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## LEARNERS ON THE PERIPHERY: LURKERS AS INVISIBLE LEARNERS

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### Abstract

Lurkers, who are also known as silent learners, observers, browsers, read-only participants, vicarious learners, free-riders, witness learners, or legitimate peripheral participants (our preferred term), tend to be hard to track in a course because of their near invisibility. We decided to address this issue and to examine the perceptions that lurkers have of their behaviour by looking at one specific online learning course: CLMOOC. In order to do this, we used a mixed methods approach and collected our data via social network analysis, online questionnaires, and observations, including definitions from the lurkers of what they thought lurking was. We then analysed the data by using social network and content analyses and interpreted the research findings using the concept Community of Practice, with the Pareto Principle used to delimit types of learner. Our research findings revealed that lurking is a complex behaviour, or set of behaviours, and there isn't one sole reason why lurkers act the ways that they do in their respective communities. We concluded that for a more participatory community the more active, experienced or visible community members could develop strategies to encourage lurkers to become more active and to make the journey from the periphery to the core of the community.

### Abstract in Turkish

Sessiz öğrenenler, gözlemciler, tarayıcılar, sadece okuyan katılımcılar, hayali öğrenenler, bedavacılar, tanık öğrenenler veya bu çalışmada da tercih edildiği üzere çevresel katılımcılar olarak da tanımlanan gizil öğrenenler, neredeyse görünmez olmalarından dolayı bir ders sürecinde takip edilip belirlenmeleri zor olan öğrenenlerdir. Bu bağlamda bu konuya değinebilmek ve gizil öğrenenlerin davranışlarından kaynaklanan anlayışlarını inceleyebilmek için çevrimiçi bir ders olan CLMOOC incelenmiştir. Bu amaçla karma araştırma yöntemi benimsenmiş ve gizil öğrenenlere yönelik yapılan tanımlar da incelenip çalışmaya dâhil edilerek, sosyal ağ analizi, çevrimiçi anket ve gözlem yoluyla araştırma verileri toplanmıştır. Elde edilen veriler sosyal ağ analizi ve içerik analizi yoluyla incelenmiş, araştırma bulgularının yorumlanmasında Uygulama Toplulukları, öğrenenlerin belirlenmesinde ise Pareto Prensibi'nden faydalanılmıştır. Araştırma bulgularına göre gizil öğrenme karmaşık bir davranış veya davranışlar bütünüdür ve gizil öğrenenlerin ilgili öğrenme topluluklarında niçin bu şekilde davrandıklarına yönelik tek bir sebep yoktur. Araştırma sonucuna göre, daha katılımcı bir topluluk oluşturabilmek amacıyla daha aktif, deneyimli veya görülebilen, belirgin topluluk üyeleri gizil öğrenenleri daha aktif olmaya teşvik etmek ve onların çevresel yörüngeden merkezdeki ana topluluğa doğru yolculuklarını sağlamak için stratejiler geliştirmeleri önerilmektedir.

### Abstract in Greek

Οι ενεδρεών χρήστες, «lurkers» στα αγγλικά, και κοινώς γνωστοί με άλλους όρους όπως για παράδειγμα «σιωπηλοί μαθητές», «παρατηρητές», «περιηγητές», «συμμετέχοντες που μόνο διαβάζουν και δεν συμμετάσχουν», «μαθητές μέσω δοτής εμπειρίας», «παρασιτικοί μαθητές», ή και «θεμιτοί περιμετρικοί συμμετέχοντες» (ο τελευταίος όρος είναι ο όρος που προτιμάμε). Σε αρκετές περιπτώσεις οι ενεδρεών είναι δύσκολο να ανιχνευτούν σε ένα διαδικτυακό μάθημα ή μια

διαδικτυακή κοινότητα λόγω του ότι είναι σχετικά αόρατοι εντός του μαθήματος. Η ομάδα μας αποφάσισε να εξετάσει το θέμα των ενεδρευών, και να εξερευνήσουμε τις αντιλήψεις που έχουν οι ίδιοι οι ενεδρευών για τις δράσεις τους εντός μαθήματος. Το συγκεκριμένο μάθημα για την έρευνα μας ήταν ένα ανοιχτό διαδικτυακό μάθημα, το CLMOOC. Χρησιμοποιήσαμε έρευνα μεικτής μεθόδου και συλλέξαμε δεδομένα μέσω κοινωνικού δικτύου, διαδικτυακά ερωτηματολόγια, και τις παρατηρήσεις που κάναμε ως ερευνητές. Τα δεδομένα συμπεριλαμβάνουν και ορισμούς από τους ενεδρευών για το πως καθόριζαν οι ίδιοι τέτοιου τύπου δράσεις. Αναλύσαμε τα δεδομένα μέσω ανάλυσης κοινωνικού δικτύου και μέσω ανάλυσης περιεχομένου. Ερμήνευσαμε τα ευρήματα μας χρησιμοποιώντας το πλαίσιο των κοινοτήτων πρακτικής (community of practice) όσο και την αρχή Pareto για να καθορίσουμε τα ώρια μεταξύ διαφόρων τύπων μαθητών. Τα ευρήματα μας παρουσιάζουν μια εικόνα που δείχνει πως οι δράσεις και η συμπεριφορά των ενεδρευών είναι πολυσύνθετη, και δεν υπάρχει ένας και μοναδικός λόγος για τον οποίον οι ενεδρευών δρουν με τον τρόπο που δρουν εντός των κοινοτήτων τους. Καταλήξαμε στο συμπέρασμα ότι για να υπάρχει μια πιο συμμετοχική διαδικτυακή κοινότητα τα μέλη της κοινότητας που είναι πιο ενεργά, πιο ορατά, και πιο έμπειρα εντός της κοινότητας, θα μπορούσαν να αναπτύξουν διάφορες στρατηγικές έτσι ώστε να ενθαρρύνουν τους ενεδρευών να γίνουν ακόμα πιο ενεργά μέλη και να μεταφερθούν από την περίμετρο της κοινότητας προς το κέντρο της.

### **Abstract in Chinese**

亦被称为沉默学习者·观察者·浏览者·只读参与者·替代学习者·搭便车者·见证学习者或合法的周边参与者(我们的首选术语)·因为近乎隐形·往往在课程中难以追踪。我们旨在解决这个问题·并通过调查一个特定的在线学习课程(CLMOOC)来研究潜伏者对于其自身行为的看法。为此我们采用了混合研究方法·并通过社交网络分析·在线问卷调查和观察等方式收集了我们的数据(即潜伏者对潜伏行为的定义)·然后·我们通过使用社交网络和内容分析来分析数据·并使用实践社区的概念解释研究结果·使用帕累托法则界定学习者的类型。我们的研究结果显示·潜伏是一种复杂的行为或一系列行为·而且没有单一的原因可以解释潜周边者在各自不同社区的行为方式。我们的结论是·对于一个更具参与性的社区·更积极·经验丰富或可见的社区成员可以制定策略·鼓励潜伏者变得更积极·完成从社区的周边到核心的转变历程。

