

Evaluating long-term MOOC impact: a case study of TEL MOOC

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Abstract

Since the launch of the first massive open online course (MOOC) in 2008, numerous claims have been made about MOOCs' power to 'fix' broken education systems, including those in the Global South. However, some (e.g. Altbach, 2014) argue that MOOCs are strengthening the dominant academic culture of the West, to the exclusion of alternative voices. Subsequently, there has been a growing call for the creation of more localised MOOCs in the Global South, in addition to demand for rigorous evaluation of MOOCs' long term impact in order to ascertain whether individual courses are meeting their intended outcomes for learners and other stakeholders in diverse contexts.

This paper outlines a new approach to investigating MOOCs' long-term impact, developed in connection with a long-term impact evaluation of the 'Introduction to Technology-Enabled Learning (TEL) MOOC' - a collaboration between Athabasca University, Canada, and the Commonwealth of Learning. A 'theory of change' approach has been applied as the framework for the TEL MOOC evaluation, allowing for investigation of complex mechanisms of change and causality. The evaluation findings themselves will be shared at PCF9 and will be the focus of a subsequent report.

1. Introduction

Eulogising about MOOCs' power in the Global North has greatly reduced since the first MOOC was launched in 2008. However, MOOCs are still being positioned as potential solutions to increasing access to quality education in the Global South (Laurillard & Kennedy, 2017). In recent years there has been increased demand for courses that meet the specific needs of local learners, rather than reflecting dominant Global North priorities, and for rigorous evaluation of such courses to determine whether they are indeed achieving their intended outcomes, especially in the longer term.

This paper details a new approach to evaluating MOOCs' long-term impact, developed in connection with an evaluation of the 'Introduction to Technology-Enabled Learning (TEL) MOOC' - a collaboration between Athabasca University, Canada, and the Commonwealth of Learning.

1.1 The TEL MOOC evaluation

TEL MOOC is openly licensed and intended to 'provide an accessible learning opportunity to teachers, particularly in developing countries, to expand upon their knowledge and skills regarding the use of technology in teaching and learning' (Cleveland-Innes et al, 2017, p. 1). The TEL MOOC impact evaluation focuses on the following questions:

- What evidence is there that TEL MOOC has had a long-term impact on participants' attitudes and behaviour, especially their subsequent use of technology-enabled learning (TEL), open educational resources (OER) and open educational practices (OEP)?
- What is that impact and how does it differ across diverse contexts?
- What contributory/inhibiting factors have affected this impact and how do they differ across diverse contexts?
- What evidence is there that TEL MOOC has had an impact on stakeholders other than the learners themselves?

In investigating the long-term impact of a course on education practitioners, the TEL MOOC study is amongst a small minority of MOOC evaluations. Foley et al (2019) recommend that:

The longer-term impact of undertaking a MOOC must also be understood; at present there is little follow-up data gathered after the courses have concluded. This information is particularly needed when courses are designed to increase the knowledge or skills of a specific working population.

In investigating the impact of a MOOC on stakeholders beyond the participants themselves the TEL MOOC evaluation is amongst an even even smaller group of studies. One reason for this may be the difficulties involved in measuring this type of impact, which requires navigating the complex relationships between cause and effect – a key requirement for the TEL MOOC evaluation strategy outlined in this paper.

1.1.1 The TEL MOOC evaluation methodology

The TEL MOOC evaluation features an explanatory sequential mixed methods design whereby an initial phase of quantitative survey research is followed by a phase of qualitative, interview-based research intended to further explore the survey findings in respect of 8 individual TEL MOOC participants' experiences and contexts. The study design is intended to combine the broad overview of diverse learners' experiences in equally diverse contexts that is possible via quantitative survey research

with the deep insight into human experience that qualitative research makes possible. The evaluation also draws and builds on the findings of the three previous TEL MOOC evaluation studies (Cleveland-Innes et al. 2019; Cleveland-Innes et al., 2018; Cleveland-Innes et al., 2017), each focusing on learners' experiences and outcomes during their study of the course.

