

Orchestrating knowledge construction in peer-facilitated online discussion forums

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Abstract

The Open University of Sri Lanka implemented four MOOCs for continuing professional development of practitioners on the adoption of OER and OEP. These CPDMOOCs adopted a scenario-based approach to learning within the social-constructivist pedagogy. Learners in this context were presented with real life situations that engaged them in three inter-connected learning tasks. These were: creation of an artefact as a solution to the challenge they faced in the scenario; sharing of their creations in the discussion forum, and reflecting on the learning process. Engagement in peer-facilitated discussion forum was a key learning activity in each CPDMOOC. This was designed to promote collaborative learning and to facilitate co-construction of knowledge among the learners. This was also an assessment task, where learners were required to share their creations in the discussion forum and provide constructive feedback to each other. This case study investigated how and to what extent, interactions among peers in the discussion forum have supported knowledge construction, in the CPDMOOC on “Understanding OER”. Collection and analysis of data in this qualitative study was guided by the Community of Inquiry (CoI) framework (Garrison, Anderson & Archer, 2001). Critical prerequisites for successful online learning are the promotion of cognitive presence, social presence and teaching presence. An in-depth examination of the online interactions was conducted via content analysis of a total of 430 messages that were posted by 68 participants in 76 threaded discussions using coding and categorizing. The findings indicated active engagement of learners in the discussion forum in different ways according to the three types of presences, which has promoted knowledge construction through peer learning. The presentation will engage the audience in identifying various patterns of peer interactions supporting knowledge construction, and their implications for the design of peer-facilitated discussion forums in CPDMOOCs.

Keywords: Peer-facilitated discussion forums; Knowledge construction; CPDMOOCs; Scenario-based Learning; Community of Inquiry

Introduction

Massive Open Online Courses (MOOCs) have gained wide recognition in the field of open, distance and flexible learning, as online courses open to anyone, anytime, free of charge. MOOCs enable not only efficient and flexible access to interact with a wide range of learning resources, but also highly interactive synchronous and asynchronous communication with instructors and peers, that support collaborative and co-operative learning. Discussion forum facility is a common feature in online learning environments, which is also widely used in MOOCs to promote peer learning. However, gaining the maximum advantage from peer-supported discussion forums as a knowledge construction tool is a challenge, which requires careful design of learning experiences.

The Open University of Sri Lanka, with the support of the Commonwealth Educational Media Centre for Asia, designed, developed and implemented four MOOCs for continuing professional development of practitioners (CPDMOOCs) on the adoption of Open Educational Resources (OER) and Open Educational Practices (OEP). Deviating from conventional MOOC design practices, these CPDMOOCs adopted a scenario-based learning (SBL) design within the social-constructivist pedagogy. Learners in this context were presented with real life challenging scenarios that engaged them in three inter-connected learning tasks: creation of an artefact as a solution to the challenge they faced; sharing of their creations in a peer-facilitated discussion forum; and self-reflecting on their learning process.

Engagement in peer-facilitated discussion forum was a key learning activity in the learning experiences designed in each of the four CPDMOOCs. This was also an assessment task, where the learners were required to share their creations in the discussion forum and provide constructive feedback to each other. This peer-facilitated discussion forum activity was specifically designed to promote collaborative learning and to facilitate co-construction of

knowledge among the learners. This paper presents a case study which investigated how and to what extent, interactions among peers in the discussion forum have supported their knowledge construction, in the CPDMOOC on “Understanding OER”.

Review of Literature and the Conceptual Framework

MOOCs have a vast potential to support continuing professional development, provided the learning environments are appropriately designed (Laurillard, 2014). A variety of MOOC designs are evolving since the first generation of cMOOCs based on Connectivist theory promoting ‘knowledge creation and generation’, and the second generation of xMOOCs focusing on ‘knowledge duplication’ (Siemens, 2014). However, most of the contemporary MOOCs demonstrate a knowledge transmission mode, which is a change of focus from its original intention of promoting knowledge creation (Bates, 2015). Such models of conventional lecture-based practices ignore existing sound principles of online learning and thus raise significant pedagogical challenges (Naidu, 2015).

