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# On lurking: Multiple perspectives on lurking within an educational community

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### Highlights

- Lurkers are invisible, silent learners on the peripherals of the networks.
- Transactional distance can be in multiple forms.
- Lurkers prefer vicarious interaction.
- Combination of internal and external factors can lead learners to lurk.

### Abstract

Lurkers, or as defined in this research, Legitimate Peripheral Participants (LPPs), have been a fundamental aspect of online communities and more research is needed to better understand them. This paper, therefore, examines lurkers in a mixed-method study through the lenses of Transactional Distance, Interaction Types, and Self-Determination Theory and aims to identify their defining features. The findings show that the degree of engagement of any particular LPP is influenced by different aspects of distance and interaction. Time, as an external factor, and lack of interest, as an internal factor, emerge to be the most influential considerations; but a combination of these factors can also lead learners to be an LPP. Characteristic words to define LPPs seem to be ones that have positive connotations and indicate that LPPs learn through less active and visible methods than other learners.

### Keywords

MOOCs; Lurkers; Legitimate peripheral participants (LPPs); Transactional distance and interaction; Self-determination theory

## 1. Introduction

"Lurkers are like stars; not always seen, but always there."

Learning is an essential skill that helps people to survive in their ecosystem. Individuals can learn to improve themselves, make sense of the environment in which they exist, and better integrate themselves into it. It is a complex process and has many forms. In spite of its vital significance, for a long while engagement in learning has been associated with observable behaviours, such as raising one's hand in class or responding a thread in a discussion forum. This assumption has limited our understanding and has led us to explore learning only as a visible and measurable phenomenon.

Online learning environments bring with them many new affordances and possibilities. They provide an opportunity for researchers to revisit concepts of what it means to be a learner, and what it means to engage in learning. In contrast to traditional definitions of learning, this study does not consider learning only as it relates to a set of observable behaviours and rejects confining it into a single dimension.

Instead, this study suggests that learning can happen in many ways and that lurking is one way of learning and interpreting our online and offline, virtual and face-to-face, worlds. Lurkers are often considered to be an elusive group of participants because they are less visible than other learners and thus more difficult to identify and track. Lurkers are, therefore, given many names, some of which are: free-riders, vicarious learners, browsers, witness learners, read-only participants, non-public participants, observers, or invisible learners (Honeychurch, Bozkurt, Singh, & Koutropoulos, 2017). Having reviewed the literature and found various definitions that were both positive and negative, Edelmann (2013) suggests that an understanding of lurkers is important lest there be "misunderstanding of the online environment" (p.647). This study is an attempt at understanding the practice of lurking and lurkers themselves. It uses the term Legitimate Peripheral Participants (LPPs) (Honeychurch et al., 2017; Lave & Wenger, 1991) which has a neutral connotation and defines these learners' characteristics from the perspective of an online learning network.

To this end, the main purpose of this research is to build on our past research and further examine LPPs in online networked learning spaces through three lenses. This research uses Transactional Distance, Interaction Types, and Self-Determination Theory to frame LPPs and seeks to answer the following research questions:

- How do LPPs perceive psychological, emotional, cognitive, and cultural distance? This research question specifically investigates transactional distance.
- How do LPPs interpret learner-learner, learner-facilitator, and learner-content, and learner-interface interaction in an online learning ecology? This research question specifically investigates interaction types.
- What kind of factors drive participants to be LPPs? This research question relates to all three of the proposed frameworks.
- How do LPPs define lurking? This research question builds on our previous research.

## 2. Literature review

While there has been research literature involving the MOOC and Self-Determination Theory (e.g., Beaven, Codreanu, & Creuzé, 2014; Beaven, Hauck, Comas-Quinn, Lewis, & de los Arcos, 2014) these studies tend to not focus on LPPs but rather on participants who are visibly active. The same is true for research that

examines the MOOCs from an Interaction Types lens, and likewise research about MOOCs and Transactional Distance. For this reason, we have not included this literature here.

In our previous research on LPPs within the community we are researching, we concluded that lurking is a complex behaviour on the part of LPPs and that there is no single identifiable reason for choosing to be an LPP (Honeychurch et al., 2017). Lurking is a concept that is hard to define because it is a complex set of behaviors, which are dependent on context (Dennen, 2008). While lurking has been thought of as a generally negative activity characterized by participant disconnection from the community, and passive/silent behaviors, there is some evidence that community members lurk for “valid reasons” (Nonnecke, Andrews, & Preece, 2006, p. 17); that lurkers are actually “actively evaluating perceived community support” (Honeychurch, Bozkurt, Singh, & Koutropoulos, 2016; Yang, Li, & Huang, 2017, p.18) and that learning actually takes place while engaging in what Dennen (2008) describes as “pedagogical lurking” (p. 1624). An example of such pedagogical lurking taking place can be seen in Kop’s (2011) work in MOOCs where participants express positive associations with regard to lurking and learning. Despite the potential negative connotations, Soroka and Rafaeli (2006) indicate that “lurking is an integral and normal part of Internet behavior” (p. 164), and what connects LPPs to other members of their online communities is a shared interpersonal trait of curiosity (Schneider, Von Krogh, & Jäger, 2013).

The reasons for lurking, as mentioned above, are not easy to fully define. Nevertheless, researchers have attempted to explain the various reasons for this online behavior. For example, in early research conducted by Nonnecke and Preece (1999) that examined lurking behaviors of users of ICTs of the time period (e.g., BBS, MOO, newsgroups, discussion forums, etc.), they identified thirteen such factors that impacted a particular user’s decision to be an LPP. These factors can be further organized into the broader categories of personal and emotional, perceived value, community, and privacy and safety. Preece, Nonnecke, and Andrews (2004) identified five factors that impacted lurking and participation: software usability, the necessity of posting, being helpful by not posting, insufficient information about the group, group dynamics/community fit for personal needs. Ridings, Gefen, and Arinze (2006) identified categories such as psychological and trust as barriers to participation in online communities. Nonnecke et al. (2006) found that community design, interaction, and membership were also reasons for participants not posting in an online community. Finally, Sun, Rau, and Ma (2014) identified four categories: environmental, personal, individual-group relationship, and security and privacy.

