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Student interactivity and teacher participation: An application of legitimate peripheral participation in higher education online learning environments

Abstract

Lave and Wenger's legitimate peripheral participation is an important aspect of online learning environments. It is common for teachers to scaffold varying levels of online participation in Web 2.0 contexts, such as online discussion forums and blogs. This study argues that legitimate peripheral participation needs to be redefined in response to students' decentralised multiple interactions and non-linear engagement in hyperlinked learning environments. The study examines students' levels of participation in online learning through theories of interactivity, distinguishing between five levels of student participation in the context of a first-year university course delivered via a learning management system. The data collection was implemented through two instruments: i) a questionnaire about students' interactivity perception in the online reflective learning (n=238) and then ii) an open-discussion on the reason of the diverse perceptions of interactivity (n=34). The study findings indicate that student participants, other than those who were active, need high levels of teacher or moderator intervention, which better enables legitimate peripheral participation to occur in online learning contexts.

Keywords: interactivity; learning management systems; legitimate peripheral participation; online learning; reflective learning

The active engagement of students within the curriculum in any formal educational environment is a perennial problem for practitioners. Lave and Wenger's (1991) work on participation found that novices entered the arena of action as 'apprentices'. In this capacity, social conventions provide a legitimacy of participation for novices, as they develop sufficient knowledge and skills to gain 'full membership'. This is what Lave and Wenger term 'legitimate peripheral participation' (LPP). In formal educational contexts, LPP refers to the way a learner gains access to new learning contexts and their subsequent involvement by observation of more expert peers in the learning community that is requisite for full membership of that context. Wenger (1998) made the distinction between boundaries that define membership and non-membership, and inclusion and exclusion, and how peripheries are areas of overlap. In this way, learners are often in peripheral contact with a learning

environment, and will need to go through a process of incremental engagement and participation before their membership becomes more substantive.

Understanding more about legitimate peripheral participation will allow teachers to put in place more robust learning processes to mitigate problems with gaining the substantial participation of learners. Yet research is needed to examine how LPP functions in online learning environments in higher education. In particular, LPP needs to be extended to understand the characteristics of student participation in online learning, where there is a decentralised convergence of multiple interactions with peers and non-linear functional processes of engagement in online learning. First, students in higher education in Western countries today are *digital natives* who are all native speakers of the digital language of computers, video games, and the Internet (Waycott et al., 2010; Prensky, 2001). For example, in online learning contexts in teacher education courses, many students are new to specialist disciplinary content, but may be familiar with the technology platforms used in online contexts (e.g. blogs, online chat, watching video clips). The student is peripheral to the learning community in terms of content, but positioned more centrally to the technology platforms of online learning. The co-existence between technically experienced students, who have full membership in a discourse, is different to the experiences of newcomers to the discourse. Online learning as typically a non-linear and decentralised system, which shifts its focus from sequential learning processes of a conventional curriculum, to multiple interactions and non-linear engagements online (Author, 2008).

In higher education, a semester-based, assessment-driven learning process is common, and these factors can work against creating a sense of community. In general, a course is not designed to build a sense of belonging and ownership unless its learning objectives explicitly address them. In a collaborative learning context, therefore, all students who are novices at the beginning should work together to develop sufficient knowledge and skills to gain *full membership*, and various interactions with peer students. This implies that a systematic framework is needed to guide students to participate in a non-linear learning process. Student engagement in online learning can involve decentralised content (e.g. student generated content), tasks (e.g. blogs), and assessment (e.g. peer review), and converges on multiple interactions with peer students. Lave and Wenger (1991) stated:

[Learning] is itself an evolving form of membership. We conceive of identities as long-term, living relations between persons and their place and participation in communities of practice. Thus identity, knowing, and social membership entail one another. (p. 53)

This view of learning as a social process, whereby identities and knowledge are co-constructed, would be a more appropriate term to capture the underlying essence of legitimate peripheral participation or Communities of Practice. Lave and Wenger (1991) also suggested that such learning is situated in a specific context and embedded within a particular social and physical environment. Wenger (1998) partly acknowledged the issue and claimed that:

Communities of practice reproduce their membership in the same way that they come about in the first place. They share their competence with new generations through a version of the same process by which they develop. Special measures may be taken to open up practice to newcomers, but the process of learning is not essentially different. (p. 102)

This view acknowledges that the nature and position of LPP changes. As argued above, however, the changes will be more complicated in a case of online learning in which the co-existence of learners with varying levels of participation and identities from full to peripheral, strengthens decentralised interactions and non-linear engagement in learning. Student engagement and participation need to be systematically addressed in terms of different groups of online learners within a systematic framework.