### **Abstract in German**

Passiv Zuschauende ("lurker"), die auch als stumme Lernende, Beobachtende, Stöbernde, nurlesend Teilnehmende, indirekte Lernende, Trittbrettfahrende oder legitim peripher Lernende (der von uns bevorzugte Begriff) bekannt sind, sind schwer in einem Kurs zu verfolgen, da sie nahezu unsichtbar sind. Wir haben uns dieses Themas angenommen und die Wahrnehmungen, die passiv Zuschauende des Online-Kurses "CLMOOC" von ihrem eigenen Verhalten hatten, untersucht. Zu diesem Zweck haben wir einen Methodenmix unter Nutzung von Sozialer Netzwerkanalyse, Online-Fragebögen und Beobachtungen verwendet, der auch eigene Definitionen passiven Zuschauens ("lurking") von den passiv Zuschauenden selbst enthält. Die Datenanalyse erfolgte unter Verwendung von Sozialer Netzwerkanalyse und Inhaltsanalyse. Die anschließende Interpretation der Daten erfolgte auf Grundlage des Modells einer Community of Practice in Verbindung mit dem Pareto-Prinzip, um Lernendentypen unterscheiden zu können. Unsere Forschungsergebnisse zeigen, dass passives Zuschauen ein komplexes Verhalten oder eine Reihe von komplexen Verhaltensweisen ausdrückt, und dass sich das Verhalten von passiv

Zuschauenden in ihren jeweiligen Communities nicht auf einen einzigen Grund reduzieren lässt. Wir schließen aus unseren Forschungsergebnissen, dass zur Erreichung einer stärkeren Teilnahme aktive, erfahrene und sichtbare Mitglieder der Community Strategien entwickeln sollten, die passiv Zuschauende dazu ermutigen, aktiver zu werden und die Reise von Rand der Community zu ihrem Zentrum zu machen.

### **Abstract in Portuguese**

*Lurkers*, também conhecidos como “alunos silenciosos”, “observadores”, “navegadores”, “participantes que só leem”, “aprendizes vicários”, “usuários livres”, “testemunhas”, ou “legítimos participantes periféricos” (nosso termo preferido), tendem a ser difíceis de acompanhar ao longo de um curso devido à sua quase invisibilidade. Nós decidimos explorar essa questão e examinar as percepções que os *lurkers* têm do seu próprio comportamento através da análise de um curso *online*: CLMOOC. Para tal, métodos mistos de pesquisa foram utilizados, e nossos dados foram coletados através da análise de redes sociais, questionários *online*, e observações, incluindo as definições dadas pelos próprios *lurkers* sobre o que eles julgam como *lurking*. Em seguida, análises de redes sociais e conteúdo foram conduzidas, e os resultados da pesquisa foram interpretados utilizando a noção de Comunidade de Prática. O Princípio de Pareto foi utilizado para delimitar os tipos de alunos. Os resultados dessa pesquisa apontam que *lurking* é um comportamento complexo, ou um conjunto de comportamentos, e que não há uma única razão pela qual os *lurkers* agem dessa maneira nas suas respectivas comunidades. Nós concluímos que, para o desenvolvimento de uma comunidade mais participativa, os membros mais ativos, experientes ou visíveis podem desenvolver estratégias para encorajar os *lurkers* a se tornarem mais ativos e a ingressarem na jornada da periferia para o centro da comunidade.

**Keywords:** lurkers, legitimate peripheral participants, invisible silent learners, peripheral learners, online learning networks, Community of Practice, Pareto Principle.

### **Introduction**

Online networked learning spaces have brought many opportunities for lifelong learners who traverse among and between networks in their quest for information and knowledge. The globally connected, distributed networks host many learning communities in which lifelong learners participate in more or less active manners. In the literature, these learners are categorized based on their participation levels. For instance, deWaard et al. (2011) categorized them into three categories: “memorably active participants, moderately active participants”, and “lurking participants”. Kizilcec, Piech, and Schneider (2013) categorized them as “completing, auditing, disengaging”, and “sampling” learners. Similarly, Hill (2013) identified these learners as “active participants, passive participants, drop-ins, lurkers/observers”, and “no-shows”. Building on all of this, we suggest that these learner types can be explained by looking at the following variables: “community ecology, membership/participation, knowledge type”, and “individual roles” (Figure 1). Although the related literature provides some explanation about active learners (posters of information in a network) (Walker, Redmond, & Lengyel, 2010; Rafaeli, Ravid, & Soroka, 2004), there is still work to be done analysing lurkers who by their very nature are difficult to observe and quantify.

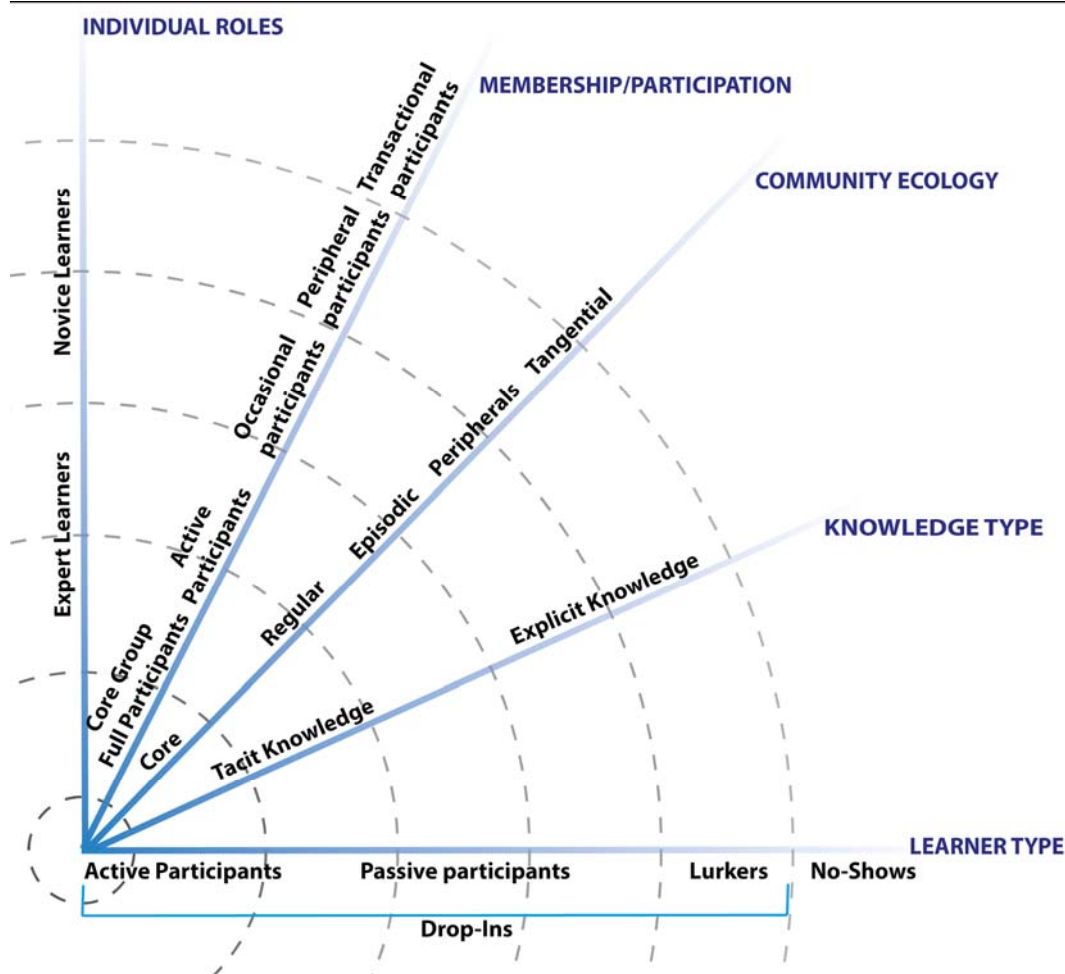


Figure 1. Learners' participation levels and their position in layers of a learning network

The diagram above shows how lurkers hold a peripheral position in a learning network in terms of individual roles, membership/participation, community ecology, and knowledge type. However, it is also possible that lurking learners can move inwards through the layers and reach the core of the learning network, which means that their engagement in the learning network may transform them from no-shows into lurkers, and from passive participants into active participants.