Detailed discussion of the evaluation methods, and of the study findings, is beyond the scope of this paper and will be reported at the PCF9 conference. Discussion of the framework that is the basis for the TEL MOOC evaluation, and the literature that informs that framework, is the focus of the remainder of this paper.

2. MOOC evaluations: reviewing the literature

Existing MOOC evaluations tend to concentrate on what can be easily measured at scale, for example learner demographics, retention and completion rates (Liyaganawardena, Adams, & Williams, 2013), and on learners' experiences during their study of a course, rather than on longer-term impact. For example, numerous evaluations address the effectiveness of structure, content and pedagogy in terms of participants' achievement of course learning outcomes (e.g. Margaryan et al, 2015), while others (e.g. Campbell et al., 2014) have studied MOOC learners' intentions. Of more relevance to the TEL MOOC evaluation are studies investigating MOOCs' impact on professional practice, for example Milligan and Littlejohn's (2015) evaluation of the edX MOOC *Fundamentals of Clinical Trials*, which identifies a gap between 'learning intentions and learning behaviour', finding 'little evidence of the course on practice'. The TEL MOOC evaluation builds on this finding in investigating whether, in the longer term, any intention-behaviour gap might decrease as MOOC learners have the time and opportunity to reflect on the significance for their practice of knowledge gained and skills developed, and to experiment with new ways of working and new approaches. Other relevant studies include evaluations focusing on MOOCs' use for teachers' professional development - a function of TEL MOOC - for example Laurillard's (2016) study of a professional development MOOC intended for teachers from emerging economies. However, such studies are uncommon. The TEL MOOC evaluation addresses this gap in knowledge.

2.1 Evaluations focused on MOOCs as networks

While many MOOC evaluations focus on the effectiveness of courses' structure, content and pedagogy, Stephen Downes (2013), co-creator of the first MOOC, argues that MOOCs should actually be evaluated for their success as networks:

MOOC success...is not individual success. We each have our own motivations for participating in a MOOC, and our own rewards, which may be more or less satisfied. But MOOC success emerges as a consequence of individual experiences. It is not a combination or a sum of those experiences...but rather a result of how those experiences combined or meshed together.

The TEL MOOC evaluation is grounded in a similar assumption about the potential power of learner networks and, in part, is interested in the extent to which learners continue to participate in such networks after their study of a particular MOOC has ended, and the ways in which this networked participation may contribute to the long-term impact of a course.

2.2 MOOC evaluation frameworks and models

For courses such as TEL MOOC, intended to benefit stakeholders additional to participants themselves, having a rigorous and systematic, but suitably flexible evaluation framework is particularly important in allowing researchers to fully capture and understand nuanced mechanisms of change and the complexities of establishing causality.

To answer the TEL MOOC evaluation questions the evaluation framework needed to:

- Identify the diverse needs of multiple stakeholders, beyond the MOOC participants themselves, in order to fully establish the long term impact of the course.
- Allow for consideration of a wide range of contextual factors that may enable/limit impact.
- Allow for analysis of complex mechanisms of change.
- Allow for consideration of multiple interpretations of causality.
- Allow for both quantitative and qualitative evidence to be used as support for the evaluation.
- Offer the flexibility for iterative refinement in light of emergent findings and for multiple stakeholders in diverse settings.

The process of developing an evaluation framework for TEL MOOC involved first considering the merits and limitations of existing MOOC evaluation frameworks, of which there are few.

2.2.1 Kirkpatrick's model

Kirkpatrick (1975) offers a commonly used model for evaluating the efficacy and adoption of educational interventions. The model comprises four levels:

- reaction - learners' feelings about the learning experience
- learning - the resulting increase in knowledge or skill resulting from the learning experience
- behaviour - the implementation of acquired knowledge/skills in employment/other contexts

- results - the broader impact of the training on an organisation (or, by extension, any other environment or stakeholders, though this is not covered in Kirkpatrick's original model).