This project approached the engagement and participation of the first year students in a pre-service teacher program with the concept of interactivity, which has been measured on a scale by Nam and Smith-Jackson (2007). They identified that level of student online interactivity is one of the key variables affecting the integration of reflective learning processes. Yet what framework or learning strategy should we apply in online learning environments in order to ensure that students actively participate in a collective learning process? Without having a reflective learning component in an online learning environment, students may perceive the learning site as a digital repository and an electronic notice board (Wang, 2004). Constructivism portrays that the learners are actively engaging in a socially interactive learning environment (Holzl, 1999). In other words, reflection on the experience and collaboration with peers in the context of social interaction and communication enables the construction of new understanding and the generation of new knowledge (Sessums, 2005). For this collaborative learning, students' reflective and collaborative capabilities are central to constructivist pedagogy. In a practice, embedding reflective learning into an online learning platform requires responding to student diversity, such as learning styles, personalities, learning preferences, and varying levels of technology competence (Holzl, 1999). In this research, a customised online reflective learning (ORL) framework was used in

order for students to follow the full process of reflective learning in a learning management system (LMS) and to argue for knowledge of how LPP functions in online learning contexts.

Online learning and its limitations

Online learning is characterised by its flexible delivery and accessible approaches (Knabe, 2004; Wang, 2004). The term online learning is often interchangeable with terms such as web-based learning and e-learning because of its emphasis on online curriculum, certain pedagogic formations, and the use of various technological devices and modalities (McKimm, Jollie & Cantillon, 2003). The benefits of online learning are that it “facilitates communication, enhances interactions, provides student-centred, self-paced, and collaborative learning, disseminates shared information, and reaches out to global communities” (Pacheco, 2005, p. 6). In many instances, online learning is used in conjunction with ‘traditional’ educational formations in what is often identified as ‘blended learning’ (Oliver, Herrington & Reeves, 2006), or ‘hybrid learning’ (Snart, 2010). In certain educational contexts, particularly in distance education, online learning environments are considered sufficiently functional and effective to establish quality learning contexts independent of ‘traditional’ methods. This is because of their use of multi-faceted interactivity and communicative platforms (Knabe, 2004; Nam & Smith-Jackson, 2007; Reushle & McDonald, 2000).

Online learning relies on information and communication technologies (ICT) to deliver the curriculum. ICT for online learning in tertiary education institutions is often provided via a LMS. These platforms are distinguished by their synchronous (e.g., online chat) and asynchronous modalities (e.g., blogs). Although each mode of communication can be used independently, an integration of both approaches is considered ideal (Oliver, 2005; Oliver et al., 2006). The use of synchronous, asynchronous, and integrated modalities when used strategically can facilitate a higher quality communication between students and students, between students and teachers, and between students and content than non-interactive features of a LMS (Author, 2008). For online learning, quality communication promotes students’ participation by providing a formal means and structure for learning activities. Pedagogically, communication modalities are not only individually mediated, but can also be socially mediated to the extent that communicative action created by the teacher can lead to students’ active participation (Handelsman, Briggs, Sullivan & Towler, 2005). Therefore, to enhance student participation in online learning, teachers should consider including interactive platforms in their use of a LMS.

Embedding reflective learning in learning management systems

This study utilised reflective learning, a pedagogical method to improve students' critical thinking and a process of communication for deep learning, which occurs through various forms such as self-reflection and collaboration (Henderson, Napan & Monteiro, 2004; Sessums, 2005). Reflective learning offers learners an opportunity to review their learning experience and seek its meaningful message. It leads learners towards growth of the individual – morally, personally, psychologically, and emotionally, as well as cognitively (Branch & Paranjape, 2002). It also leads towards critical and creative thinking and communication and collaboration between student and self, students and content, student and teacher, and student and peer students for new solutions and knowledge production (Huitt, 1998; Ruggiero, 1998). The two key components of reflective learning in terms of student participation – *individual engagement* and *collaborative involvement* – have to be properly reflected in a learning process to some degree (Balafoutas, Sakonidis & Hadjileontiadou, 2003; Ryberg & Larsen, 2008).