## Research Questions

This paper aims to shed some light on lurkers and lurking in online learning communities. In particular, this study seeks answers for the following research questions:

1. How is lurking perceived by lurkers?
2. How is contribution defined from the perspective of a lurker?
3. Why do people lurk (rather than joining in)?
4. Do lurkers feel part of the community?
5. What might persuade lurkers to join in?
6. Is lurking a lesser experience than participating, or just a different one?

## Literature Review

How do we define lurkers? A standard dictionary definition of the term is “to read messages written by other people on the Internet in a newsgroup, chat room, etc., without writing any messages yourself,” however the term can also have negative connotations and be defined as “to wait in a secret or hidden place especially in order to do something wrong or harmful” (both from The Merriam-Webster Dictionary, n. d.). A definition of the term in dictionaries that are more technology oriented appears less biased, despite the origins of the term. NetLingo for example defines the term as “a visitor to a newsgroup, chat room, blog, or social networking site” (NetLingo, n.d.), perhaps juxtaposing *visitors* with *residents* who participate more actively in their respective communities. Turning to the academic literature, lurkers are defined by Rafaeli et al. (2004) as persistent, silent, members of a community who are present but, never or rarely contribute to the interactions happening within the community. Similarly, Ridings, Gefen, and Arinze (2006) define lurkers as members of a community who participate in online discussions regularly but interact less frequently.

In their review of the literature on lurkers Walker et al. (2010) have found that different types of names have been suggested for this group of users, names such as Free-Riders (Sweeney, 1973; Kollock & Smith, 1996), Vicarious Learners (Lee & McKendree, 1999), Browsers (Salmon, 2002), Legitimate Peripheral Participants (McDonald, 2003; Lave & Wenger 1991), Witness Learners (Fritsch, 1997; pp.355-378), and Read-Only participants (Williams, 2004), – to name a few. These terms provide a less judgmental view of the activities of lurkers than in the paragraph above and in some cases the terminology even seems positive, as is the case with Legitimate Peripheral Participants.

Some researchers have attempted to identify the factors that cause individuals to be lurkers or active participants. Focusing on motivational factors, Sun, Rau, and Ma, (2014) claim that the nature of an online community may affect community members’ impression of the community, and therefore influences users’ willingness to participate and the extent of their participation. Accordingly, online community factors (group identity, pro-sharing norms, reciprocity, and reputation), individual factors (personal characteristics, self-efficacy, goals, desires and needs), commitment factors (affective commitment, normative commitment, and continuance commitment), and quality requirement factors (usability, security, privacy, convenience, and reliability) may affect community members’ motivation thus resulting in the differentiations between a lurker and an active participant, or somewhere between these two edges of the continuum. Sun, Rau, and Ma further grouped the reasons for lurking into four categories: environmental reasons (poor quality of messages, bad interaction design, low response rate, and long response delay), personal reasons (introversion, a lack of self-efficacy, and bashfulness), relationship reasons (the attitude or disposition of internet users toward the group modifies their actions), security reasons (community may not satisfy their requirements of security and privacy). Other researchers have also undertaken to identify reasons for lurking (Nonnecke, Preece, & Andrews, 2004), however, it is difficult to provide a complete list of the reasons why one might lurk in a learning community because the structure of a networked learning community is not predetermined, as might be the case with traditional online courses, and in any specific instance there might be many reasons for lurking; reasons that community organizers can’t foresee in advance. Lurking is actually a complex, fluid state. A community member that is identified as a lurker can be an active participant in another community, or as stated by Hagel and Arthur (1997), lurkers can become active participants over time.

Munzel and Kunz (2012), speaking from a marketing perspective, provide us with an additional term to consider: multipliers. According to Munzel and Kunz this “group is characterized by high passive activities, active first-order activities, and active second-order activities. Hence, the

members of this class have a more balanced portfolio of activities, which multiplies their usage of the web site. [...] By commenting and forwarding one's own reviews or other authors' reviews, the members of the class multiply and therefore amplify the scope of these reviews" (2012; p.60). Munzel and Kunz were dealing with the concept of electronic word of mouth, hence in their case an active member of a community was one that wrote reviews about products in that community. This provides us with a more nuanced understanding of the activities of individuals in online platforms.

A frequently used rule to describe participation in online communities is the 90-9-1 rule. This rule posits that approximately 90% of the members consume content, 9% participate to some extent by contributing content from time to time, and 1% contribute a lot and regularly (Nielsen, 2006). The idea was articulated by other researchers who reported that lurkers indeed constitute the majority of online communities, that is to say, approximately 90% of participants can be identified as lurkers (Preece et al., 2004; Rafaeli et al., 2004; Ridings et al., 2006; Nonnecke & Preece, 2001). Kushner's essay (2016) traces this rule back to Nielsen whose audience at the time were software engineers and user interface designers. Kushner further draws connections between participation on social platforms and monetization of that content. Media platforms tend to see non-participation, or little participation, as potential lost revenue. However, in educational contexts it is important to question this unquestioned assumption of non-participation.

From another lens, when lurking is examined from a social network analysis standpoint and from a content generation perspective, lurkers are contextualized on twitter as "a rare class of tweeters, who follow many people, but they themselves rarely post or reply any tweets" (Fazeen, Dantu, & Guturu, 2011).

Lurkers have been seen as a net-negative in communities in which they participate (Farzan, DiMicco, & Brownholtz, 2010). Lurkers appear to be in the role of having untapped potential, and hence the goal is to convert lurkers into posters, with consequences of not posting, or not being active at a certain threshold in a community, spelling out a certain concern for the viability of that community (Walker, Redmond, & Lengyel, 2010).

Nonnecke, Preece, and Andrews (2004) stress the importance of knowing how lurking affects the online communities that they are members of, and how one appropriately manages lurkers in a community. This is an interesting point of view because it puts lurkers in a position to be "managed" in communities where they, by and large, volunteer their time and content. It also provides for an interesting philosophical dilemma, namely: should community members be actively managed? Or should communities emerge out of the spontaneous actions of their members, and hence allow for lurking as a valid form of participation in a community? It also does not help that online *communities* are sometimes conflated with other forms of online interactions, such as online workgroups. To help distinguish online communities from other forms of online interactions, Ridings et al. provide us with a distinction between online workgroups and online communities. They write that "online groups can gather to complete organisational work tasks or short-term projects, virtual communities are longer-term, emergent, and based on personal relationships" (Ridings et al., 2006; p.331). They further elaborate that lurkers have different motivations and behaviours as compared to individuals who are posters in a community.