Asynchronous discussions play an important role in online learning by providing a space for instructors and students to form a community to engage in a dialogue about the course content and to co-construct knowledge (Gao, Zhang, & Franklin, 2013). Discussion forum is an important tool which allows participants to share their ideas and compare progress with others (Ching & Hsu, 2013). Students can share meaningful ideas and gain satisfaction in learning when they are able to interact with peers (Sher, Sherratt, Williams, & Gameson, 2009). These also provide opportunities for the learner to think, reflect and share their own ideas and experiences with peers and to search for new information (Anderson & Dron, 2011; Pena-Sheff & Nichollas, 2004). Thus, peer-facilitated discussions provide a social context for learning and motivate collaborative learning (Liu & Tsai, 2008). They also play a significant role in enhancing knowledge construction and cognitive development process (Pena-Shaff & Nicholls, 2004).

While discussion forum is a common feature in most online learning environments, maintaining interactive discussions to achieve the expected knowledge construction is often a challenge (Karunanayaka, Rajendra, Ratnayake, & Naidu, 2016). A constructivist learning environment will support collaborative co-construction of knowledge through social negotiation among individuals, and the meaningful use of technology will enable such learning (Jonassen, 1999). Discussion forum facility provides opportunities for learners to interact with each other and engage in meaningful discussions which is aligned with a social-constructivist approach to learning (Vygotsky, 1978). Hence, Discussion forums need to be orchestrated to support learners co-construct knowledge, through engagement in meaningful peer-facilitated interactions.

The Community of Inquiry (CoI) framework identifies critical pre-requisites for a successful online learning experience (Garrison, Anderson & Archer, 2001). It comprises three elements – i.e. Cognitive presence, Social presence and Teaching presence, as well as categories and indicators to define each presence (Garrison & Arbaugh, 2007). Cognitive presence is explained as the extent to which the participants are able to construct meaning through sustained communication. Social presence denotes the ability of participants to project their personal characteristics into the community, thereby presenting themselves to the other participants as “real people”. Teaching presence is explained as two functions - Design of the educational experience; facilitation and direct instruction by the instructor; and facilitation and direct instruction by the students (Garrison et al., 2001). These three elements of the CoI framework have been identified as quite significant in promoting knowledge construction in online learning environments (Annand, 2011; deNoyelles et al., 2014; Karunanayaka et al., 2016; Lambert & Fisher, 2013).

The CoI framework provided the conceptual basis in the current study which explored how peer-facilitated discussion forums supported knowledge construction in a CPDMOOC.

Study Context and Course Design

Four CPDMOOCs were designed to help practitioners develop competencies in solving real-world problems and issues in the adoption of OER and OEP. These were, Understanding OER; Searching and Evaluating OER; Creating and Adapting OER; and Integrating OER and Adopting OEP.

A Scenario-based approach to Learning (SBL) which models situated cognition (Brown, Collins & Duguid, 1989) was adopted as the pedagogical design of the CPDMOOCs. The SBL approach is grounded in constructivist

pedagogy where learners are placed in real world learning scenarios that provide the context and scaffolding for all learning activities. It contains three key attributes: A Learning Scenario – where learners are situated in authentic learning scenarios; Learning Activities – where learners assume key roles and face challenges; and Assessment Tasks – where learners demonstrate developed competencies (Naidu, Menon, Gunawardena, Lekamge & Karunanayaka, 2007).

The SBL pedagogical approach provided a useful framework to plan and design effective, efficient, engaging learning experiences in the CPDMOOCs (Naidu & Karunanayaka, 2014). The process involved identifying the overall key competency, formulating specific learning outcomes, creating learning scenarios reflecting real life challenging situations and developing a variety of learning/assessment tasks supported with OER. In addition, theoretical guidelines based on the first principles of instruction (Merrill, 2002) and good practices of online learning (Anderson, 2008) also provided insights in the design process.