Reflective learning is student-centred, contextually driven, and uses critical enquiry to deepen learning. It is a socially-mediated process of learning (McGill & Brockbank, 2007). Similarly, reflection is a form of mutual communication process with others. “Socially-mediated reflection is enhanced considerably by collaborative work” (Herrington & Oliver 2002, p. 315) and collaboration on tasks facilitates reflective practice and enriches its process (Herrington & Oliver, 2002; Oliver, 2005). For McGill and Brockbank (2007), transformational or critical learning requires conditions that enable the learner to reflect on their learning, not only individually, but collectively. The challenge for educators is to determine how to employ the merits of reflective learning in online environments (Henderson et al., 2004). In online learning, embedding individual engagement and collaborative involvement provides a supportive context for LPP.

Online learning occurs through a LMS that offers flexible and accessible learning applications. These are standardised applications, but which is not always adaptable to the educator's teaching and learning objectives. It has been acknowledged that such platforms have been effectively used to facilitate reflective learning process of individual and collaborative learning (Griffith & Liyanage, 2008; Herrington & Oliver, 2002). From students' perspective of participation in online learning, reflective learning through a LMS requires considering how to equally enhance students' expression for their individual engagement and connection for collaborative involvement without requiring face-to-face

interaction (Author, 2011). Pedagogically, face-to-face interaction provides higher degrees of contingency, attention, emotional, and immediate feedback than online learning, while online learning may restrict these features of the learning environment because of its technological limitations (Baker, 2004).

To integrate individual engagement and collaborative involvement into online learning, therefore, the expression process and the connection process need to be viewed separately, but merged within a systematic structure (Author, 2011). First, the expression process, which is fundamental for both reflective processes and online learning, needs to be framed towards information exchange. For example, an article should be written to consider possible interpretations by the target audience. In line with the expression process, second, the connection process needs to be strategically and functionally placed inside the reflection process to provide a collaborative learning environment. For example, individual students should try to attract target audience (their peers) and build a collaborative involvement. A pair of expression and connection is not in a sequential process, but is interrelated and correlated. Eventually, the reflective learning on a LMS has to be embedded into individuals' expression for connection and connection for collaboration with others towards socially networking.

Participation and interactivity in online learning

This paper makes a distinction between participation and activity in a higher education context. Participation can be understood in constructivist terms as the behaviour of a learner where the learner engages in the formal educational context in individualistic formations (Coates, 2007). In contrast, activity can best be understood in social constructivist terms where learning is behaviour associated with the individual in collective formations (Little et al., 2009). Participation can be active or passive, while activity is always active, but is marked by its reciprocal and collaborative qualities (Krause & Coates, 2008). However both forms of behaviour are important for student learning not least because all learning is fundamentally individualistic and the individual is affirmed by their position in the collective.

Wenger (1998, p. 55) defined participation as a process of “action and connection” where individuals play a part and build relationships with others. Theorising traditional contexts, Wenger views participation as a “complex process that combines doing, talking, thinking, feeling and belonging” (p. 56). Suggesting traditional participatory formations have practical, communicative, cognitive, emotive, and communal qualities. The question then arises as to how these qualities transfer to the virtual environments of online learning.

Drawing heavily on Wenger's work, Hrastinski (2008) offered the following six conceptions of online learner participation:

1. Participation as accessing e-learning environments
2. Participation as writing
3. Participation as quality writing
4. Participation as writing and reading
5. Participation as actual and perceived writing
6. Participation as taking part and joining in a dialogue

When compared to Wenger's definition, these six conceptions appear thin. Although all six are 'doing' and involve 'thinking', and some are 'talking' (Point 6) and 'belonging' (Points 1 and 6), it is difficult to ascertain any attribute of 'feeling' here. Additionally there is also an emphasis on writing and reading (Points 2, 3 and 4). This is not surprising as historically the majority of pedagogic activity in tertiary-level learning has involved reading and writing. In traditional contexts this was largely an individualistic activity; however, in online learning where synchronous and asynchronous communication modalities ask students to participate in collaborative ways, the learning processes of reading and writing take on different pedagogic significance. As Hrastinski (2008) explained, "Much reading is not passive, since it may encompass engagement, thought and reflection. The concept of 'vicarious learning' recognizes the fact that learning may occur through observation of other learners engaged in active dialogues" (p. 1760). Thus interaction between students, even though they may not appear to be involved because they are reading rather than writing, does not mean that learning is not taking place at least passively. Hrastinski goes on to say that even though most of the studies he reviewed relied on quantified measures of activity as a measure of participation, several of these studies acknowledged limitations of this approach and called for better measures of online participation. Nonetheless, in online learning environments, it is thought that active student participation can significantly affect learning, assessment, achievement, and retention rates (Davies & Graff, 2005; Hrastinski, 2008; Yukselturk, 2010).