What do lurkers learn? Beaudoin (2003) suggests that without evidence of visible activity, one might assume that learning is unlikely to occur. However, he argues that learning can also take place when learners are engaged as observers of others' activity. In their review of lurkers, Walker et al. (2010) discuss the differing views, or rather one might say differing beliefs, of how lurkers

learn by lurking. Some of the literature indicates that lurkers learn through observation, colloquially one might refer to this as “learning through osmosis,” while others assert that lurkers are only learning a small fraction of what they can learn since they are not active; thus missing out on deeper learning opportunities. It strikes as one of those legacies of p-Learning (physical, or face to face, learning) that Dron (2016) mentions. The legacy of the physical classroom, with its spatio-temporal constraints, gives us a particular view of what participation is. However, in an online environment, someone who isn’t speaking up (providing verbal postings) isn’t necessarily someone who isn’t paying attention, and it is not necessarily appropriate to quiz them. This type of assessment, by means of forced participation, is another possible legacy of p-Learning which finds its way into online communities, and hence suggests a negative view of individuals who do not post, regardless of the potential lack of the need for assessment in communities. It is this inherent attitude toward lurkers which juxtaposes them as freeloaders, as compared to posters who are seen as “workers” (Egan, Jefferies, & Johal, 2006). Taking into account the learner’s point of view is something that is seen in Dennen’s (2008) research. Using self-reports, Dennen (2008) found that students felt that their ability to learn was impacted by both *posting* and *reading* messages and noted that students who posted (non-lurkers) to meet course requirements felt that the discussion activities had a less positive impact on their ability to learn. This might suggest a need for learners to have the freedom to lurk, and to determine for themselves what interactions are valuable, and which ones are not. Walker et al. (2010) suggest that in order for lurkers to modulate their behaviours and go from not posting to posting in the context of an online class, the instructor, or the facilitators of the class, needs to provide appropriate external motivators, in other words provide an answer to the common question of “what’s in it for me?”. Relating to this notion of participation is Gourlay’s argument that in what we know today as engagement, in Gourlay’s case ‘student engagement,’ there is a “reification of the notion of ‘participation’ which – although appearing to support a ‘student-centred’ ethos – may serve to underscore restrictive, culturally specific and normative notions of what constitutes ‘acceptable’ student practice” (2015; p.403). It is interesting to look at lurking from this angle because of *othering* effects toward lurkers. For instance, Bishop (2011) writes that “for lurkers to be converted into posters, and in order for their untapped contributions to be allowed to be expressed, online community managers need to overcome the lurkers’ fears that are preventing them from participating” (p.27) and that the main concern of lurkers appears to be a loss of privacy. This paints lurkers in a mono-dimensional light and to some extent from a lurking-as-pathology angle.

Hrastinski (2008; 2009) indicates that there are different perspectives on how participation in online communities can be conceptualized, and makes the point that participation is both a complex and an evolving process for learners. Lurking is thus seen as a *legitimate* type of participation, and lurking indicates a *potential* for more active participation. One way of conceptualizing a lurker comes from Waite, Mackness, Roberts, and Lovegrove (2013) and their experiences in the FSLT12 MOOC. In this instance, they see lurking, within the context of this MOOC, as a liminal space where lurkers, novice learners, are looking to make sense of the MOOC by observing and practicing skills and behaviours that are associated with active participation. In this case lurking is seen as a type of apprenticeship, which ties into the notion of learning as a community of practice.

Because the term *lurker* is a loaded term with negative connotations, we propose instead that *legitimate peripheral participants* (LPPs) should be used to describe these less active, but still engaged, learners, and that *peripheral learning* instead of *lurking* be used in order to describe these types of behaviour. Accordingly, these are the terms we will use in the rest of the paper.

## Theoretical Framework

This research uses *Community of Practice* (CoP) in order to look at the CLMOOC learning community, and the Pareto Principle in order to delimit types of learner in the CLMOOC network.

### **Community of Practice**

A Community of Practice (CoP) refers to the individuals who gather together for common interests, goals, or knowledge, producing something beneficial through their collaborative efforts and mutual interaction across community members. A CoP consists of three elements: mutual engagement, joint enterprise, and shared repertoire (Lave & Wenger, 1991; Wenger, 1999). According to this theory, learning is a social practice and a process of participation that is at first legitimately peripheral but that increases gradually in engagement and complexity (Lave & Wenger, 1991; 2002). Lave and Wenger propose:

*“a decentered view of the locus and meaning of learning, in which learning is recognized as a social phenomenon constituted in the experienced, lived-in world, through legitimate peripheral participation in ongoing social practice; the process of changing knowledgeable skill is subsumed in processes of changing identity in and through membership in a community of practitioners; and mastery is an organizational, relational characteristic of CoP” (Lave & Wenger, 1991; p.64).*

They indicate the importance of the master-apprentice relationship in CoP (Lave & Wenger, 2002). In other words, they perceive being an apprentice, that is to say being a peripheral member, as a step in the process of moving toward to full participation – that is – being a master. In the context of this study a legitimate peripheral participant (LPP) is viewed as an apprentice.

### **The Pareto Principle**

The Pareto Principle is also known as the 80/20 rule. According to this principle, approximately 80% of the effects come from 20% of the causes (Juran, 1975). From the perspective of a learning network, this principle indicates that roughly 20% of the participants produce most of the content and 80% of the participants consume this content. However, it should be noted that these numbers are arbitrary and that the 80/20 split is not necessarily exact. This can be seen as an organizing principle similar to 90-9-1 referenced in the literature review section.

When the Pareto Principle effect is observed in a network, the distribution pattern will be “Long Tail” (Anderson, 2004). This means that in terms of learners’ production and consumption patterns, active learners make up approximately 20% of the long tail distribution and less active participants, in other words LPPs, comprise about 80%. In our research we use the Pareto Principle to delimit active learners from LPPs.

## Methodology

### **Research Context**

The LPP data for this project was collected from an event run by the CLMOOC community in 2016. CLMOOC (Connected Learning MOOC) was an originally collaborative offering from the National Writing Project (NWP) network ([nwp.org](http://nwp.org)) and was never tied to any specific institution. It first ran in 2013, 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-centred activity in networked, peer-based, communities. Since the original MOOC there have been other



versions, and a community has evolved (the second C now stands for *community*, not *course*). The 2016 iteration of CLMOOC was organized by volunteers who were designers and participants of previous CLMOOC iterations and who define themselves as being a part of the CLMOOC community.

### **Research model and design**

This research uses a mixed method methodology in which quantitative data collection and analysis was followed by qualitative data collection and analysis to help explain or elaborate on the quantitative results. (Creswell, 2012). The quantitative data was collected through social network analysis while qualitative data was collected through online questionnaires and observation notes.

### **Data collection tools and analysis procedure**

Social network analysis (SNA) was used to map the structure of the network and to identify LPPs. In order to do this, participants using Twitter in the CLMOOC were tracked by using SNA. Before analysing the data, a link to a questionnaire had been sent to the #CLMOOC hashtag and total of 21 participants responded. However, the responses of 4 of these participants were excluded from this research because they were identified as active participants with high out-degree values (the out-degree is a metric that demonstrates a node's (participant's) input into a network). Participants lying in the 80% of the network in terms of their out-degree values were identified as being potential participants (LPPs) of our study, and a second questionnaire was sent to these participants. After gathering the responses from these, still further questions were directed to these sampled participants in order that they could elaborate their responses and allow us to tease out a deeper insight regarding participants' views. Thus we interviewed participants at a stage when they were engaging as peripheral learners, whether or not they later became more active learners. One of the researchers tracked all the interactions on Twitter and kept his observation notes in a researcher journal. These observation notes were used for data triangulation.

SNA was then used to analyse the data. Participants' out-degree values were calculated and visualized in a graph to see the distribution of their participation levels (Figure 2). In addition to pure quantitative node metrics, a qualitative sociogram (Figure 3) was created to visualize the network holistically and to identify research participants' positions in the network. This sociogram was created based on local metrics such as nodes and ties, and global metrics such as overall network values. The qualitative data collected through questionnaires and observations were analysed through content analysis. In order to increase reliability, direct quotes are provided in the findings and discussion section.