## 2.1. Theoretical backgrounds

Despite previous empirical attempts to understand lurkers, there is still much to discover about them, and this research intends to contribute to the related literature by examining them through the lenses of three theoretical perspectives. These are Transactional Distance, Interaction Types, and Self-determination Theory:

### 2.1.1. Transactional distance

Transactional Distance is a theory developed by Moore (1983) in order to describe distance education as a pedagogical concept, rather than as a geographical phenomenon. It describes the nature of interactions between learners and teachers in terms of types of distance. Moore (1983) uses the concept of a transaction (Dewey, 1938) in order to explain specific patterns of learner and teacher behaviour. Our study extends Moore’s original model and seeks to explain LPP behaviour in terms of transactional distance by extending Moore’s original categories to include emotional, cognitive and cultural distance as well as the original category of psychological distance. Our intuitions, as participant-researchers in similar online learning communities, were that these facets were likely to affect levels of engagement and were therefore designed our research questions in order to investigate this. We define each of these as follows:

- Psychological Distance: this refers to the distance between an online learner, people and things that are not in their physical vicinity. Typically, these distances can be of four types: temporal, spatial, social, and hypothetical (Lieberman, Trope, & Stephan, 2007). For the purposes of our study, we wanted to separate psychological distance into two sub-categories of cognitive and emotional distance.
- Cognitive Distance: by this, we mean psychological distance viewed solely as an intellectual distance. We were interested in the way that learners related to the conceptual aspects of an online community or its members and whether this would be a motivating factor for some learners.
- Emotional Distance: by this, we mean the amount to which learners care personally about the content of a community or are close to its members. This is similar to affective social distance (Bogardus, 1933), but without the cultural aspect. We wondered if learners would join a course or community purely because they felt emotionally close to a core participant or a member, regardless of the academic content.
- Cultural Distance: this refers to the differences in cultural values that exist between members of different countries (Beugelsdijk, Kostova, Kunst, Spadafora, & van Essen, 2018). In this study, we examined whether participants viewed others from different cultural contexts differently or whether participation was affected by different cultural elements.

### 2.1.2. Interaction types

Interaction, in some form, is a prerequisite for deep and meaningful learning (Moore, 1983). Moore (1989) defined three types of interaction that are necessary when learners are separated in time and space. These are learner-learner, learner-instructor, and learner-content interaction. Moore views learner-content interaction as a defining characteristic of education because without this interaction, according to Moore, there cannot be education (Moore, 1989). Learner-instructor interaction is what is regarded as essential by many educators, according to Moore, because it ties into the ability of the educator to stimulate curiosity and motivation for learning (Moore, 1989). Finally, learner-learner interaction was a new concept at the time of Moore's original writings on the subject, however, this type of interaction has taken on additional significance with the increased importance of social learning theories, with the most recent example being connectivist (Siemens, 2004) approaches to learning. With a focus on the broad use of technology, Hillman, Willis, and Gunawardena (1994) added another interaction type: learner-interface. These four factors were confirmed by Chen (2001) in a study of online learners. In this study, learner-interface interaction refers to components of online learning such as Social Network Sites (SNSs), and hashtags. This research adopts these four types of interaction and seeks to explore how LPPs perceive and interpret their interaction according to each.

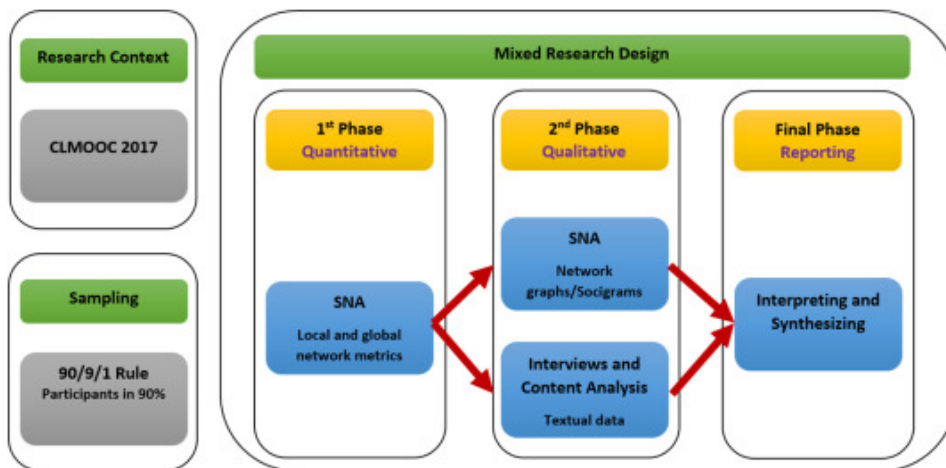
### 2.1.3. Self-determination theory

Self-Determination Theory (SDT) is a theory of motivation that provides an explanation of intrinsic motivation of human innate psychological needs and desires for autonomy, competence, and relatedness (Deci & Ryan, 2000; Ryan & Deci, 2000). It focuses on motivation, distinct autonomous motivation and controlled motivation (Deci & Ryan, 1985) and suggests that intrinsically motivated behaviours are typically autonomous while extrinsically motivated behaviours are controlled. This framework is used here to investigate the intrinsic and extrinsic factors that lead learners to be LPPs and attempts to explain each.

## 3. Methodology

### 3.1. Research model and design

This research analyses LLPs from both quantitative and qualitative perspectives of online learning communities. It, therefore, uses an **explanatory sequential mixed methods design**, which consists of processes that include first collecting quantitative data and then collecting qualitative data (Creswell, 2012). The justification for this design is that while we can derive a general picture from the quantitative analysis, a more refined view and better explanation can be gained through qualitative analysis (Creswell, 2012). The first phase of the research involves Social Network Analysis (SNA), which examines network data from both a numeric and a visual perspective. The second phase used online surveys to collect data, and content analysis to interpret textual data collected from these surveys. The overall research flow is depicted in Fig. 1.



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Fig. 1. The overall research flow.