As early as the 1990s researchers were interested in defining activity in online learning environments, albeit in the contemporary vernacular of computer-mediated instruction in distance education. Gilbert and Moore's (1998) review of the literature found interactivity in this context defined as a reciprocal exchange between technology and learner. However, the terms 'interaction' and 'interactivity' are often used interchangeably. Wagner

(1997) highlighted a distinction between these activity types. Wagner sees ‘interaction’ as interplay and exchange between individuals and groups where reciprocal events require two objects and two actions (1997, p. 20). Conversely she sees ‘interactivity’ as something to have emerged from “descriptions of technological capability for establishing connections from point-to-point...in realtime” (p. 20). In this sense, ‘interaction’ describes characteristics of human behaviour as social practices, whereas ‘interactivity’ describes characteristics of human social practices mediated by contact with technology.

Levels of interactivity in LMS

In practical terms, Anderson (2003) maintains any emphasis on interaction by teachers should; 1) encourage contact between students and teachers, 2) develop reciprocity and cooperation among students, 3) encourage active learning, and 4) give prompt feedback. Interaction is an important element of effective online learning. For example, higher levels of learner interaction can result from discussion related to assignments, and collaboration with peers, which in turn improve students’ quality of learning and academic performance (Lear et al., 2010; Yukselturk, 2010).

Salmon (2002) identified five stages of interactivity for e-learning including Stage 1 access and motivation, Stage 2 online socialization, Stage 3 information exchange, Stage 4 knowledge construction, and Stage 5 development. Salmon believes that the stages require students to progressively increase their level of interactivity, resulting in higher levels of learning. Wang (2010) studied how social network position relates to knowledge building in online learning communities. Within learning communities, there are central and peripheral roles and Wang posited that actors within the learning community have different levels of knowledge building capability according to their role. He referred to five levels of roles: periphery, semi-periphery, opinion leaders, meaning negotiators, and brokers. It is important to note here that these roles are in relation to social network position within the learning community, and can be adopted by either teacher or student. Roblyer and Wiencke (2004) offered a rubric for assessing interactive qualities in distance courses: Element 1 social/rapport-building designs for interaction, Element 2 instructional designs for interaction, Element 3 interactivity of technology resources, Element 4 evidence of learner engagement, and Element 5 evidence of instructor engagement. However, the rubric provides little information on how much instructor interaction is required to take advantage of the pedagogical benefits of online threaded discussions (Mandernach, Gonzales & Garrett, 2006).

Roblyer and Wiencke's rubric and Salmon's five stages tend to exhibit somewhat opposite characteristics of the online constructivist model. Both tend to exclude students' active and non-linear participation by confining their learning activities to a predetermined stage or a linear process that are similar to LPP. These models confine interactivity to the interactions between students and teacher and between students and materials / technology only and define it as a linear and sequential process. Indeed, the models resemble reflective learning processes (i.e., Kolb's (1984) Learning Cycle and Gibbs' (1988) reflective cycle) to the extent that they limitedly respond to the values of reflective learning and the requirements of online learning. Hence, student participation has to be reformulated with the levels of interactivity or interactive activities in an online learning environment. In this sense, Salmon's (2002) five stages of interactivity in e-learning and Roblyer and Wiencke's (2004) five elements of interactivity quality assessment justify the categorisation of the five levels of interactivity - not vertical, but horizontal, because their analytical understanding and systematic classification of online learning environments, and Wang's (2010) five levels of role-based learning community engagement supports not sequential, but synchronic understandings of interactivity which types of student participation in line with higher levels of interaction is the primary focus of LMS. The transversal taxonomy because of horizontal and synchronic, allows customising the five levels of interactivity for an online reflective learning framework (refer to the next subsection).

Study design and research question

The pedagogical aim of this research is to identify students' interactivity levels by using customised online reflective learning (ORL) and the key research question is to explore what levels of student participation occur in an LMS site. The outcome is expected that teachers can maximise the benefits of reflective learning in an LMS site by providing customised scaffolds for the interactivity levels. Based on the literature review - online learning and its pedagogical limitations and reflective learning and its feasibility in online learning, this study modifies the five levels of interactivity in the context of online learning. Then an ORL framework was developed and applied as an assignment format to a large student cohort – first year pre-service teachers.