Several MOOC evaluation studies have adopted Kirkpatrick's model, including Goh et al (2018), who focus solely on the first two levels, Alturkistani et al. (2018) who use (to varying extents) all four levels, and Lin and Cantoni (2017), who also cover all four levels of Kirkpatrick's model. However, none of these studies cover broad context-related considerations, indicating a weakness of Kirkpatrick's model, which offers no obvious place for nuanced investigations of context as enabling or inhibiting impact at Levels 3 and 4, nor a framework for considering alternative causes for the apparent impact of a specific course.

In summary, while Kirkpatrick's categories of 'behaviour' and 'results' initially appeared of interest for the TEL MOOC evaluation, the model does not offer a sufficiently nuanced approach to analysing and comparing complex mechanisms of change and how they differ for individual learners in specific contexts, nor a sufficiently systematic mean of capturing and understanding the significance of context in enabling/limiting impact on diverse stakeholders.

2.2.2 The MOOCKnowledge model

A model placing more emphasis on contextual factors than is allowed by Kirkpatrick's approach has been developed by Kalz et al (2015) in connection with the MOOCKnowledge project. Kalz et al's (2015, p. 62) model (Figure 1) maps the background (or distal) variables that may account for variances in MOOC learners' attitudes and behaviour and include 'demographic data, the socio-economic status of the participants, their lifelong learning profile, previous experiences with open online courses and IT competences'. The model also maps the proximal variables that directly influence learner intention and behaviour, identified as attitude, perceived norm and perceived behaviour control (i.e. self-efficacy).

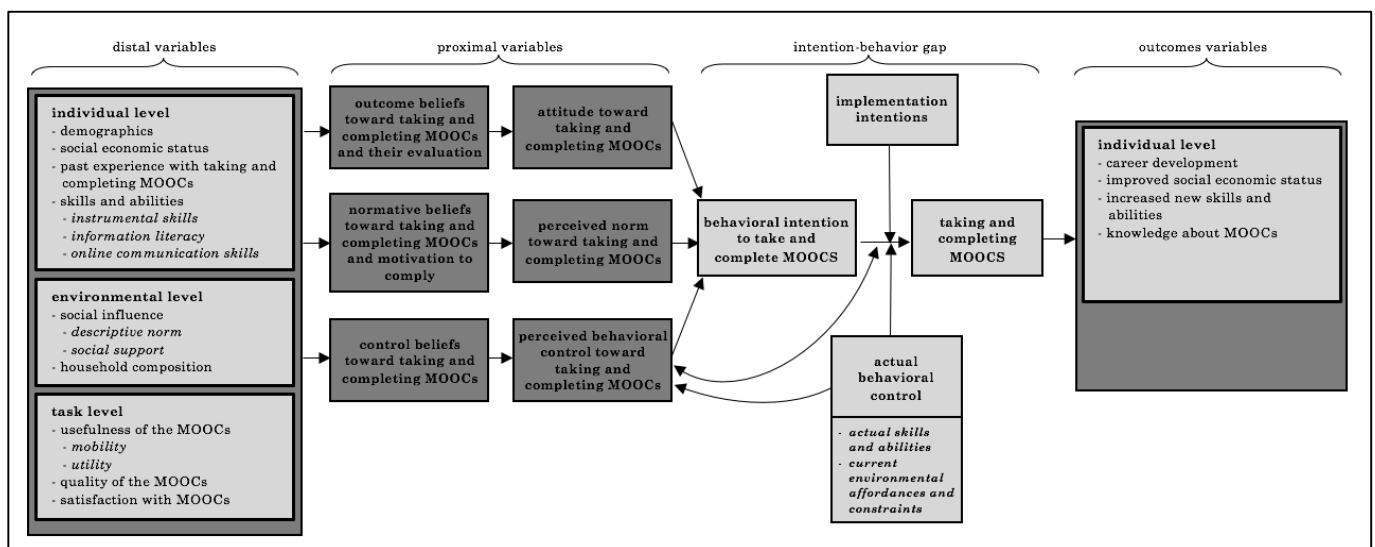


Figure 1: Research model of the MOOCKnowledge project (Kalz et al, 2015, p. 67).