### 3.2. Research context

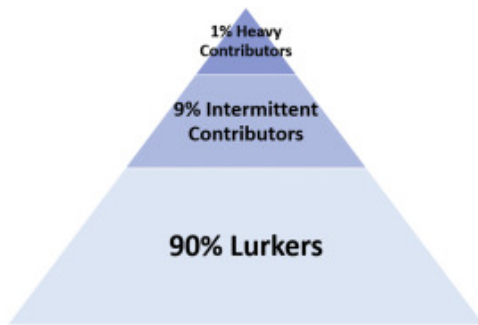
CLMOOC (Connected Learning MOOC) ran from July 10 to August 13, 2017. This was the fifth iteration of CLMOOC, which was originally a collaborative offering from the National Writing Project (NWP) network ([nwp.org](http://nwp.org)) in 2013 and was never tied to any specific institution. CLMOOC was designed and facilitated by a group of educators from NWP in order to support educators in experimenting with designing and learning using the Connected Learning framework. This framework aims to support learning as an interest-driven, production-centered activity in networked, peer-based, communities. The intention of CLMOOC was to provide “an open, collaborative, knowledge-building learning and sharing experience” and “cultivate a community of learners in creative, networked collaboration, centered around making”. In CLMOOC, rather than instructors, there were “teams of facilitators, coaches, and make cycle leaders, as well as other volunteers ... behind the scenes supporting CLMOOC and its community” (CLMOOC, 2017). Importantly, the second ‘C’ in CLMOOC stands for ‘collaboration’ and not for ‘course’ (West-Puckett, Smith, Cantrill, & Zamora, 2018).

### 3.3. Sampling

In order to sample CLMOOC participants, the 90-9-1 Rule was used (Nielsen, 2006). According to this rule, 90% of users are LPPs (they read but contribute little or no content of their own), 9% are contributors (they participate from time to time), and the remaining 1% of users are heavy contributors: in other words, they are leading participants and creators (they participate a lot and account for most contributions) in online



communities (Fig. 2). These values are not exact cut-off points to classify participants but are very useful in framing participation and in identifying research participants.

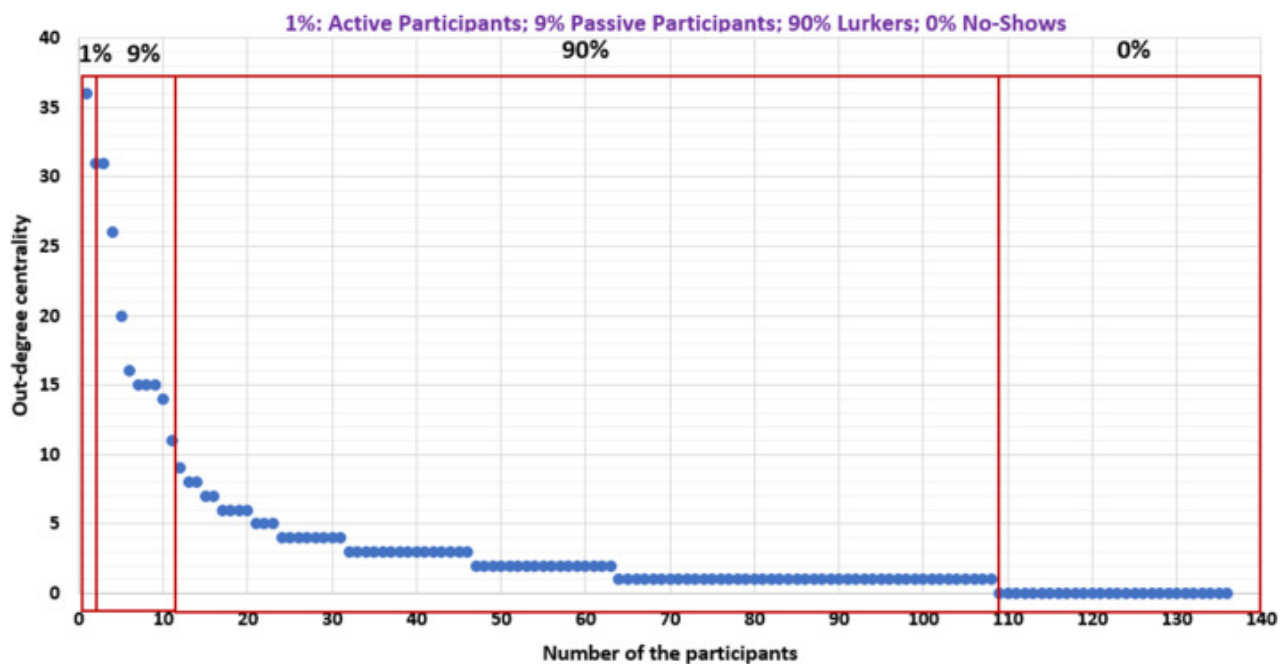


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Fig. 2. 90-9-1 Rule (Nielsen, 2006).

The first week of participation in CLMOOC (2017) was examined according to a metric of out-degree centrality. Out-degree centrality refers to participants' engagement and interaction and, in the scope of this research, it is calculated according to the number of tweets created. The first week is of particular interest as a sample because it included many participants, and thus can be considered as representative. In addition, sampling the first week provided us with an opportunity to take it as a base and to examine whether those in the 90% continued to be peripheral participants. The first week demonstrated that of the 136 participants, 97 were in the 90%, nine were in the 9%, and two were in the 1% (Fig. 3). A total of 28 participants were not included in research as they had in-degree values, but their out-degree values were zero. This means that they were mentioned in tweets with the CLMOOC hashtag, but they did not respond to these mentions. Therefore, they were not really participating. In our sample, 1% was responsible for 15%, 9% for 34%, and 90% for 51% of the out-degree values.



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Fig. 3. Distribution of CLMOOC participants according to their out-degree values.

### 3.4. Data collection procedures, tools, and analysis

There were two phases to the research process. The first phase used SNA for both data collection and analysis. SNA is a technique used for tracking, visualising, and analysing networks (Hansen, Shneiderman, & Smith, 2010) which can also be used to interpret structural patterns of social relationships (Scott, 1991). In this phase, we analyzed network data that was collected by tracking the #CLMOOC hashtag on Twitter. Each participant that used the CLMOOC hashtag was tracked and represented as a node, and their interactions are represented as ties. Based on interactions tracked, local and global metrics of the network is calculated (See Appendix 1 for a glossary of SNA terms). In order to gather network data, the researchers used NodeXL, which is “an extendible toolkit for network overview, discovery and exploration implemented as an add-in to Microsoft Excel” and can be used for “network overview, discovery and exploration” (Smith et al., 2009, p. 255). NodeXL works with many social media platforms and crawls data according to the permissions granted by APIs. The data crawled by NodeXL is then can be further analyzed through global and local quantitative metrics and qualitative network sociograms.