Five levels of interactivity and an online reflective learning framework

The levels of participation in an online learning environment can be represented on a scale of 5 levels, with Level 5 'Active' being the highest level of participation and Level 1

‘No Activity’ being the lowest. From a pedagogical point view, the highest interactivity is realised through learner’s full participation in the reflective learning process. The active participants post articles for sharing and inviting peers, and regular visiting to comment on others’ work. On the other hand, the average participants are not actively engaging in building connections with others despite regularly viewing others’ work. The table 1 depicts the five levels of interactivity according to their participation types, reflective learning, and frequencies and activities on ORL.

Table 1

Participation types and online activities

Levels of interactivity / participation type	Online Reflective learning	Relevant activity
Level 5 Active participants	Individual and collaborative creation: Expression and connection	*Regular visiting, posting, and commenting
Level 4 Semi active participants	Individual participation and partly collaboration: Expression and passive connection	Regular visiting and frequent commenting
Level 3 Average participants	Mainly individual participation: passive expression	Regular visiting, but rarely commenting
Level 2 Passive participant	Lack of individual participation and no collaboration	**Irregular visiting
Level 1 Non-participants	No participation	None, or rarely visiting

* 3-5 times per week, 1-2 episodes of commenting and/or posting per week

** Less than 2 times per week

In this table, the participation types are classified with the five levels of interactivity. Each level is linked to the ORL in line with the density of the expression and the connection and the relevant activities in terms of the frequencies of visiting the site, posting and commenting. Active participants experience the benefits of online learning environments, while other types of participants might experience benefits partially or to a limited degree. To ensure all students experience the full potential of reflective learning, therefore, an ORL needs to be designed as a framework in which the highest level (the active participants) has to be embedded into the learning process and reflected in the LMS design. Table 2 presents the customised stages of the ORL process to cater for the active participants.

Table 2

Online reflective learning process (modified cited in Author, 2011)

Stages	Instructions
Initiation: idea development	- Understand the task - Understand the target audience

Preparation: idea development	<ul style="list-style-type: none"> - Write ideas and concepts for the assignment with no more than 200 words or develop idea sketches and collect relevant artefacts for video clip production. - Should consider strategies to get feedback from as many as peers as possible.
Expression: idea presentation in conjunction with the concept of connection	<ul style="list-style-type: none"> - Express the idea and manipulate its format of presentation to attract other members - Prepare supporting materials or resources for further explanation and clarification of their idea when being given questions from others - Think about how to attract others and encourage them leaving feedback to the idea if have not received enough responses
Connection: give and take feedback with in conjunction with the concept of expression	<ul style="list-style-type: none"> - Give productive feedback to others' ideas - Invite others to come to see your own idea - Present the idea in effective and creative ways - Respond to others' feedback on your own idea for deep discussion which happens through social interactions - Take a collaborative approach to receive productive feedback which helps the final project
Reification: collection of peers' feedback	<ul style="list-style-type: none"> - Select five students' feedback only for your reflection - Collect your own feedback given to the others for your reflection - When critically reviewing your critical understanding of the feedback gave and given, reify your ideas for the final project
Reflection: reflective writing	<ul style="list-style-type: none"> - Based on your critical understanding of collaborative and individual feedback, write your reflection in terms of how the feedback has influenced your project development. - The collected feedback must be attached with either/both indirect or/and direct quotations.
Actualisation	<ul style="list-style-type: none"> - Apply the reflection outcomes to the project - <i>Generating new knowledge</i>
Evaluation	<ul style="list-style-type: none"> - Receive results of the assessment and reflect the entire assignment.

The framework is intended to overcome the limits of sequential processes of learning and accommodate students' different levels of interactivity. It enables students and teachers to consider the value of online reflection and encourages students to be active participants.

Participants and assessment

The course was a large, first year student cohort (n > 600) of pre-service teachers in digital literacy study in a university, and the assignment task was offered in an LMS. Students were asked to discuss and argue how technology changes teaching and student learning, and what would be an appropriate teacher model as a result of those changes. The outcomes of the assignment included a video clip and a written essay. To do so, students undertake a reflective process via Virtual Groups for their task completion (refer to the ORL framework presented in the next section). Prior to the beginning of the assessment task, students were randomly allocated to virtual groups in the LMS. Each group comprised twenty students. The task proposed that students post their work, including ideas, concepts, and artefacts, and comment and discuss on peers' work. The task spanned five weeks of the first

semester, and formed part of the summative assessment. This requirement was designed so students could build connections with peers with a view to enhance collaborative participation in the task over the five weeks. In their submission of the work, they were required to provide evidence of their participation in the course.