The MOOCKnowledge model has some relevance for the TEL MOOC evaluation in identifying variables that may explain variances between the impact of the course on individual learners' subsequent practice and on other stakeholders in diverse contexts. However, the model is limited by the fact that the identified proximal and distal variables are largely restricted to intrinsic factors, rather than extrinsic factors such as socio-cultural, political, geographical and economic context, and infrastructure constraints such as internet connectivity and the availability of resources such as up-to-date and reliable hardware and software. Arguably this is a major shortcoming in respect of applying the MOOCKnowledge model to evaluations of heterogeneous cohorts comprising learners from very diverse contexts.

2.2.3 The Theory of Change approach

A theory of change (TOC) approach was eventually adopted as the basis for the TEL MOOC evaluation due to its affordances in offering a systematic framework for investigating the complex relationship between cause and effect that must be unraveled when conducting a long-term impact study.

The TOC approach was developed by Weiss (1995). A key value of TOC is their making explicit the conditions and assumptions required to enable change, and their dynamic and iterative nature; TOC are intended to be revised throughout the evaluation process as understanding of a programme or initiative changes. Developing a TOC allows practices to be linked to outcomes, and in identifying assumptions a TOC gives priority to the reasons why impact may not be achieved, as well as the drivers of impact.

Breuer et al (2016) explain that:

The ToC is often developed using a backward mapping approach which starts with the *long-term outcome* and then maps the required *process of change* and the short- and medium-term outcomes required to achieve this. During this process, the *assumptions* about what needs to be in place for the ToC to occur are made explicit as well as the *contextual* factors which influence the ToC. Additional elements of a ToC can include *beneficiaries*, *research evidence supporting the ToC*, *actors in the context*, *sphere of influence*, *strategic choices and interventions*, *timelines* and *indicators*. These elements are usually presented in a diagram and/or narrative summary.

The TEL MOOC mixed methods study, combining survey research with qualitative interviewing, is intended to identify possible patterns in the impact of the course across cohorts, in addition to collecting rich evidence about the experiences of individual learners on a case study basis. The majority of data collected about the apparent impact of TEL MOOC comprises value reporting and observational/anecdotal evidence, together with a deep exploration of context-related factors that may influence any apparent/lack of impact in each case study. A TOC offers a way of placing this evidence into a framework that allows for comparison across cases, representing some of the diversity of MOOC cohorts, in respect of the mechanisms of change and varieties of long-term impact evident in each case.

While development projects often develop a TOC as part of the project planning process, the TEL MOOC evaluation TOC was developed in two phases – speculatively, informed by existing literature, in advance of conducting the research, and then in more detail in light of the survey and interview findings, as a way of understanding the impact mechanisms in individual cases. The evaluation process also involves iterative refinement of the TOC framework in the light of new findings - a bringing together of the outcomes of each case study, and of the survey results, to allow for any commonalities and patterns to be identified. Figure 2 shows the draft ToC devised at the start of the TEL MOOC evaluation as the basis for identifying variables that would help to answer the evaluation questions, and developing the survey and interview questions used to collect data about those variables.