In the first quantitative phase, the network structure was identified by tracking the #CLMOOC hashtag through SNA techniques. In order to identify LPPs, each participant's out-degree values (which refers to the level of engagement and activity) were calculated. Participants in the 90% of the network, in terms of their out-degree values, were identified as being potential participants (LPPs) and were invited to participate in an online survey. In addition to identifying and sampling potential LPPs, we monitored five weeks of network interactions and tracked whether participants change their positions throughout the layers of the network.

In the second qualitative phase, based on local and global network metrics, we visualised those CLMOOC network and participants lying in the 1%, 9%, and 90% positions. The rationale and justification of this classification is explained in the sampling section. Following this analysis, we investigated how LPPs build connections in the network through SNA. After that, the online surveys were delivered to 77 participants out of 97 with identifiable accounts through emails, direct messages, or mentions. A total of 23 participants out of 77, falling within the 90% during the five weeks, responded to the survey (response rate was 29.3%) (see Appendix 2 for online survey questions). Since the research questions were based on specific theoretical and conceptual perspectives, the content analysis of online surveys used the survey questions themselves as themes to be used in this analysis. While reporting the findings, the researchers provided direct quotes to give a voice to the participants, to ensure transparency of the qualitative analysis, to enrich the understanding of readers of this article and add their own interpretation, and most importantly to increase the credibility of the research process.

## 4. Findings and discussion

The first phase of this research presents a network analysis of LPPs' network positions. The second phase provides a deeper explanation based on the survey responses from LPPs. These include topics such as transactional distance, interaction, internal and external factors, and a definition of lurking behaviors.

### 4.1. The first phase

The first phase of the study was the calculation of SNA metrics of the CLMOOC network. Firstly, global metrics (that is to say overall network metrics) were calculated in order to have a holistic view of the network (Table 1). A total of 136 participants (nodes) were identified. There were 1497 interactions (ties)



among these participants. Of all interactions, 385 were self-loops (participants only interacting with themselves that can be observed in any network) which means that these interactions did not mention any other node, but only used the CLMOOC hashtag. Only 6 participants were isolated nodes (i.e., those 6 out of 136 did not connect to any other nodes). Taking 6 steps as a threshold for the distance (Milgram, 1967) gave a maximum geodesic distance value of 5 and an average geodesic distance of 2.704 (which explains the number of required steps for the shortest paths among any other nodes) and therefore indicates a tightly connected network pattern. Graph density value can range between 0 and 1 and in the analysis of the network, where the total number of nodes ( $n=136$ ) and the total number of ties ( $n=1497$ ), was 0.0228. Further analysis demonstrated that the reciprocated node ratio was 0.423. Of the total number of 1497 ties, 741 ties (49.5%) were reciprocated while 756 ties (50.5%) were not reciprocated. According to Dunbar (1992), the number of individuals who can establish a stable communication is 150 which is very close to the number of the participants in our sample ( $n=136$ ). Considering that all these interactions occurred among participants who were separated in time and space; and keeping in mind that in Face-to-face settings reciprocated interactions among 136 participants is not expected, graph density and reciprocated node ratio metrics demonstrate that the sampled network demonstrated interaction in acceptable ranges.

Table 1. Overall global metrics for the CLMOOC network for the first week.

| Metric                               | Value    |
|--------------------------------------|----------|
| Graph type                           | Directed |
| Nodes                                | 136      |
| Total ties                           | 1497     |
| Self-loops                           | 385      |
| Reciprocated node pair ratio         | 0.268    |
| Reciprocated node ratio              | 0.423    |
| Single-nodes                         | 6        |
| Maximum geodesic distance (diameter) | 5        |
| Average geodesic distance            | 2.704    |
| Graph density                        | 0.0228   |

Following this analysis, the local node metrics were calculated. In this step, the nodes were ranked from highest to lowest according to their out-degree metrics. Those nodes with zero out-degree value ( $n=28$ ) were excluded from the sample since this means that even though some participants tried to interact with them (because they have in-degree values), they did not respond to these efforts at all; thus their out-degree value was calculated to zero. The main research sample ( $n=108$ ) was then clustered according to the 90-9-1 Rule. Two participants were grouped in (1%), nine participants were grouped in 9%, and 97 participants were grouped in 90%. The means of local metrics for these clusters are presented in Table 2.

Table 2. Means of the local metrics of the participants clustered according to the 90-9-1 rule.

| 90-9-1     | In-degree | Out-degree | Betweenness centrality | Eigenvector centrality |
|------------|-----------|------------|------------------------|------------------------|
| 1% (n=2)   | 31        | 34         | 3530.978               | 0.047                  |
| 9% (n=9)   | 15        | 18         | 1413.672               | 0.033                  |
| 90% (n=97) | 2         | 2          | 63.778                 | 0.006                  |