Data collection, analysis and validity

At the end of the semester students were asked, on a voluntary basis, to fill out an online survey to gather responses about their reflective learning task and their participation. The questionnaire was available on the course LMS site. This allowed students to complete the instrument if they were visiting the site. The data were collected from 238 participants in terms of their perceptions of interactivity in the ORL via a questionnaire. Then a focus group discussion with 34 among the participants was undertaken to investigate the reasons of their diverse perceptions of interactivity.

The questionnaire consists of quality of online learning, quality of learning materials (lecture and tutorial), quality of online reflection and communication, and perceptions of interactivity levels. The first three sections ask students to rate their responses on a 5-point Likert scale with “Strongly disagree” being the lowest rating, and “Strongly agree” being the highest, plus non-applicable. The last section asks students to define their type of interactivity based on the transversal taxonomy of the five levels of interactivity (Table 1). These qualities of students’ perceptions of interactivity were ascribed into a quantitative measure for data analysis purposes which is amenable to statistical analysis (Creswell, 2009).

Then, the subsequent discussion was implemented through a semi-open structure that is based on the premise that the different types of higher levels of interaction (or ‘active participants’) occurred in the LMS site. The contents of the discussion were thematised for a systematic articulation of the understanding of the reasons in line with the questionnaire analysis (Creswell, 2009) through the consensus of the participant students.

Results

Table 3 shows that the student response to the overall quality of online learning is highly positive and 83.2 percent of the respondents answered either ‘Strongly agree’ or ‘Agree’. Table 4 shows that the majority of students were also satisfied with the learning materials provided in the LMS site.

Table 3

Overall quality of online learning

Quality of web-based learning	Respondents (percent)
Strongly agree	72 (30.3%)
Agree	126 (52.9%)
Neutral	34 (14.3%)
Disagree	4 (1.7%)
Strongly disagree	2 (.8%)
Total	238 (100.0%)

Table 4

Quality of learning materials (lecture and tutorial) provided in the learning website

Recorded lecture	Respondents (percent)	Tutorial materials	Respondents (percent)
Strongly agree	65 (27.3%)	Strongly agree	48 (20.2%)
Agree	115 (48.3%)	Agree	124 (52.1%)
Neutral	43 (18.1%)	Neutral	40 (16.8%)
Disagree	10 (4.2%)	Disagree	20 (8.4%)
Strongly disagree	2 (0.8%)	Strongly disagree	3 (1.3%)
Not applicable	3 (1.3%)	Not applicable	3 (1.3%)
Total	238 (100.0%)	Total	238 (100.0%)

In contrast to Table 3, Table 5 indicates that half of the responses are positive; while 24.4 and 29 percent answered that the quality of ORL for their quality of learning and communication experience were neutral. The result has a similar pattern with the levels of interactivity (Table 6).

Table 5

Overall qualities of learning and communication in the ORL

Quality of ORL	Respondents (percent)	Communication	Respondents (percent)
Strongly agree	36 (15.1%)	Strongly agree	32 (13.4%)
Agree	84 (35.3%)	Agree	84 (35.3%)
Neutral	58 (24.4%)	Neutral	69 (29.0%)
Disagree	41(17.2%)	Disagree	37(15.5%)
Strongly disagree	17 (7.1.8%)	Strongly disagree	9 (3.8%)
Not applicable	2 (.8%)	Not applicable	7 (2.9%)
Total	238 (100.0%)	Total	238 (100.0%)

Table 6

Student perceptions of their interactivity levels

Levels of activity	Respondents (percent)
Active participants	61 (25.6%)
Semi active participants	56 (23.5%)
Average participants (or regular viewers)	64 (26.9%)
Passive participant (or irregular viewers)	53 (22.3%)
Non-participants	3 (1.2%)
Not applicable	1 (.4%)
Total	238 (100.0%)

Although most students successfully completed the ORL activity, nearly 50 percent of the respondents claimed that they were either active participants or semi active participants.