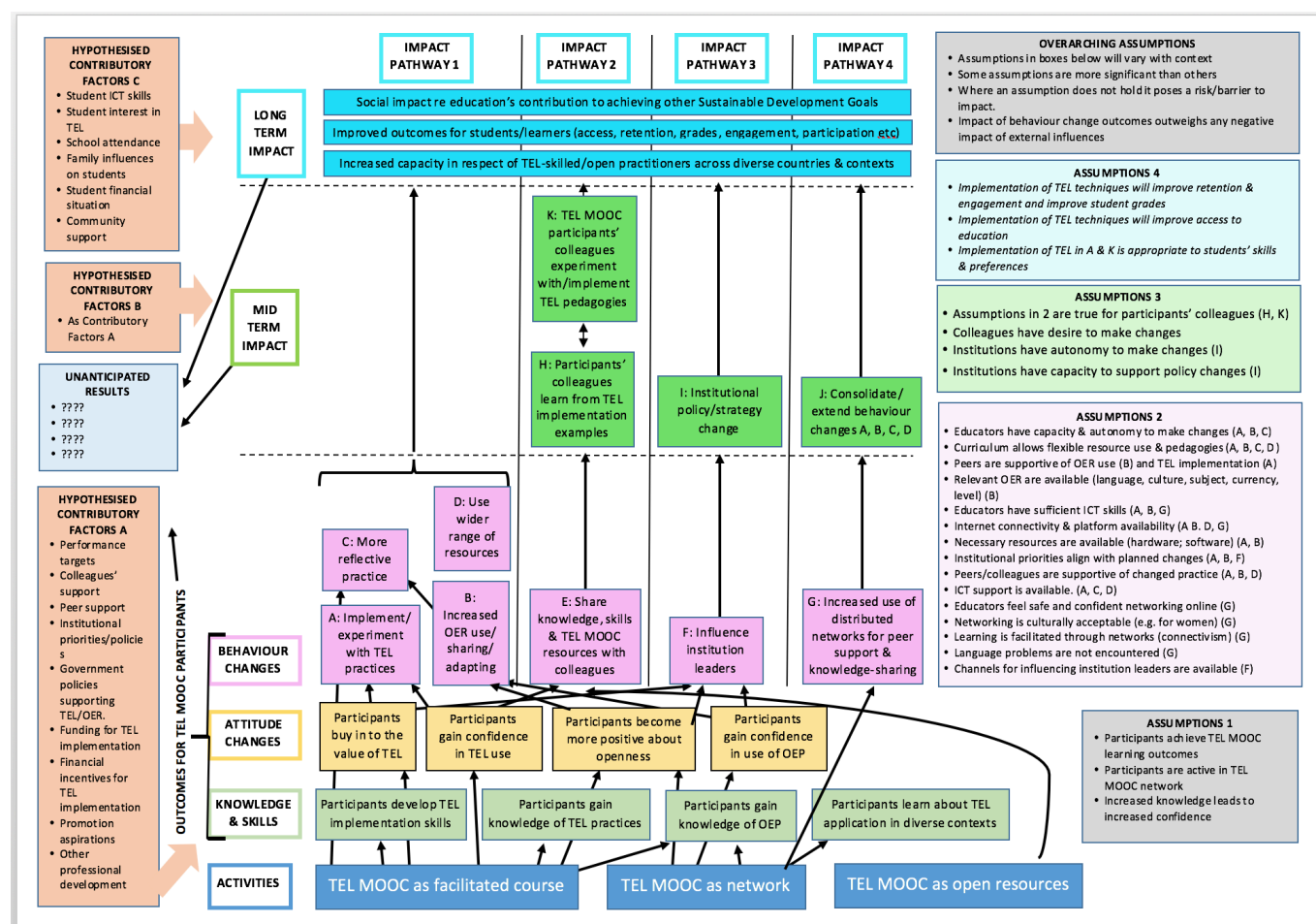


Figure 2: The draft TEL MOOC TOC

3. The TEL MOOC draft TOC

The TEL MOOC draft TOC features the following components:

- Three categories of activity contributing to any identified impact – TEL MOOC as a facilitated course, as a network (following Downes, 2013), and as downloadable and shareable open resources.

- Four impact pathways indicating possible mechanisms of short-, medium- and long-term impact on MOOC participants and other stakeholders.
- Two sets of contributory factors potentially enabling and/or limiting impact.
- Five sets of assumptions assumed to be true for the hypothesised impact to be realised, and a risk to achieving impact, where an assumption is not true.

3.1 The impact pathways

The four possible impact pathways are drawn from four related hypotheses:

Pathway 1: TEL MOOC participants make changes in their own practice as a direct result of their study of the course (and any contributory factors), leading to longer-term impact on learners and on society more generally.