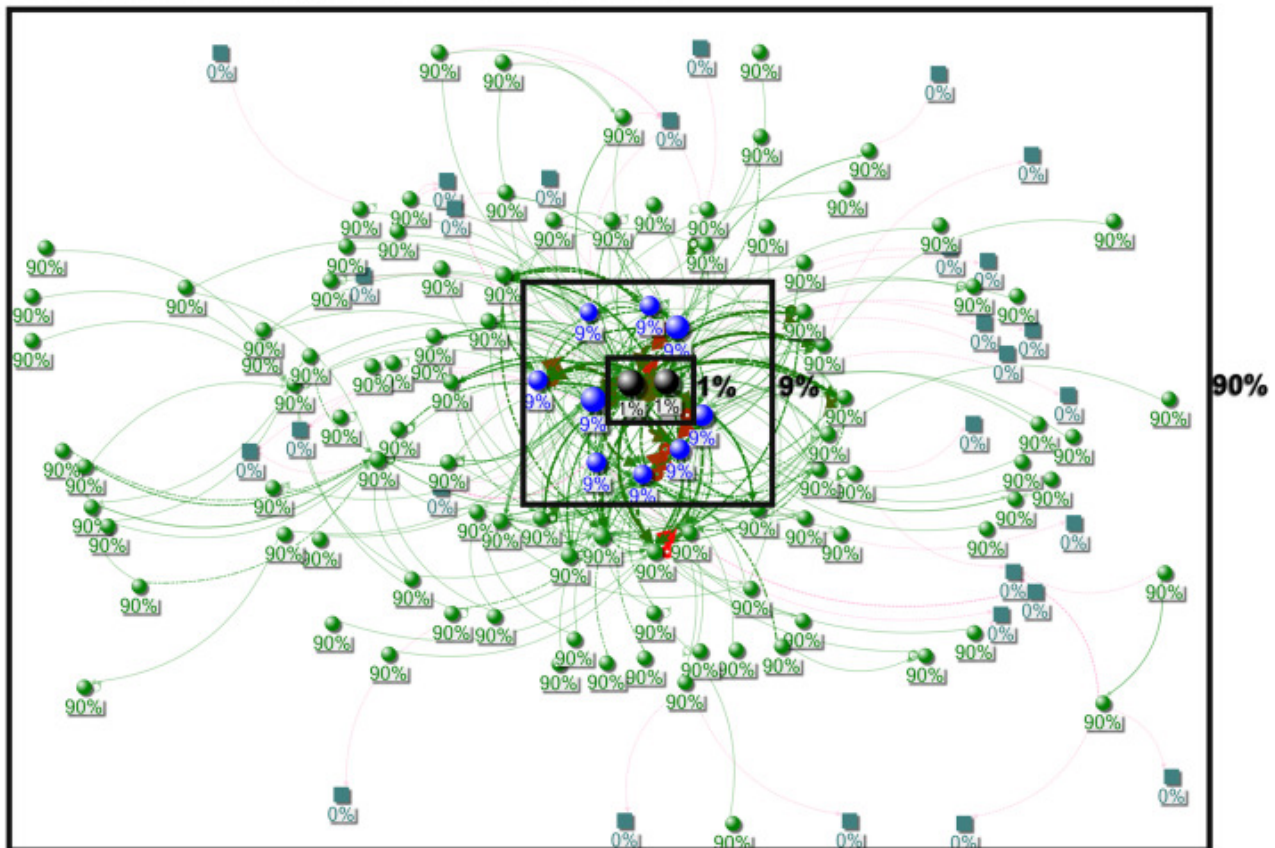
As can be seen in [Table 2](#), when the in-degree and out-degree values of each group are compared, learners in the 90% (LPPs) have limited participation. In terms of betweenness centrality, which refers to the ability to link other participants, eigenvector centrality, and PageRank, which refers to participant prestige, we see that in each instance, those in the 90% play a minor role. When compared, reciprocated node pair ratio provides interesting findings. Accordingly, in addition to the distribution of the out-degree, reciprocated interactions seem to be an indicator of the participants' positions in the network. This further confirms that interaction has a pivotal role and further justifies the theoretical lenses used in this study (e.g., Interaction Types and Transactional Distance). All in all, global metrics ([Table 1](#)) indicate that CLMOOC was a tightly connected learning community with strong connections and interactions, and local metrics ([Table 2](#)) demonstrate that the 90-9-1 Rule is a sound ground to classify participants as LPPs (90%), moderately active participants (9%) and active participants (1%).

#### 4.2. The second phase

In the second phase of the study, the CLMOOC network was visualized based on global and local metrics. To see the overall network structure, a sociogram (network graph) was created using the Harel-Koren Fast Multiscale layout algorithm ([Harel & Koren, 2001](#)). The tie colors, widths, and opacities are based on edge weight values. The node sizes and layout order are based on out-degree values. Nodes in the 1% are marked as black spheres, the 9% as blue spheres, the 90% as green spheres and those in the 0% are marked as grey squares.

As can be seen in the sociogram for the first week, active participants (1%) sit at the very center of the network and moderately active participants (9%) lie around them. However, LPPs (90%) are distant from the center. When [Fig. 4](#) is examined, it can be also seen that those who are close to the center are exposed to much of the interaction, which can be considered important for any social learning. In this sense, it seems to be important to understand how LPPs perceive distance, which kind of interactions they value and what are the internal and external factors that make them LPPs.

Social media network connections among Twitter users for #CLMOOC by Aras BOZKURT



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Fig. 4. Distribution of participants according to 90-9-1 rule.

#### 4.2.1. Transactional distance

In Transactional Distance Theory, distance refers to “the relationship of the two partners in the educational enterprise” (Moore, 1983, p.155). In online learning networks, distance refers to more than just physical distance and, therefore, this section investigates transactional distances from the perspectives of psychological, emotional, cognitive, and cultural distances.

##### 4.2.1.1. Psychological distance

The responses to the online survey indicate that the nature of an online learning environment, and thus how it is perceived by learners, is a determinant of psychological distance. For instance, one of the participants reported that “*the conversations in a course or group and then the subtleties of how people treat each other and that influence how I interact with them psychologically*” (P2). In addition to beliefs formed by the engaged learning community, there is another belief formed by the self itself: “*Depending on my state of mind (lots of anxiety going on right now), I am more or less likely to be actively involved in a community*” (P22). That is, psychological distance can stem from factors in the outer or the inner world of the participants. Overall, the findings indicate that while psychological distance is an indicator of being an LPP, it is difficult to say where, when, and why lurking starts and ends.

The literature also suggests that psychological distance is not one thing, but actually a sum of many smaller components. Different component parts are time, space, social distance, and hypotheticality; and they guide the prediction, evaluation, and behavior of the selves (Trope, Liberman, & Wakslak, 2007). As

well as being an indicator of LPP, decreasing psychological distance would increase a sense of community among learners (Rovai, 2002a), thus helping to form a less hierarchical learning community. Empirical findings also show that psychological distance is a critical predictor of success in distance learning (Shin, 2003). The existing literature and this study's findings thus support the thesis that psychological distance is an indicator of being an LPP and having a sense of community in a learning environment.

#### 4.2.1.2. Emotional distance

The survey responses suggest that when some participants feel and are exposed to emotional distance, they “would drop out altogether rather than stay as an LPP” (P20). However, contrasting views were also articulated. For instance, it was said that participants should not be present for emotional connection, but they should expect to “learn, extend, or change the way I see things” (P2). Another participant suggested that emotional connections are something we hope for, but they are also something we can develop and use to fill the gaps in emotional distance. Supporting this view, it is expressed that participants “would more likely reveal [emotional] presence if [they] had strong feelings about topic” (P14). This means that while emotional distance is an indicator of being an LPP, it is a dimension that is built upon and developed collectively. It also appears that emotional connections provide for a virtuous cycle in minimizing distance: in other words, the more people connect, and the more connected they feel, the more likely they are to be brought in from the periphery. Even though the CLMOOC was not a traditional classroom environment per se, there are potential connections here to the concept of social presence (Rourke, Anderson, Garrison, & Archer, 2001). In learning environments, higher levels of social presence have been linked to more collegial learning communities that encourage participation and interaction (Zhao, Sullivan, & Mellenius, 2014).