In each CPDMOOC, three inter-linked learning/assessment tasks were designed:

- An individual ‘creation’ of an artefact to promote creative learning;
- Sharing of creations in a peer-facilitated discussion forum to encourage collaborative learning
- Writing of a self-reflection to promote reflective learning.

To support learner engagement in these tasks, carefully selected OER were integrated appropriately, which offered relevant content to support knowledge construction of learners.

The CPDMOOC on “Understanding OER”, expects students to achieve the following learning outcomes:

- Explain the concept of OER.
- Identify different license types for OER for specific needs.

The learning/assessment tasks designed were constructively aligned (Biggs, 2003) with the learning outcomes, to support students construct meaning through engagement in the relevant activities and achieving the desired outcomes. The first challenging task designed in this CPDMOOC was to create a graphical representation on OER and related concepts including different license types and media formats of OER. The second task was to share their creations in the discussion forum to receive and provide peer feedback. Finally, the learners reflected on their learning experience, as the third task. Specific guidelines were provided to the learners to engage in each of the prescribed learning and assessment tasks. Table 1 indicates the guidelines provided for the discussion forum activity of this CPDMOOC.

Table 1: Guidelines for Peer-facilitated discussion forum - CPDMOOC on “Understanding OER”

Details of the Learning Activity / Assessment Task - 2 of CPD MOOC 1	
Requirement	Description
Nature of the task	Group Activity - Collaboration - Discussion Forum
Description	Each learner is allocated in a peer group. Share your graphical representation (created for Assessment Task 1) in the discussion forum to receive peer feedback
Guidelines	<ul style="list-style-type: none"> • Post your graphical representation to the discussion forum (as an attachment), along with a short description about it (self-post). • Review and respond to the posts of at least three (03) of your peers. • Your feedback should be: Helpful; Meaningful; Constructive; Critical • Respond to at least two (02) peer comments you receive.
Time frame	One week
Learner Support	Instructor guidance and peer feedback
Participation Requirements	<ul style="list-style-type: none"> • Your individual forum post with uploaded graphical presentation • Providing feedback to at least three (03) peers’ submissions • Responding to at least two (02) peers’ comments on your submission
Assessment Criteria	Your participation will be evaluated against the Assessment Rubric. (see Table 1.6)
Deadline	Complete engaging in this task by DD/MM/YYYY, HH.MM Hours

Assessment Rubrics with specific criteria were used to evaluate each task, which were also shared with the learners. See Table 2 which indicates the assessment rubric used to evaluate the discussion forum task.

Table 2: Assessment Rubric – Discussion Forum Activity – CPDMOOC on “Understanding OER”

Assessment Task – Collaborative Activity					
Criteria	Active participation in the discussion forum as follows: 1. A self-post with a clear description on your own graphical presentation 2. Graphical presentation uploaded as an attachment to your post 3. Providing feedback to at least three (03) peers’ submissions 4. Responding to at least two (02) peers’ comments on your submission 5. Providing helpful; meaningful; constructive; and critical comments				
Marking Scheme					
5 Marks	4 Marks	3 Marks	2 Marks	1 Mark	Marks received
Engaging in the discussion, satisfying all five (05) criteria.	Engaging in the discussion, satisfying any four (04) criteria only.	Engaging in the discussion, satisfying any three (03) criteria only.	Engaging in the discussion, satisfying any two (02) criteria only.	Engaging in the discussion, satisfying any single (01) criterion only.	

Within this context, the present study explored how the peer-facilitated discussion forum in the CPDMOOC – “Understanding OER” has supported knowledge construction among the learners.

Methodology

Research design

This investigation adopted a case study approach. It was an in-depth qualitative exploration on peer-facilitated discussion forum of the CPDMOOC, “Understanding OER”.