Pathway 2: TEL MOOC participants share knowledge, skills and resources with colleagues, who are also influenced by participants' change in practice, leading to practice changes for colleagues and subsequent longer-term impact on learners and society.

Pathway 3: TEL MOOC participants influence institution leaders, leading to institution-wide policy/strategy change, and long-term impact on learners and society.

Pathway 4: TEL MOOC participants' learning is enhanced by their being part of a massive cohort of MOOC learners, functioning as a community of practice (see Downes, 2013; Wenger, 1998). They gain networking experience and skills, and make connections that last beyond their study of the course and are a source of peer support as they experiment with the application of their newly gained skills and knowledge to their own practice.

3.2 The 'contributory factors': Considering causality

The TEL MOOC evaluation features a 'contribution-oriented' (Stern et al., 2012, p. 38) approach investigating 'the contribution an intervention is making to outcomes and wider impacts' (Gates and Dyson, 2017, p. 31). Accordingly, the TEL MOOC TOC features three clusters of 'contributory factors' – Cluster A making a potential contribution to the impact of TEL MOOC on participants themselves in terms of changes in their attitudes and behaviour, Cluster B (identical to Cluster A) making a potential contribution to the impact on TEL MOOC participants' colleagues' attitudes and behaviour, and on institutional/policy change, and Cluster C making a potential contribution to the longer-term impact on stakeholders other than the course participants and their colleagues. The inclusion of these 'contributory factors' in the TOC is informed by current thinking around causality in impact evaluation.

Gates and Dyson (2017, p. 36) identify five ways of thinking about causality - successionist, narrative, generative, causal package and complex systems. The TEL MOOC evaluation combines a narrative, generative and causal package approach. The narrative approach foregrounds 'the importance of human agency in causality by attending to human perception, motivation and behaviour' (Gates and Dyson, 2017, p. 35), viewing participants as 'active agents' (Stern et al., 2012) with different values and different outcomes, and treating context as 'an important factor in determining whether a program will work in a certain setting'. The case study strategy used for the TEL MOOC evaluation allows for a narrative approach in investigating individual learners' experiences, while the use of a TOC provides a framework in which these narratives can be conceptualized in terms of specific impact mechanisms.

The generative approach involves building and verifying a theory-based explanation of how causal processes happen - identifying mechanisms that connect two events as a means of 'understanding why, for whom, and under what conditions interventions work to produce specific results' (Gates and Dyson, 2017, p. 36). The use of a TOC approach is generative in nature, especially the TEL MOOC evaluation strategy of creating an individualised, context-specific TOC for each case study MOOC participant.

Finally, the causal package approach involves 'examining the contributory role components of interventions and combinations of multiple interventions play in producing outcomes and impacts' based on the idea that 'many interventions do not act alone, and the desired outcomes are often the result of a combination of causal factors, including other related interventions, events, and conditions external to the intervention (Mayne, 2012)' (Gates and Dyson, 2017, p. 36). A key feature of the TEL MOOC evaluation is its adaptation of the TOC approach to align with the principles of contribution analysis.

3.2.1 Contribution analysis

Contribution analysis is a methodology used to identify the contribution an intervention has made to one or more changes that might be identified as its impact. It is based on a recognition that it is difficult to prove attribution for many interventions. Mayne (2012) explains that this is because there are usually many different steps between activities and the eventual desired changes, outcomes and impact, external factors will influence those changes, and many different interventions can contribute to a single change. Contribution analysis is particularly useful in circumstances where there are many different contributors to change.

INTRAC (2017) explain that:

Normally...theories of change are developed as pathways showing how change at one level contributes to change at further levels (i.e. how activities lead to outputs, intermediate outcomes, higher outcomes and eventually impact). In contribution analysis, changes are assessed at all these different levels in order to compare reality with the theory. Contribution analysis does not seek to conclusively prove whether, or how far, a development intervention has contributed to a change or set of changes. Instead it seeks to reduce uncertainty. The aim is to produce a plausible, evidence-based narrative that a reasonable person would be likely to agree with.