Emotional distance determines and shapes how people interact and communicate (Dede, 1996). In this research, it can be seen to shape peripheral participation. In a worst-case scenario it could even induce participants to drop out. Learning is a social process, and even in online learning communities, emotional presence is a significant component of learning experiences (Cleveland-Innes & Campbell, 2012). Thus, emotional engagement can be considered as an indicator of being an LPP.

#### 4.2.1.3. Cognitive distance

The survey responses suggest that type of distance connects to issues of instructional design: more explicitly, the process that learners go through in learning content that is available to them. Our research participants reported that: “I definitely do not feel half as smart as most of the people engaged in the groups where I am lurking. This definitely leads me to lurk more, speak less for fear of saying something stupid” (P15). Therefore, it seems to be “Important for participants to communicate on the same level to get mutual benefits” (P11). The participants' responses reveal that when the content is just beyond their reach or does not meet with the learners in an intermediate space, then a participant will become an LPP: they are still engaged and working with the materials, but not in a visible manner.

Individuals differ in their cognitive processing styles and this affects their decision-making processes (Robertson, 1985). Moreover, it is found that cognitive learning preferences of learners in distance education affect dropout rates (Robertson, 1985). Accordingly, “online learners who have a stronger sense of community and perceive greater cognitive learning should feel less isolated and have greater satisfaction with their academic programs, thereby resulting in fewer dropouts” (Rovai, 2002b, p. 228). Cognitive presence, along with social and teacher presence, is significant for the effectiveness of learning in online communities (Garrison, Anderson, & Archer, 2000). This suggests that cognitive distance will influence a decision to become LPP, or dropout entirely from the course or community.

#### 4.2.1.4. Cultural distance



In the previous sections, the findings demonstrated that psychological, emotional, and cognitive distances affect participants' decisions to be an LPP or dropout altogether. Cultural distance, however, seems to have little effect. Moreover, participants' attitudes toward cultural distance seemed to be positive. For instance, by interpreting cultural diversity as richness, one of the participants stated that cultural distance is *"only a minor problem and more enriching"* (P11). In a similar fashion another participant said that *"cultural diversity enhances the online experience"* (P17). It seems that, as long as there are no communication barriers resulting from cultural diversity, participants embrace it: *"I tend to stay around if I am interested, even if the cultural frame is distant - but linguistic difference prevents me from lurking"* (P18).

## 4.2.2. Interaction types

### 4.2.2.1. Learner-learner interaction

The survey responses show that learner-learner interaction is important as long as it is *"nurtured along"* (P1) which requires *"equality and willingness on both sides to have an open discussion"* (P6). It can be an important motive for participation in a learning network: *"when you lurk, you feel like you're not a 'core member', so having someone like or reply to your comments is affirming"* (P8). More importantly, such interaction *"helps [them] to feel engaged with the learning experience and makes [them] want to come back for more. The more [they] get to know people, the more [they] want to know about them. And this is where the learning happens for [them]"* (P15). Another participant indicated that they *"think of personal commentary, feedback, sharing, and reaction"* (P2) emerging as important interactions between participants, and at the same time a concern for others' time emerged; for instance, one participant indicated that they *"worry that [they] would intruding on their space and time"* if they interacted more (P2).

### 4.2.2.2. Learner-facilitator interaction

Some responses suggested that learner-facilitator interaction is necessary to get *"guidance, support, encouragement when needed"* (P1). If learners see or feel supportive efforts by facilitators, that would *"encourage [them] to join in"* (P10) the conversations. Interaction with facilitators *"is valued, especially if the facilitator interacts with [them]"* (P14). An interesting dynamic was also noted by one participant: *"I feel like facilitators can sometimes forget about those who are on the peripheral or figure they have made the decision to take that role and thus they don't have to work as hard to get them involved"* (P16). This seems to indicate that facilitators have the power to engage LPPs to become more central members of the network, and that some LPPs have come to expect that the facilitator will reach out to them instead of relying on self-determination of the LPPs.

### 4.2.2.3. Learner-content interaction

The survey responses suggest that some learners are interested in the content of a course to *"drive their participation"* (P13) and *"such interaction is necessary to get 'feedback from others'"* (P14), thus enabling communication with others in the learning network. However, other responses differ, suggesting that some *LPPs find learner-content interaction enough for their learning experience*. For instance, one respondent wrote that *"[participants] like being able to interact with content without the pressure of socializing"* (P8) and that they perceive this type of interaction as *"the creativity and learning"* (P5). This participant's comment seems to corroborate Anderson's Equivalency Theorem where meaningful learning is supported as long as one of the forms of interaction is at a high level (Anderson, 2003). It should be noted that, in his work, Anderson only considers Moore's original three forms of interaction. Some LPPs believe that they are active participants by virtue of their interactions with content, but not with the other participants, saying that they are usually: *"interested in the content rather than personal interactions so want to learn but don't want to necessarily have to deal with other people in order to do the learning."* (P16). Some LPPs say that learner-content interaction is significant for them: *"If I don't contribute to the content, then I am not contributing to the*

discussion" (P1). Some feel that learning without visible presence would not be a problem for them "...I'd be happy just to learn from the materials in the course" (P6); others participate in such experiences knowing that their interaction will be limited to content only: "I prefer courses where you are supposed to interact with the content rather than just memorize it" (P20). This confirms that interaction can be in different forms, in different quantities, sometimes not visible, and its presence can be limited to oneself only. In sum, the findings indicate that interaction with content is valued by some LPPs.

#### 4.2.2.4. Learner-interface interaction

This interaction type refers to interaction with learning materials such as websites, learning platforms, mobile apps, hashtags, and so on. One of the responses indicates an important fact about lurking: "if the interface reveals our presence, participants may not feel unacknowledged" (P13), that is if LPPs interact with different interfaces, they are there and present even if their identifiable participation is lower than expected, or lower than in relation to other participants. It was also noted that the interfaces should be "simple enough for people [with lower digital literacy] to engage with" (P20). The platforms, or sites, used in a community are an important factor that influences the level of participation, and whether or not someone will be an LPP. As one of our participants noted, there are "multiple platforms, some seem more intimate others more distant" (P13). The level of comfort with a particular platform influences "how much tuned in" to the course an LPP will be (P12), hence, a specific platform determines the level of engagement in the community and impacts decisions about LPP.