### **Sampling**

In order to choose our participants, we took a snapshot of CLMOOC in the first week of the 2016 event. A total of 200 potential participants were identified in this first week. The raw data collected from Twitter was analysed and a total of 80 participants with an out-degree value of zero were excluded from the research corpus because they were not actually participants - just people who had been mentioned by actual participants on Twitter. These excluded participants had in-degree values (a metric that indicates interactions consumed) ranging from a minimum of one and a maximum of three (each mention equals to an in-degree value) (Figure 2). After plotting all participants according to their out-degree values, it was apparent that the participants were distributed according to the Long Tail pattern. Having plotted this, we looked to see who were active learners, and who were LPPs. A total of 24 participants were identified as active learners, and thus excluded from the research study, and 96 participants were identified as LPPs

and therefore included in the study. We then noted that participants were spread out according to the 80/20 principle. It should be noted that these cut-off points are arbitrary, which is why this research also used the participants' position according to the SNA of the first week (Figure 3).

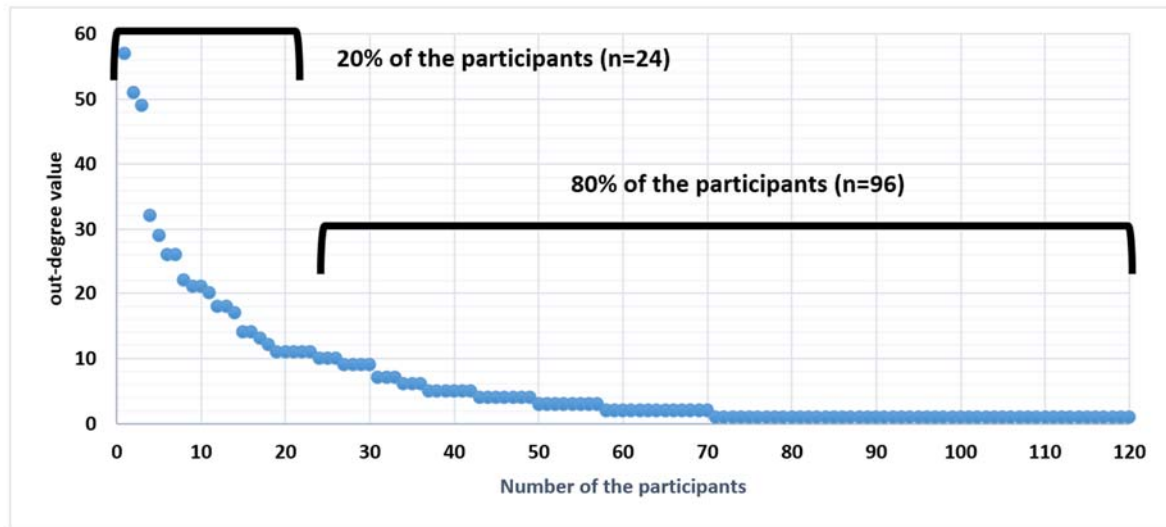


Figure 2. Distribution of learners according to their out-degree values

## Findings and Discussion

The first stage of the research explains the LPPs' position in the network structure while the second stage provides a deeper explanation based on the responses from LPPs.

### *The First Stage*

To see the overall network structure a sociogram was created using the Harel-Koren Fast Multiscale layout algorithm. In the sociogram, the 20% (active learners) were marked as blue circles while 80% (LPPs) were marked as red squares. Participants with an out-degree of zero (no-shows) were marked as green diamonds. Those who agreed to join in the research were marked as black squares. Additionally, out-degree values for each participant are shown on the sociogram (Figure 3).

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

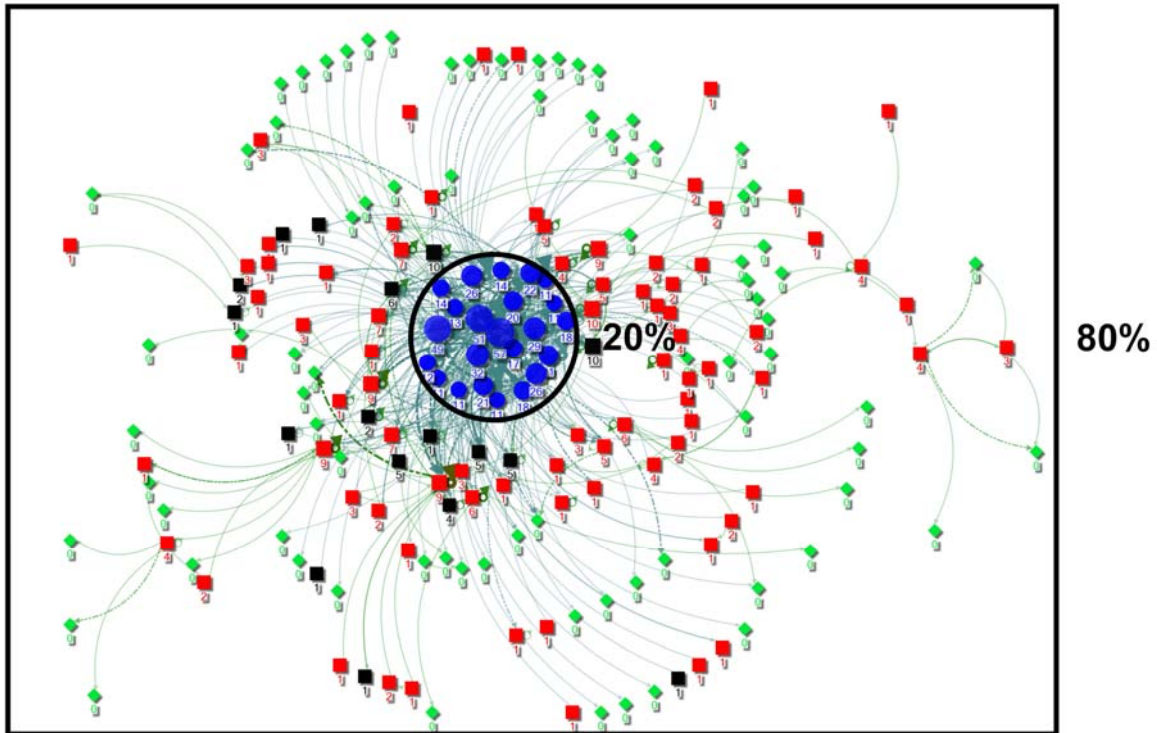


Figure 3. Distribution of participants according to the 80/20 principle

As can be seen in sociogram for the first week, active learners (blue circles) comprise 20% of participants and lie in the core of the learning network while LPPs (red squares) comprise 80% of participants and are peripherals around these active learners. The interaction among the 20% is denser as compared to the 80%. This indicates that one variable about being an active participant or a LPP is related to a participant's production and consumption patterns. These findings also conform to the Pareto Principle.

### ***The Second Stage***

After completing the SNA, a questionnaire with open questions was sent with those identified as LPPs so that we could come to a deeper understanding of the phenomenon. The following headings comprise the questions with their original wording.