Research Questions

Based on the key research question, “How did peer-facilitated discussion forum supported knowledge construction among learners?” the following sub-research questions guided this inquiry:

1. What factors supported learner engagement in the discussion forum?
2. To what extent interactions among peers in the discussion forum supported their knowledge construction?

Participants

CPDMOOCs were open to all practitioners worldwide. Initially, 319 participants, representing 28 countries registered in the platform, yet, 183 practitioners had enrolled as participants of this CPDMOOC on “Understanding OER”. Out of them, only 58 learners had participated in the discussion forum activity, who were considered as the participants of this study.

These participants comprised 66.7% females and 33.3% males. Majority were practitioners in education-related professions such as University lecturers and school teachers. While many were familiar with online learning, SBL approach was new to all. Also, for a very high majority, this was their first MOOC experience.

Methods of Collection and Analysis of Data

An in-depth examination of the online interactions among the participants in the discussion forum was conducted. All enrolled learners were formed in to 10 sub-groups (A-J) to engage in separate discussions, with one teacher

facilitator assigned to each group. Content analysis of a total of 430 messages that were posted by these 68 participants in 76 threaded discussions, was done using coding and categorizing (See Table 3).

Table 3: Details of the discussion forum

Sub-Groups	Learners (L)	Teachers (T)	No. of Discussion Threads	No. of Posts (by learners)	No. of Posts (by teachers)
A	05	01	06	18	01
B	06	01	07	60	01
C	06	01	08	27	02
D	07	01	11	57	11
E	08	01	09	56	02
F	06	01	07	23	06
G	06	01	07	67	01
H	06	01	09	38	06
I	06	01	09	38	04
J	02	01	03	08	04
Total	58	10	76	392	38
	68			430	

A data analysis strategy developed based on the CoI framework (Garrison et al, 2001) was used in the content analysis of the threaded discussion forums. An individual post by each participant was considered as the ‘unit of analysis’. These individual posts were analysed, categorised and coded according to the three presences – Cognitive Presence (CP), Social Presence (SP) and Teaching Presence (TP), based on the CoI framework (Garrison et al, 2001), using a coding template (see Table 4).

Table 4: CoI Coding Template (adapted from Garrison et al, 2001)

Element	Category	Code	Indicators
Social Presence (SP)	Open Communication	SP-OC	Risk free expression
	Group Cohesion	SP-GC	Encourage collaboration
	Affective Expression	SP-AE	Emotions
Cognitive Presence (CP)	Triggering	CP-T	Puzzlement
	Exploration	CP-E	Information exchange
	Integration	CP-I	Connecting ideas
	Resolution	CP-R	Apply new ideas
Teaching Presence (TP1) (Teachers)	Design and Organisation	TP1-DO	Curriculum and methods
	Facilitation of Discussion	TP1-FD	Sharing personal meaning
	Direct Instruction	TP1-DI	Focusing discussion
Teaching Presence (TP2) (Learners)	Facilitation of Discussion	TP2-FD	Sharing personal meaning
	Direct Instruction	TP2-DI	Focusing discussion

Findings and Discussion

What factors supported learner engagement in the discussion forum?

The peer-facilitated discussion forum was designed in such a way, that each learner was required to commence the discussion by posting his/her graphical representation, along with a clear description about that creation. This requirement essentially resulted in sharing of their understanding and knowledge about OER and related concepts. A majority of the posts adhered to this requirement by providing a clear description and also providing constructive feedback to peers.