The literature suggested that interaction, in some form, is required for deep and meaningful learning (Moore, 1983) and participation is an intrinsically visible part of learning (Wenger, 1998). Our findings show that all four types of interaction provide nuanced reasons why some participants chose to be an LPP. LPPs' explanations for learner-learner, learner-facilitator, and learner-interface interactions show various reasons for being an LPP, while the responses about learner-content interaction reveal some interesting findings on both the reasons they chose to be an LPP and their learning experiences as LPPs.

Equivalency Theory (Simonson, 1999) explains that only one type of interaction can contribute to educational effectiveness (Anderson, 2003). As illustrated above, this might explain why, in our study, LPPs tended to prefer learner-content interaction and ignore other interaction types - i.e. they did so because they were satisfied with this as a learning experience. Their behaviour can be described as vicarious interaction (Kruh & Murphy, 1990) which "takes place when a student actively processes both sides of a direct interaction between two other students or between another student and the instructor" (Sutton, 2000, p.4). Those who interact vicariously read, observe, and learn from interactions of others and do not feel obliged to directly interact with those others. The literature also reports that some learners prefer such online or distance learning experiences to conventional, face-to-face experiences because they want to be more autonomous and independent without feeling compelled to socially interact with others (Daniel & Marquis, 1988). In summary, it seems that LPPs are satisfied with learner-self interaction, which is invisible, uncountable and vicarious in nature.

#### 4.2.3. Internal and external factors of LPPs

To better understand what causes somebody to be an LPP, our research investigated internal and external factors that might lead to this behavior. The findings demonstrated that time (n=12) is the main external factor, followed by professional commitments (n=4), digital literacy (n=3), difficulties in multitasking (n=2), family commitments (n=2), gatekeepers (n=1); lack of interest (n=6), lack of curiosity (n=4), self-efficacy (n=4), easy connectivity (n=4), inability to tune in (n=3), lack of confidence (n=2), mood (n=1), anxiety (n=1), fear to connect (n=1), and fear of failure (n=1) (Fig. 5). However, it should be noted that either just one or a combination of these factors can lead learners to become an LPP. It could be that this list is not exhaustive, and that factors other than those listed here might emerge in different networked learning spaces.





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Fig. 5. Internal and external factors leading a learner to be an LPP.

#### 4.2.4. Defining LPP behaviour

In order to better identify the characteristics of LPPs, we asked research participants to provide us with positive words that define LPPs actions as well as negative words they did not like but are nevertheless used to define LPPs. We first defined the most apparent words for active participants, moderately active participants, LPPs (lurkers), no-shows, and drop-ins (Table 3). We then compared both positive and negative words reported by survey respondents. Next, we identified some words reported by research participants such as “hiding”, “sneaking”, “creeping”, and “skulking” which are loaded terms and portray LPPs in negative roles. From this, we determined that LPPs do not like the word *lurking* and found it “dirty” (P24). We also excluded synonyms of these words that were given as positive representations of LPPs (e.g., soaking up, absorbing, etc.). In all, we prepared the following table that characterizes the engagement level of participation with a special focus on LPPs actions.

Table 3. Characteristic words that define different levels of participation.

|   |  |  |  |
|---|--|--|--|
| <b>Active participants:</b><br>creating, curating,<br>writing, actively<br>engaging,<br>welcoming | <b>Moderately active participants:</b><br>contributing, helping,<br>developing,<br>commenting,<br>discussing | <b>Lurkers:</b> watching, listening, reading, observing,<br>digesting, wondering, browsing, following, tracking,<br>quiet learning, vicariously participating, internally<br>engaging, invisibly engaging, introverted participating | <b>No-shows:</b><br>waiting,<br>pausing, by<br>standing,<br>seeking<br>opportunity |
|---|--|--|--|

Drop-ins: picking up, benefiting, visiting, looking up, stopping by

## 5. Conclusion and suggestions

In this paper, we have explored the perceptions of LPPs through the lenses of psychological, emotional, cognitive, and cultural distances. The perceptions that learners have of these distances, and how they perceive each one, factor into the decision that each learner makes as to how close to the core, or what degree of engagement, will define their status as an LPP. Cognitive and emotional distance appear to have more concrete connections to the decisions made by individual LPPs with prior connections to individuals, or connections to knowledge types being flagged as important. The more connected an LPP is to other people or the knowledge presented, the more they seem willing to move closer to the core. The fewer the connections, the more they drift toward the periphery and become an LPP. Cultural distance appeared to be minimal in CLMOOC which may be unsurprising, given that it began as a project to support North American teachers, and thus began with a fairly homogenous group. In future research, it would be interesting to examine LPP's perceptions in a community that is not as established as CLMOOC or that draws a wider variety of participants in order to examine whether cultural distance plays a role in such networks and learner decisions in deciding their presence level in the course.

**Learner-learner interaction** plays a role in how learners feel about their learning experience. Increased learner-learner interaction brings out feelings of actually being engaged in the learning process, even for LPPs. As described in the findings of emotional distance, this is a type of virtuous circle: the more learners interact and connect, the more they feel encouraged, interested, or internally compelled to participate. There are also those who might be characterized as thoughtful lurkers who consider the interests of other participants and do not want to impose their interest in additional interaction on them. While some view learner-learner interaction as a way to 'delurk' and move from the periphery closer to the core, others view

**Learner-facilitator interaction** as the way to accomplish this. There appears to be a fine balance for learner-facilitator interaction: enough interaction to get participants going, but not too much so as to stifle participant creativity. This fine balance coupled with differing perceptions of what learners think the right balance is can make it difficult to get learner-facilitator interaction 'just right'. Even if learner-facilitator interaction is just right, there is something to be said about being interested in the content itself, and our findings in learner-content interaction lead us to think that there is a contextual dependency on content and how interesting it is to the learner. If a learner is not particularly interested in the weekly content, information, or activity they may decide to be an LPP for a week and watch from the sidelines and engage more visibly in subsequent weeks when the topic is more of interest. This, in the past, has been called the dip-in/jump-out nature of MOOC participant interactions (de Waard et al., 2011). Finally, with regard to learner-interface interaction, an unsurprising discovery is that the platform interface impacts decisions of

**degree of engagement of LPPs. The easier the platform is to navigate, the lower the barrier to participation.** We would, however, suggest that user experience is not necessarily the same for all users. In our previous paper on LPPs in this community (Honeychurch et al., 2017) we discovered that different participants preferred different social platforms: for example, one platform was seen as useful or engaging by one LPP, but that same platform was not perceived to have the same value-positive attributes by another

user. When considering Interaction Types, it may be useful to think of Anderson's Interaction Equivalency Theorem (2003). The idea of getting all interactions 'just right' for all learners in a course is most likely a fool's errand, however, if viewed from the perspective of Anderson's theorem LPPs can have a meaningful engagement with content, ideas, and others, if learner-content and learner-interface interactions are high even if learner-learner and learner-facilitator are low.