#### ***1. How is lurking perceived by lurkers?***

Peripheral learning is usually perceived as a less active behaviour compared to participating, and is generally seen as less desirable, as we saw in the literature above. It is often defined as passive participation or observing. This view was also found to be held by some of the participants in this research. Some of the responses demonstrated that they saw peripheral learning as a passive method of participation. However, the responses also made it clear that peripheral learning is not simply a matter of being an observer. Rather, peripheral learning is about engaging silently with invisible social ties and ongoing conversations that are happening in the network. This invisible engagement is a type of action, albeit invisible in the network, where LPPs have a hidden potential to become visible, active, participants in the network – to move from being an apprentice to a master. This move from invisible to visible occurs as the conversations in the network continue and there are potentially more possibilities to pique an LPP's interest and enable them to engage with more visible ties. This piquing of interest is a function of time, connection strength between nodes, and a diversity of topics of conversation.

The responses also revealed that peripheral learning is not merely a matter of being a passive participant, but that it is more about engaging with what is already there rather than creating or starting something new. For instance, one of the participants reported that being an LPP is “being involved in a passive way: following the ongoing conversation and sharing it with without commenting, expressing opinions and actively engaging in the conversation. Basically, just what I did!” [Participant 4B]. This reinforces the findings of Lave and Wenger (1991) – there are rewards for peripheral participation which simply cannot be quantified by the number of posts someone contributes to the overall network. For example, one participant indicated that even though they wanted to be more active in the community, “[they]’ve enjoyed peeking into what people are doing and saying” [Participant 3B] which is something valid to get out of peripheral participation. Another common theme concerned the tools used in the MOOC. Some participants indicated that the more they participated the more they learnt about the educational technology and information and communication technology (ICT) [Participants 7, 13, 20], which is especially interesting considering that the course did not focus specifically on ICT. Pedagogy also formed another theme of interest amongst LPPs. Participant 17, for instance, mentioned that they “learn new ways to teach, think, and, connect”. Even as LPPs the participants still felt that they were learning. In addition, the level of authenticity in the interactions is a key element. For example, one participant wrote that:

*“It depends on the authenticity of your limited interactions with members. Certainly you still learn a lot from conversations, from exploring what others share and their blogs, and from their creativity. I’m happy to appreciate what others create, and to add people to my networks”.* [Participant 2].

This is also linked to leisure learning: it is a learning activity that does not involve putting in too much effort or following a schedule. As stated by one participant, “lurking is a great way to learn, albeit by mostly consuming - there is much to read, save and come back to later, without necessarily completing any or many of the activities” [Participant 2B] This comment also justifies the use of one of the terms used for LPPs: free-riders.

In summary, the above responses indicate that LPPs do not orbit merely on the periphery, but that their orbits intersect layers of the community ecology (see Figure 1). In contrast to active participants’ visible connections, LPPs had more transparent or invisible connections, which permeate different levels of the ecology. Whereas we focus on the *posts* or *contributions* of active participants, with LPPs we can focus on different questions such as “what do they do with what they observe?”.

## 2. How is contribution defined from the perspective of a lurker?

Participants were asked what constituted a contribution in an online learning community. Interestingly, many Web 2.0 types of interaction such as liking, retweeting, and sharing weren’t considered as contributions to that community. Rather, contribution is seen as adding value to the content rather than just disseminating it. However, actions such as favouriting, retweeting, and sharing are thought to be an indicator of peripheral learning. One participant indicated that their participation was “mostly liking and retweeting on twitter” but they continue to say that “ideally a contribution is more than that: it means also commenting and adding to the community of learners, bringing something ‘in’” [Participant 4B].

One aspect that is important to mention is that notions of what constitutes *appropriate* participation, in a learning context, are already formed in some participants’ minds. There seems to be some aspect of comparing this learning experience to what participants have explored before in classrooms. For example, Participant 1B writes that what they consider participation as “posting and interacting with others – [they] teach online often and tell [their] students it must be

a substantive contribution. Liking is not enough". Hence, there seems to be a devaluing of activities that are not immediately visible. The mantra appears to be, like in classrooms that are assessed, *don't just like, but tell me why you like it*. In a graded classroom context this might make sense given that the learners are evaluated for credit, however in an open community do these same metrics make sense?

Web 2.0 types of interaction can be seen as an indicator of being socially or emotionally present in a community. For example, one participant says that "Oh, I didn't think about the like button as a contribution... that still seems like peripheral learning though: if a like button is like a smile, I was smiling, but I didn't create my own posts or comments on others". In another instance, Participant 3B writes that "[they] wouldn't say that what [they]'ve been doing is much of a contribution. Liking is not a contribution, it's just saying 'I'm here', 'I read what you said'," which is an interesting point in that actions such as retweeting or liking are the digital equivalents of paralinguistic features of dialogue, such as nodding your head when you agree. In a traditional, face to face, classroom if we saw our fellow learners nodding in agreement with what we are saying, or providing non-verbal feedback of understanding (such as "uh huh"s) we would most likely count that as some sort of participation because of its context: in a small, time-bound, space-bound meeting of participants it's not economical to have everyone say something for the sake of participation-as-verbal-content-production. Similarly, online, even though there doesn't exist the same space and local-time boundaries, it might not be economical for everyone to produce textual content as time and attention are finite resources and such web 2.0 actions may indicate a more economical approach for members of the periphery to use as a means for a majority of their participation.

In summary, contribution is seen to involve interaction with members of a community, and the perception is that this involves more than just liking, favouriting or retweeting, although these are indicators of being present in a community.

### 3. Why do people lurk (rather than joining in)?

We researchers tried to explore whether participants lurk because of the type of medium employed in connecting the community. In a connectivist learning space, learning is distributed among the platforms in an effort to meet participants in the diverse digital spaces they inhabit. Though some platforms are spaces where most of the participants gather, those who don't like one of these platforms can be labelled as an LPP of the community when participation is seen in aggregate, but they may be more active in one of the other platforms of the community. Responses show that the platform used can be an identifier of being a LPP. Participants reported that platforms used affect their attitude to be a more or less active participant:

*"I started out being 80% G+, 18% FB[Facebook] and 2% Twitter. I gradually increased the balance between G+ and FB to where they're about equal. Still hardly any Tweeting..."*  
[Participant 6]

Following these responses, the researchers tried to explain why particular platforms were preferred by the various LPPs. The reasons for why people used the various spaces varied by participant. Some strong emotions were displayed for both Facebook and Google+, where some respondents indicated that they hated a particular platform and hence didn't use it. Some of the aspects of usage were user experience related; in these cases, one social media platform was seen as better than another in terms of usability or privacy. For example, Participant 3 wrote that:

*"Twitter gathers more posts more quickly and I like that, plus the hashtag search is effective. FB is something I already use regularly, so it doesn't take additional time/effort. G+ is hard to follow and awkwardly organized."*

There is also an element of how the social media platform fits into the workflow of participants. For example, one participant wrote that they “typically create on [their] blog to have a central place for the work, then send it out to communities via Twitter, Facebook, and other connections” [Participant 17]. Another participant delineated exactly how they use each platform by writing:

*“I tend to keep Facebook for personal use, Twitter for PLN and Google+ don’t usually use except when something like CLMOOC comes around and that’s where the activity is” [Participant 13].*

And likewise another participant stressed that they also use different platforms for different uses and in some cases, they do not want to intersect platforms for personal and professional uses:

*“Twitter is the space I already use most for connecting with education folks, so that is why I have used it most. The google+ group has a lot of subtopics and I do sometimes go there. It is not as automatic for me. I think I would find more if I did. FB I keep more to personal use and therefore I have not engaged in CLMOOC in that space.” [Participant 24]*

Finally, others take a more pragmatic approach to their social media platform usage and, as Participant 4 explained, they go wherever the higher amount of traffic is, where more people are posting their CLMOOC contributions. This pragmatism also seems to lead participants to use multiple platforms for different purposes. As Participant 22 wrote:

*“Twitter is a crossover space where many communities and hashtags intersect. Twitter is the street; Google+ is an interior, more bounded and focussed space.”*

Interestingly, we see in our observations that some participants see peripheral learning as a time-saving strategy. For a call to join in participation, one of the participants responded:

*“Will try, for sure. Busier then. Easy to lurk!” [Tweet from observation notes]*

Our observations also revealed that the type of message can also lead to participants’ behaviour. For example, a message can be a general/one-way broadcast message that does not require reciprocal communication. This raises further questions about how types of learning design can lead to active and passive participants.

