should continue to be central to the design of further online professional learning courses.

The 10 design principles articulated in this paper explore some of the key emerging themes from the completed trials in which the structure, content and conceptual framework of the course is considered in detail. Professional development interventions aiming to build and sustain educator communities of practice globally in which teachers are considered and used as reflective creators should consider and build on these characteristics and procedures.

Limitations to the research surfaced in different phases but largely include challenges regarding the MOOC intervention and research design. Participation in the course required strong internet connectivity as well as foundational digital skills in order to access the online course and interact with other participants. This excluded populations who did not have the infrastructure or skills required to participate, which was particularly the case in low-income countries where a range of barriers to MOOC participation
have been well documented. While participants came from a range of contexts, as documented in the pre-course surveys, the cohorts were also small for the data collected, which may not have offered enough varied, real experiences of teachers taking on local facilitator roles. Participants also noted challenges regarding their availability and engagement with having to balance multiple demands and competing priorities, in addition to extreme circumstances in light of COVID-19 and the ensuing challenges in participants’ professional and personal lives. This offered a tension where the context of COVID-19 presented a need for rigorous evidence building of remote TPD programming that is flexible in its design, however teachers may not have been in an ideal position to embark on professional development at this difficult time.

Research design limitations included the study being highly complex with many human, cultural, and environmental factors. The methods sought to be varied in order to capture as many of these moving parts as possible, however large amounts of data were derived from different sources remotely, which offered particular challenges for the qualitative data. In addition, the use of a mechanical MOOC model emphasised removing as many barriers to participation as possible. This meant that none of the content from the course was locked, i.e. participants did not need to register in order to access the course materials. Because the questionnaires were voluntary, it was therefore not possible to know whether more participants were engaging in the course inactively.

This study has pointed to multiple areas for future research. Priority areas that will inform the design of two new courses, which are currently in development and will be available in the same series as this MOOC for local facilitators include: (i) The extent to which the impact seen in the course is scalable and sustainable, which will be researched through continued engagement with previous course participants. This will also seek to more accurately capture the voice of the ‘inactive’ participant who did not submit a final artefact but still engaged with the course materials. (ii) The extent to which the edudialogue.org community hub is used and the development of design principles regarding this community space for practitioners and researchers. (iii) Catalytic impact of local facilitation, i.e. the unintended and unanticipated impacts of local facilitation, beyond what is currently included in the impact assessment framework. (iv) Sustainability as it relates to considerations for scaling back support from the course facilitator for future live cohorts. (v) Mitigation factors for addressing limitations regarding accessibility, particularly regarding infrastructure and digital skills, through the development of a related case study.

This research study offers important areas of further consideration, particularly since new technology-focused professional development programmes and pilots are erupting through a number of initiatives. Across this landscape, the role of technology to support and reshape teacher professional development stands to be better understood with rigorous research.

Notes

1. T-SEDA is an established and tested resource pack that supports practitioners in developing dialogic teaching and learning and is designed for local adaptation: https://www.educ.cam.ac.uk/research/programmes/tseda/.
2. https://mbrugha.github.io/facilitation/.
3. This course entitled 'Educational Dialogue' was a Masters-level short course in which students were introduced to the key theorists, methodologies and debates in the field of educational dialogue. Students developed their own dialogic practices and thinking through hands-on activities in their own contexts, using research-informed and practical resources.
4. Final learning products are still being accepted.

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