Remembering that most students had to go through the proposed ORL process (Table 2) to complete the task, it was anticipated that the majority of students would identify themselves as the active participants. As the ORL progressed, the students posted their work, commented on peers' work, and discussed relevant issues in their virtual group. The following are the selected students commented on some positive aspects of ORL:

With the Virtual Group I was a little disappointed in the beginning due to a lack of response from my blogs with helpful info for their assignments and asking for opinions on mine. I did wait quite some time and I was a little discouraged and found it a while before I was confident in navigating. But now WOW everyone is sharing ideas and improving ideas, and it's a great way to improve quality of the project while helping others to do the same.

The use of Blackboard communication channels is a good feature. I enjoyed using the My Virtual Group and assignment discussion forums to answer the questions I had without needing to leave my home or emailing a lecturer.

The forums, discussions boards etc. were good to help meet new people, get answers to questions and get different opinions.

The subsequent open-ended discussion with 34 participants revealed three possible reasons why students did not recognise themselves as 'active' participants: 1) communication and learning mode preferences, 2) none or low peer engagement and 3) absence of teacher intervention.

First, the majority of the students agreed they wanted to receive feedback from peer students when they were in face-to-face contact with at other times. The following are selected comments which address their need:

I realise the whole purpose of this unit was to help each other 'learn' through the medium of networks, but I'd rather get face-to-face feedback from my actual tutorial group rather than a whole bunch of strangers whom I've never met before.

I have not really liked the online peer feedback for my assignment. Maybe it would work better if we each brought a draft to class instead and marked it that way.

I feel that asking for a portion of an assessment to be based on a third parties' involvement is unfair. It would be beneficial to have someone with more knowledge of the programs we are using in the workshops.

It seems that these students were not familiar with online communication and/or tended to focus on outcome rather than process. Their strong preference for face-to-face contact with their peers and teachers decreased their active engagement in the virtual group.

Second, the majority of the participant students agreed that none or low peer engagement also discouraged them from developing higher quality participation in their collaboration and reflection processes, and impeded more frequent communication with peers. The following are selected comments that show their view on peer student engagement:

The virtual group system is not that successful It can be altered in a way that students may just pour their ideas and give immediate comments. It is problematic, as not all are participating.

The virtual group drives me crazy, because I feel not everyone actively becomes involved, which makes me not want to participate.

It was completely unfair on my part as I was giving out very good feedback, which was constructive and also topic building; whereas, the feedback I received was very poor and not helpful at all.

In collaboration, the students who believed that they made contributions to a group expected to receive at least quality and immediate feedback from the other members. The underlying values would be realised in an individuals' performance and outcome based system.

Third, the majority of students felt that lack of teacher intervention led to some disengagement or non- participation. The majority of the students said they definitely preferred to get feedback from their teachers rather than peers. The following are selected comments that demonstrate their need of teacher intervention:

A little more guidance needs to be given to students in regard to the virtual group. I would have to say that teacher intervention according to students' participation levels would help all students engage in efficient and quality learning.

Teacher did not explain how to use programs very well, students have to learn from blackboard and if they have any questions then they ask teacher. I think this did not help me; it is like independent study in the class.

The tutors should intervene more on what they expect of the assignment because none of us knew what right and what was wrong.

The students perceive that teacher feedback is more reliable than peers' and more directed toward timely task completion and contributes to formal results. Students interpreted the lack of teacher interaction and intervention as teachers' non-presence and no participation in the LMS.

Those three factors resulted in many students focusing on the immediate goal of completing the task as an individually given task rather than a collaborative learning process. On the surface, nearly half of the participant students prefer over face-to-face communication and more independent study in class, but fundamentally it could be worth thinking about whether their experience remained legitimate peripheral participation due to no full membership figures in LMS – probably teachers or their dominant learning style has been built based upon a liberal-individualistic framework which defends the priority of the individual to the collective in Western school systems.

Discussion and practical implications

Online learning facilitates communication and enhances interactions between students by providing student-centred, self-paced, and collaborative learning (Pacheco, 2005). Some researchers have also demonstrated that there is no significant difference in the academic achievement of students in online learning and face-to-face learning (Brownstein, Brownstein & Gerlowski, 2008; Pacheco, 2005; Warren & Holloman, 2005). However, the survey and discussion results above indicated that the reflective task in the virtual groups seemed not to accommodate students at the lower three levels of interactivity. It was expected that the majority of the students would recognise themselves as 'active' participants because the students had to go through the full reflective learning component in order to complete the task. There are some factors that need to be considered to enhance the quality of online learning by motivating and inspiring students to raise their participation to active participant status.