In summary, time is a major reason why participants do not actively engage. In addition, some participants have strong feelings about how they engage in using social media and this can result in them behaving as an LPP on some platforms.

#### **4. Do lurkers feel part of the community?**

The research further explored whether LPPs feel part of the community. The vast majority of respondents reported that they felt part of the CLMOOC community. However, the feeling of inclusion in the community varied from describing oneself as a peripheral member [Participant 24], to indicating that “the CLMOOC Community is a MAJOR part of [their] life” [Participant 6]. It seemed, from the responses to our questionnaire, that the perception of whether or not a LPP felt part of the community was mostly self-imposed. For instance, one LPP indicated that “[they] think that [they] feel like an adopted child. Feel part [of the community], but [they are] not sure [if they are] worthy” [Participant 16]. Another participant indicated that they “feel as though [they are] on the edge, where there is a central core of people who appear to know each other really well, and an enormous group like [them] dabbling around the edges” [Participant 13].

This seems to indicate that peripheral learning can be a function of connections to the community that existed prior to the current CLMOOC iteration. This raises interesting questions about how to design a community activity in order to welcome in new members, while at the same time accommodating existing members with established connections who join in. Connections, however, are not the only means of bringing people together and making them feel a part of the community. One notable example of this is expressed by an participant who wrote that they “feel close to this community, although [they] don’t know many of the participants, but [they] share their interests and values” [Participant 22]. This sharing of interests, values, and practice is another element that binds LPPs to a community, even as peripheral members, as was suggested by Sun et al (2014).

Finally, another element that is worthy of consideration is the question of ‘what does it mean to be part of a community?’ One participant wrote that “[they are] not part of the community (no time), but [they] enjoy seeing what they [the community] share” [Participant 5]. It would appear, based on this comment, that LPPs might not consider themselves as part of a community if they are in *read-only* or *consumption* mode. An interesting metaphor that came up was from Participant 16, who compared their participation as a *draft*. They indicated their wish to participate more, but their current peripheral learning behaviour was sort of like a draft of fuller participation. We also saw participants using cMOOC language such as “drop-in” to the course every now and again whenever time allowed [Participant 22], which might indicate that these peripheral learning participants have been involved in some fashion with MOOCs in the past, and are choosing a level of participation that best fits their current needs.

In summary, many LPPs do either feel part of a community or identify with it in some way, although they only engage at the periphery.

### 5. What might persuade lurkers to join in?

In order to gain deeper insights regarding motivational issues, research participants’ goals and interests were examined. From the responses received it appears that the majority of LPPs were interested in being part of the CLMOOC community. One of the participants indicated that they enjoyed CLMOOC 2015 and that had a positive impact on their interest in being part of the CLMOOC 2016 community [Participant 23]. Despite the interest in being a member of the CLMOOC community, and here the assumption is as a *more active member*, work and other obligations appear to be impeding that goal. Despite other competing obligations, these peripheral learning members still joined the CLMOOC even though they knew they didn’t have the time, and an example of this is Participant 5 who states that they “knew [they] would not have time this summer, but [they] still subscribed. This seems to indicate that, to some extent, these members still feel part of the community even though they knew that they wouldn’t have the time to be part of an actively contributing set of members. One member, Participant 16, wrote “I do want to be a part. I lurk. I even think and kind of draft” which seems to indicate that peripheral learning is a valid part of community membership. Some other participants also explicitly stated that their intention is simply to lurk: “Actually I’ve been lurking since the beginning :)”. Hence, the question might be not what we can do to persuade LPPs to be more active – they already want to be part of the community – but why are they on the periphery?

Motivations for participation varied from participant to participant, as can be expected. LPPs indicated that their motivations to be part of the CLMOOC 2016 community came from the people who generally participate in CLMOOC. One participant expresses this as being a “big fan of some individuals who are very active in CLMOOC” [Participant 5], and some, such as Participant 24 make mention of specific individuals by name. Another participant makes reference to another MOOC (most likely #Rhizo14 or #Rhizo15) by making mention to Dave

Cormier and Cormier's saying that "people are content" [Participant 16]. An individual joined because of a course at university [Participant 18], and previous participation in a previous version of CLMOOC seemed to indicate motivation for keeping up a certain level of participation in CLMOOC 2016. The uniqueness of the course itself was another motivating factor. For instance, Participant 6 writes:

*"The change from 'Course' to 'Collaboration' for the final C was crucial. Everything that's good in CLMOOC flows from truly embodying the deep meaning of that change. There have been other attempts – DS106, for example – but none were truly open and egalitarian the way CLMOOC has always been..."*

The change mentioned by this participant ties well with a comment by another participant who wrote that "CLMOOC is more of a "public event" than a MOOC, and [they] really appreciate the way they [MOOC participants] use public networks to share what they do!" [Participant 5]. This change in nomenclature does potentially have interesting connotations as far as LPPs go because in a public event not every members of the community is required to participate in order to enjoy the event. One would not call participants/attendants of a public art event as lurkers, for instance, even if there were opportunities to contribute to the event by supplying free art supplied to all who attend.

These broad responses demonstrated that even though LPPs wander on the periphery of the learning community, they had various reasons to be there. These include: expanding personal learning networks, participating collaborative activities, and learning new skills.

*"To learn, to play, to expand my PLN, I work with many lovely people and have many teacher friends but not as many playing in that arena before I joined." [Participant 1B]*

*"I was intrigued by the idea of building knowledge collaboratively and fact that CLMOOC is based on principles of Connectivism" [Participant 4B]*

Following this, things that motivated LPPs' level of participation were investigated. Among many reasons, time appeared to be an indicator of the participation.

*"The amount of time I have determines my participation." [Participant 13]*

Confirming previous research findings, most of the participants stated that timing is one of the issues that determines the level of LPPs' participation.

*"If I had more time and was not involved so much in work commitments after hours then I would participate more. I'm not sure what would motivate me to do the suggested makes. Maybe I'm just uninspired at the moment. It happens." [Participant 2]*

Respondents were asked if anything could have been done that would have resulted in finding more time to engage with the learning community. Interestingly, responses showed that LPPs' positions on the periphery would be unlikely to change. The main element that seems to be common for our participants is time, or more specifically lack of time. Participants were balancing family obligations, work obligations, and other educational or professional development activities. A hypothesis could be that LPPs are in part a result of participants multitasking and joining a variety of communities, being involved in them to the degrees that satisfy their own immediate goals.