Accordingly, the TEL MOOC TOC, and the related data collection activities, includes evidence about additional influences on participants' attitude and behaviour changes, other than their study of TEL MOOC itself.

3.3 Assumptions: Considering context in MOOC evaluations

TEL MOOC evaluation's narrative approach to causality involves considering the significance of multiple contextual factors in both driving and inhibiting impact on participants and other stakeholders in specific settings. These factors are represented as 'assumptions' in the draft TOC, and are informed by various studies addressing the influence of context on MOOCs' short-term and longer-term impact. Examples include Hood, Littlejohn and Milligan (2015), Alturkistani et al. (2018) and Douglas et al. (2019), the latter proposing a 'Contextualized Evaluation Framework' for MOOCs that, while limited by its focus on learners' experiences *during* their MOOC study, is relevant in identifying factors that may influence long term changes in attitudes and behaviour.

3.3.1 Assumptions regarding the implementation of TEL

An overarching aim for TEL MOOC is to develop participants' professional practice in respect of the use of technology-enabled learning (TEL). The TEL MOOC TOC assumptions therefore needed to address contextual factors that may act as barriers and/or enablers to TEL implementation. The literature on this topic is fairly extensive and is summarized by Thanaraj and Williams (2016). Identified factors driving/enabling TEL implementation include feelings of personal satisfaction, academics' experience and expertise with technology and the impact of government policies and legislation; innovativeness, tolerance of ambiguity and propensity towards risk taking (Solomons and Spross, 2011), plus 'collegial discussions, increased automatization, technology enhanced learning support for the teachers...tech savvy students and engagement among faculty' (Josefsson et al., 2018). Factors identified as inhibiting TEL uptake, include lack of time, increased workload, lack of autonomy, lack of compensation, lack of IT support and lack of academic staff knowledge (Solomon and Spross, 2011). Gregory and Lodge (2015) identify 'academic workload allocations...academic identity and culture, preferential time allocation to associative activities, academic technological capacity, university policies and workload and funding models' as barriers preventing the uptake, and implementation of TEL while Josefsson et al. (2018) have identified barriers including 'unclear return on time investment, insufficient funding for purchases and lack of central decisions' in addition to 'inexperience with digital tools for learning', lack of faculty engagement, poor system integration, obstruction by central systems, problems with locally developed systems and a lack of collegial discussion. The above literature about barriers to/enablers of the implementation of TEL has informed the identification of related assumptions appearing in the draft TOC.

3.3.2 Assumptions regarding OER use and OEP

One of the main topic areas within TEL MOOC concerns the use of open educational resources (OER) and the evaluation was therefore concerned, in part, about whether participants' OER use changed following their study of the course. The literature on openness in education includes multiple studies identifying the significance of context-related factors in facilitating/inhibiting the use and impact of OER and open educational practices (OEP), especially for learners in the Global South. Perryman and Seal (2014) discuss technological barriers, while Perryman et al. (2014); Buckler et al. (2014); Perryman and Lesperance, (2015) and Hodgkinson-Williams and Arinto (2017) have identified various barriers to educators' use of OER and OEP. This literature has informed the identification of related assumptions in the TOC and, once again, both phases of the TEL MOOC evaluation collect evidence relating to those assumptions.

4. Conclusion

In its use of a theory of change framework, adapted to fit with the principles of contribution analysis, case studies with data collected via qualitative interviewing, and comparison of impact mechanisms across diverse case studies and contexts, the TEL MOOC evaluation is able to answer the following general questions:

- According to stakeholders, what influence, effects and/or difference did TEL MOOC make for their lives, and especially their professional practice?
- More generally, what works, why, how, for whom and under what circumstances?
- How does TEL MOOC work in combination with other interventions or factors to make a difference?

The study findings will be reported in full at PCF9.

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