Some coded excerpts from a threaded discussion are given below as examples:

Dear Peers (SP-AE) ...As I get to know through the study (CP-E)...Those four components are elaborated in my mind map and relationships among them were depicted... (CP-I) I look forward to having progressive comments from you all. (SP-OC)

You have done a good job. (SP-AE) Your presentation is clear, attractive, and colourful. (SP-OC) Many concepts related to OER in one sheet as a summary... (CP-I) I wish if you have included why and what for OER in your presentation it will be a complete map of OER concept. (TP2-FD)

OER is really well elaborated in your graphic presentation. (SP-AE) Now I understood what I missed in my presentation. (CP-I)...I referred a lot but I suffered to fix it into one page. (SP-OC)

...Your graphical representation has missed a lot of basic details about OERs. (TP2-FD) But since this is your first attempt this is good (SP-AE)... One of the prominent weak points ... is that you did not include attributes of OER clearly... (TP2-DI)... Following links may be helpful to you... (TP2-FD) Wish you all the very best...(SP-AE)

Learner engagement in the forum has been facilitated by peer comments. All three presences were observed to be helpful. Usually, the discussions started with social presence, followed with cognitive presence and in some instances teaching presence, and ending with social presence. Most importantly, teaching presence of the student (TP2), in terms of facilitation and providing direction to the peers has been supportive, as indicated by the responses below:

Thank you for responding (SP-AE)...Adding more details information on the licenses was also in my opinion and now since you have also indicated, I would certainly see how this can be applied and improved. (CP-R)

Thank you for your comments. (SP-AE)...I thought to include concepts in a simple way...I could have added some points regarding other concepts too such as license etc. (CP-R)

Interestingly, in many instances, the teaching presence of the teacher (TP1) was observed only at the beginning of the discussion, and it seemed adequate. Following is an example:

Hi to all the members of Group A! (SP-AE) We shall now engage in a dialogue...(SP-GC) The discussion will be on the graphical representations each of you have created...and receiving/providing peer feedback to each other. Please follow the steps...(TP1-DI) Now let us start the discussion going. (TP1-FD) ... All the very best. (SP-AE)...I will intervene only where and when necessary. (TP1-FD)

This post indicated the guidance, instruction and motivation provided by the teacher to support the learners initiate and engage in the discussion.

However, there were some instances where the learners requested further clarifications from the teacher:

I have a doubt that whether CC is beyond or inside the copyright framework. If facilitator will make it clear, would be much thankful. (CP-T)

Good point raised about Copyright and OER. (SP-OC) In OER materials too, the authors do have copyright...To further clarify your doubts, I would suggest you to go through the following resources...(TP1-FD) Keep up the good discussion! (SP-AE)

Thank you very much madam. Great explanation. (SP-AE) Also CC BY ND, CC BY NC ND licenses are least free. Could I know why we are telling those are Not OER also please. (CP-T)

These licenses include ND...So, could you consider such materials as 'true' OER...? (CP-T) Read this interesting blog...what do you think...?? (TP1-FD)

Also, through the careful design of the educational experience (TP2-DI) learners were supported with clear instructions and the assessment rubric with criteria. These also encouraged learners to provide helpful, meaningful, constructive, and critical comments which led to knowledge construction.

Further, these constructive comments helped learners to further improve their individual creations which also contributed in knowledge construction, as exemplified below:

Your effort is highly appreciated. (SP-AE) You have provided the history of OER and it was very useful. (SP-GC)...Further I think it's better to include the concepts such as Open Scholarships, MOOC, Open badges, OER-based e-learning into your presentation. (TP2-DI)

Your presentation is very descriptive and clear. (SP-OC) I think if you include other key concepts which are related with OER namely, MOOC, Open badges, Open scholarship, Open courseware ect. and the links between them and with OER your presentation will be clearer. (TP2-DI)

In accordance with the SBL pedagogical design adopted in the learning experience, before attempting the assessment task, learners were required to self-study and prepare their own creations based on their understandings. By sharing these among the peer group, and through the discussions that followed, peers helped each other build up knowledge.

To what extent interactions among peers in the discussion forum supported their knowledge construction?

Peers interacted with each other in the discussion forum by sharing their understandings, ideas and making constructive suggestions.