Finally, in terms of external factors that impact the degree of engagement of LPPs we see lack of time and other professional commitments being identified as the biggest of the barriers that influence an LPP's actions. Additionally, lack of interest and curiosity seems to be effective internal factors that influence an LPP's decision. We do see connections to different types of interactions and distances as well, but the biggest barrier, time, is outside of the scope of these examination lenses.

Our research findings have some important implications for learning design practice. The biggest implication of this research, in our view, is that learning designers should design by keeping not only active participants in mind but also considering the potential lurker. Learning spaces should be provided where one can lurk yet still be an effective learner. To be clear, we are not simply advocating for a self-paced eLearning model where learners only interact with the content, rather we think that the learning design of courses should provide affordances that enable guilt-free lurking for participants should they find themselves in an LPP position. The learning design could also create an environment that provides for easy points to dip in and out of the course so that learners can more easily modulate their modes of engagement. For example, a MOOC that requires learners to join a group, and stay active within that group for the duration of the MOOC, makes lurking potentially more appealing to people who want to engage with certain aspects of the course. These learners might be interested in engaging more (becoming part of the 9%) during specific times in the course, but an up-front commitment might be something that prevents them from more targeted participation. It should be highlighted that our focus is on larger environments that can sustain both a core of active participants that keep the community going, while supporting the engagement of a larger LPP population. These principles of pedagogical designs that provide that space for lurking and provide for better dip-in points in the course, may be applicable to the designs of smaller learning environments, such as traditional college courses, but this is not our own frame of reference.

There are several strands of future research that this paper could motivate. One would be to investigate in more depth why some learners express the lack of sufficient time as a reason for not engaging. We have hypothesized that using lack of time as their rationale for lurking is a culturally accepted way to save face when an LPP decides to intentionally move to the periphery, or to drift into the periphery. This face-saving mechanism could work both ways. If the lack of engagement is intentional it saves face for other participants who are engaging and organizers who put the effort into organizing and facilitating and it validates in a non-confrontational way that the activity is of value, but just not that particular LPP. If the drift is unintentional (e.g., the LPP simply forgot), the lack of time argument is a face-saving mechanism for the LPP themselves by not casting them in a potentially negative light within the community. Another area of research interest would be to examine the user experience of participants from a holistic perspective. We know from our previous research that a single platform will not satisfy all participants (Honeychurch et al., 2017), hence LPPs in one platform may not be LPPs in another. Uncovering what particular features and affordances platforms have, and how those impact the degree of engagement would be helpful in the design and implementation of such learning communities.

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## Ethics approval and consent to participate

Ethics approval was obtained from “College of Social Science Ethics Committee, University of Glasgow, No: 400150106”. Each research participant for online asynchronous interviews signed a consent form.

## Appendix 1. Social network analysis glossary ([Bozkurt et al., 2016](#)).

- Node: Nodes can also be called “vertices, agents, entities, actors or items and they may represent people or social structures such as work groups, teams, organizations, institutions, states, or even countries” ([Bozkurt et al., 2016](#), p. 9).
- Tie: They can “represent any form of relationship or connection that occurs through exchange or interaction between two” ([Bozkurt et al., 2016](#), p. 29) or among many nodes and can also be called “links, edges, connections, arcs, and relationships and they may represent many different types of relationships like proximity, collaborations, kinship, friendship, citations, hyperlinking, transactions, and shared attributes” ([Bozkurt et al., 2016](#), p. 9).
- Degree/Degree Centrality: The metric refers to “total number of unique edges (in and out) that are connected to a vertex [node]. When the graph is directed, degree metrics can be indegree (points inward) or outdegree (points outward) ([Bozkurt et al., 2016](#), p. 29). If the indegree refers node itself, it is called a self-loop.
- Betweenness Centrality: The metric refers to “a node's ability to bridge different subnetworks in a network. In other words, it is a measure of a node's centrality in the network which is equal to the number of shortest paths from all other vertices to all others that pass through that node” ([Bozkurt et al., 2016](#), p. 29).
- Eigenvector Centrality/ Page Rank: The metric “indicates influence score for strategically connected vertices which takes into consideration not only how many connections a vertex has, but also the degree of the vertices that it is connected to. Similarly, The PageRank algorithm is a variant of eigenvector centrality” ([Bozkurt et al., 2016](#), p. 29).
- Geodesic Distance: The metric which refers to “length of the shortest path between vertices” ([Bozkurt et al., 2016](#), p. 29).
- Graph Density: The metric which “that measures the sum of edges divided by the total number of possible edges and demonstrates the level of interconnectedness of the vertices” ([Bozkurt et al., 2016](#), p. 29).
- Reciprocated Node Pair Ratio: The metric indicates the degree of the mutual relationship between the nodes.

## Appendix 2. Online survey questions

(Participants accessed the survey questions only after agreeing to participate in the research and signing consent form)

1-When you act as a legitimate peripheral participant (LPP) in an online learning community (AKA: silent learner, invisible learner, observer, browser, read-only participant, vicarious learner, free-rider, or witness learner), how would the following distance types influence or affect your behaviour?

- Psychological distance:
- Emotional distance:
- Cognitive distance:
- Cultural distance:

2-When you act as a legitimate peripheral participant, what do you think of each type of interaction and why?

- Participant-participant interaction:
- Participant-facilitator interaction:
- Participant-content interaction:
- Participant-Interface (technological medium, SNSs, hashtags etc.) interaction:

3-What internal factors drive you to be an LPP?

4-What external factors drive you to be an LPP?

5- Which words/verbs do you prefer to associate with the act of lurking?

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