*"Only a MIRACLE. I had a lot of family matters requiring my attention this summer; there's only so much time, but since I am at G+ every day (it's my main place to connect*



*online), I was really glad for the active posting at the G+ community, although I did not always click on the notifications since I really was pressed for time.” [Participant 5B]*

*“Timing is such a tricky thing. When CLMOOC is primarily in June it is hard for me as that is active NWP work at our site (camps and institutes and budgets oh my) but extending into August is also tricky as that is when work begins in earnest for school year.” [Participant 1B]*

Finally, another motivational aspect comes from the weekly prompts for the community. While some members of the community might be interested in marching to the beat of their own drum, there were members who were interested in more explicit prompts, expecting interactions similar to previous instantiations of CLMOOC. For instance, one participant mentions that what would be helpful is “a post that clarified what happened, what’s going on, and where they are heading” [Participant 15]. The same sentiment might connect with Participant 23 who writes:

*“Last year the weekly emails seemed to have so much more to them in terms of content. This year seems to be about sharing, connecting, reflecting over and over. The topics were so engaging to me last year, gave me ideas to connect, engage, share around. Not so much this year.”*

This brings us back to the idea that current interactions of a community are shaped by the expectations that have been formed in the interactions that members had prior to joining such communities.

In summary, lack of time plays a major part in participants engaging in peripheral learning and not being more active, with the need for more explicit information about how to engage also being a significant reason.

## **6. Is lurking a lesser experience than participating, or just a different one?**

We further explored how LPPs interpret peripheral learning. The responses, as mentioned briefly in the answer to the previous research question, showed that peripheral learning is a strategy of learning when learners have insufficient time. When the learner’s time was at a premium, decisions needed to be made as to where and how to spend their time, and peripheral learning is a potential answer. In instances where peripheral learning and limited interactions were required, other aspects of interaction rose as important, such as how authentic those interactions were between and among members [Participant 2], hence we see an aspect of quality of interaction, not just quantity of interaction.

Another interesting theme to consider is learner preferences. One participant wrote that “Whether active or less active, a lot of [their] learning is through reading and listening” [Participant 13] which would imply that they themselves don’t necessarily view peripheral learning (read-only or read-mostly) as a bad thing, it is what it is, and it works for them. Some, like Participant 12, seem a little more apologetic by saying “Normally, when I participate in online activities, I am an active participant” which seems to imply that peripheral learning is not normal for them, and this isn’t indicative of their typical online learner behaviours. This also seems to draw parallels that what was described above as learners carrying ideas and notions of what constitutes *proper* interaction in an online learning experience from their previous learning experiences, namely those that are designed with assessment and accreditation of the learner in mind.

*“It depends on the authenticity of your limited interactions with members. Certainly you still learn a lot from conversations, from exploring what others share and their blogs, and from*

*their creativity. I'm happy to appreciate what others create, and to add people to my networks."* [Participant 2]

*"Normally, when I participate in online activities, I am an active participant. Mostly, I find that I get new ideas or sharpen my existing ideas. I find this question particularly interesting, because I normally don't feel that I am learning when I'm lurking. This past week has caused me to lurk, and even do that infrequently. I need to think about what I learn during these times of less activity."* [Participant 12]

*"Less active participation is like chatting on the fly, meeting new people quickly and having a say. More active participation enables deeper engagement and allows for more effective learning. Both are useful. I find that after multiple, short engagements with new people, I do, eventually get to know them and their interests and ideas. I think of these relationships spanning various courses, activity and spaces. I'm not too worried about watching from the fringe and missing out. I do dive in at times."* [Participant 22]

Finally, it's interesting to note that some aspects of CLMOOC encouraged peripheral participation, in a sense. Participant 20 writes that what would motivate them more would be "more conversation-driven posts, as [they] tend to avoid "Silent Sunday" and the purely visual posts." (Silent Sunday is a weekly event where participants post an image on the various CLMOOC social media without saying anything about it.) This seems to indicate a preference of some participants for text-driven posts rather than something more multimedia in nature. If participants didn't get the input they were expecting (a conversational post for example), they might use some of those web 2.0 actions (liking, sharing, retweeting) as an indicator of their presence, but wouldn't necessarily partake in creating such original posts.

In summary, the jury is still out on this question, and we would suggest that this is looked at in more detail in future research.

## Conclusions

The existing literature suggested that peripheral learning is a complex behaviour, or sets of behaviours, and that there isn't one reason why LPPs act in the ways that they do in their respective communities. We also see this reflected in our own findings. While certain members in the CLMOOC community only engaged as peripheral learners in this run of CLMOOC, they all did so for a variety of reasons. A common reason for peripheral learning within the community is a lack of available resources, or lack of interest in using a specific resource. One resource that appeared to be at a premium was time, and this lack of time meant that many individuals who were interested in being a member of the community ended up being LPPs. Some members *became* LPPs, meaning that they intended to be more active during the run of the MOOC, while others *started* as LPPs, knowing right from the start that they didn't have the time to invest, but they signed up anyway, perhaps because being on the periphery was better than not being there at all. Hence, one might say that peripheral learning is potentially a *strategy* when there is a lack of time.

Another reason was the use of specific social media platforms. While no one means of social media connectivity was seen as *optimal*, the members' particular outlook on specific social networks, views on privacy, utility, and usage, influenced where they participated. Since the space itself isn't the important factor, but rather the *use* of that space by members of the community, we see that a clash in how different members of the community perceive these networked spaces (Facebook, Google+, Twitter) plays a role in influencing whether someone will become (or remains) a LPP in that community.

In addition to the availability, and use, of certain resources, interactions of a community are shaped by the expectations that have formed in the interactions that members had prior to joining such communities. If increased engagement is sought by community organizers, it is important to have a set of community norms and values for people to reference. This way LPPs are not left feeling “less than” for being read-mostly members. We saw in the responses that LPPs believed that actions such as liking or sharing were “not enough” or “not a contribution.” Some of the constraints of what Dron (2016) calls p-Learning have been translated into the virtual world and it is important to question assumptions of what is *engagement* or *participation* in a community of learners, and what forms of action constitute *engagement* in these new spaces for learning. Peripheral learning is a normal attitude in online learning spaces with learners that come from diverse backgrounds. Active learners and facilitators should develop strategies to allow those LPPs who wish to become more active into the core of the community once engagement has been defined - to help them make the journey from apprentice to master should they desire to do so. Perhaps instead of ‘pathologizing’ peripheral learning, we should instead view peripheral learning as a form of honoring voices from afar, and accepting that as a means of learning.

Finally, we conclude that peripheral learning is a natural behaviour in any online learning space and thus it can be naturally considered in any layer of a community. However, though not a must, there should be efforts to help LLPs to participate.

## Recommendations

Based on the findings of this research and impressions gained from our observations, we recommend the following: Peripheral learning can be seen as a potential journey from the periphery to the core of a community and LPPs can be viewed as apprentices observing the masters in any community. Given this, we suggest that facilitators could develop strategies which encourage LPPs to participate more with the community. One such strategy could be encouraging more active learners and experienced members to actively show LPPs that they are welcome in order to encourage LPPs to participate more fully if they so wish.

We asked our LPPs whether they perceived that peripheral learning was a lesser experience than participating, or just a different one. However, their responses were inconclusive. We therefore recommend that this is followed up as an area for future research.

## Authors’ Notes

The data was collected from open, public spaces on Twitter. The sociograms were anonymized even though it is not required since the data collected from public spaces. All the participants were provided with a consent form and only those who agreed the terms on the consent form were included in this research. One of the researchers (Sarah Honeychurch) has ethical approval from the University of Glasgow to undertake this research.

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