See excerpts from a sample discussion thread given below:

Dear All, Herewith I have attached the graphical representation... (SP-GC) I call it a mind map of OER. (SP-OC) It clearly shows the definition of OER and key concepts associated with it...(CP-E; TP2-FD) Then one might think for above purposes 'why people use OER?' (CP-T) To answer that, common reasons why OER are used have also been listed. (CP-I)...What includes in OER is also a problem of interest when one is trying to use OER. (CP-T) Few things were identified to have a general answer to this problem... (CP-I; CP-R)...Finally different formats of resources that are available and some famous OER web sites are also listed. (CP-R)

... I must say that your post is very informative. (SP-OC) It is really helpful to understand the graphical version. (SP-AE) Let's have a look at it. (SP-GC) ...You have been able to indicate all of them in a different manner...It is very clear...All included. (CP-I) The listing of OER resources is little unclear to me. (CP-T)...I think the block which indicates the Challenges of OER is related to our main topic. Therefore, those should be identified as related concepts. (TP2-FD)...I think you have missed out to indicate the relatedness among the concepts...(TP2-DI)

Thank you very much for taking your time to comment on my graphical representation. (SP-AE) As you said I accept that links between concepts are missing. (SP-GC) Honestly, I did not see that until you pointed out. (SP-OC)

The above dialog provides a good example of knowledge construction taking place just between interactions among two individuals. All indicators of Cognitive Presence (Puzzlement, Information exchange, Connecting ideas and Apply new ideas) was evident. At the same time, all indicators of Social Presence (Risk-free expression, Encourage collaboration, Emotions) were also apparent. Further, Teaching Presence of the students (TP2), in terms of facilitation and providing direction when responding to the peers was clearly indicated.

The following posts related to TP2 further specify how such peer interactions have led to knowledge construction.

*...I think you could have indicated the available creative commons licenses rather than showing their nature...
...one of my major concern is, at a glance it is very difficult to understand what is what since there are loads of abbreviations...
...The listing of OER resources is little unclear to me. I think those are OER repositories...
...I would like to suggest you to few things: 1. There are 5 Rs out of which you have mentioned 4Rs. The remaining R is for Retain. 2...5...This will help for better understanding of the OER concept.
...Better if you could identify more characteristics on OERs and if you could further interpret the creative common licenses.*

The detailed analysis of the posts revealed that within the peer interactions, all three presences have occurred which have supported the learners' knowledge construction in different ways. This pattern of knowledge construction was visible in most of the discussion threads, while there were a few instances where some learners were very brief in their self-posts as well as giving peer feedback. In such cases their knowledge construction was not visible and somewhat doubtful.

Concluding Remarks

The findings revealed that the active engagement of learners in the discussion forum in the CPDMOOC has supported their co-construction of knowledge in "Understanding OER" through the peer interactions. Various patterns of peer interactions were observed according to the three types of presences - cognitive, social and teacher presence, all of which collectively and inter-relatedly have supported knowledge construction. The design of peer-facilitated discussion forum in the CPDMOOC has played a significant role in promoting cognitive development, social negotiations as well as teaching/facilitating capacities among the MOOC learners.

It was interesting to note that the peer facilitation in the discussions have supported in developing deep and meaningful understandings of the concept of OER and related concepts among the learners, with minimal intervention by the instructors. However, the instructors' role in creating an enabling learning environment and designing the meaningful learning experience to promote knowledge construction becomes a crucial factor.

The SBL pedagogical approach adopted in the overall course design, which was aligned with a social-constructivist learning approach, has significantly influenced this process. The inter-connected learning activities constructively aligned with the intended learning outcomes made it obligatory for the learners to face the challenges and move forward in the learning process, in a collaborative manner, resulting in their co-construction of knowledge during the process. The study affirms that knowledge construction among MOOC learners can be orchestrated through careful design of peer-facilitated discussion forum learning experiences, based on sound theoretical guidelines and good principles of online learning.

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