First, student perceptions of ORL and LMS are important when determining student participation levels. First-year entry students are vulnerable to “academic failure, as well as most likely to experience social, emotional, and financial problems” (McInnis, 2001, p. 106). This puts them at higher risk of withdrawal from study. Kennedy et al. (2008) argued that even though first-year students are familiar with social-network technologies, they may not be comfortable using collaborative technology in formal educational contexts. As seen in the discussion data, nearly half of the participant students have a strong preference over face-to-face communication and more independent study. The course was a large first-year student cohort and the assignment task was offered in an LMS. Therefore, teachers need to ensure that students understand the collaborative processes involved and to ensure the students are confident participating in this method of curriculum delivery. As the discussion data revealed, in addition, it would be critical for those student cohorts who prefer face-to-face communication and an individualistic approach to understand advantages and disadvantages of online learning in line with their learning style.

Second, the pedagogical benefits of online learning can be enhanced through high quality interactions between teachers and students (Sessums, 2005). In particular, first-year students are likely to demand more pedagogical and technical support, which means that teacher facilitation and participation in online learning processes are crucial. Without teacher participation, the quality of the learning experience is likely to be compromised. These findings are consistent with other research (Furberg, 2009; Mandernach et al., 2006). In particular, research by Su et al. (2005) suggested that students perceive themselves as isolated individual learners when they do not have interaction with teachers. Noting the levels of interactivity, teachers can encourage those participants not functioning at Level 5 ‘Active’ to become more involved. A student who is regularly visiting the site, but not providing comments on others’ work, could be prompted by the teacher to contribute in a more tangible way, such as making a post suggesting a relevant web site or providing a useful link.

Third, teacher attention cannot always be given individually to students in large cohorts. However, as the data here indicates, the levels of activity were evenly distributed across Levels 5 to 2. This suggests that if teachers were to have at least three groups –Semi-Active, Average and Passive – liaising with the higher functioning ‘Active participants’, then activity levels may increase with the potential for online learning to be more effective because the others are not online at all to be contacted by the teacher. Teachers are aware of the importance of quality interaction with students, but many teachers do not have the skills to increase student participation and interactivity in online learning environments

(Mandernach et al., 2006; Su et al., 2005). In this unit of study, even though fifteen teachers were involved there were no technical proficiency requirements. There was also no professional development training on how to facilitate and participate in the LMS. In other words, teacher participation of the virtual group, with or without a reflective learning component, needs to be factored into course design and training. The use of an online reflective task framework would assist teachers to evaluate student participation and provide appropriate prompts for those first-year students, whose low participation in higher education puts them at risk of disengagement and possible withdrawal from coursework.

The study highlighted how learner-teacher interaction and learner-learner interaction are important components of reflective learning in online learning environments. As the data revealed, however, teachers need to be aware that students entering online learning will do so displaying various levels of interactivity. Those at the lower levels may benefit from prompting by teachers, because teachers are perceived as more task-focused and knowledgeable, and therefore, more reliable than peers. In terms of social constructivist learning, a role-based grouping between active and passive participants may mitigate barriers to participation for some students. In community of practices, in other words, a group of experienced members sustain the community where the novices can directly observe the practices of experts to gain 'full membership' (Lave & Wenger, 1991). The study argued that most students in a course are peripheral to the content and the assessment, and at the same time, technically central to online learning right from the beginning, which causes decentralised convergence of multiple interactions with peers and non-linear functional processes of engagement in learning. This implied that the full membership needs to be materialised by, and incarnated through, the teacher's systematic interventions. A great deal of variability between individual students in terms of their participation types in online learning can be supported by utilising the levels of interactivity in LMS.

The results of the discussion suggest a few practical implications. First, to bridge pedagogical gaps between students' familiarity with digital devices and social media and online learning and teaching, an integrated assessment with their engagement in various technological functions may improve their awareness of educational technology. Second, for efficient interventions of teacher in a LMS, utilising real-time and historical statistical tools embedded in a LMS would be useful in which it may motivate students to be performance oriented rather than mastery oriented. Last, the teacher's professional, reflective blogging to the learning processes where students can also participate in would be an exemplary

technological and pedagogical practice which facilitates students to follow the quality engagement.

Conclusion

Student participation in online learning has a significant impact on the quality of learning outcomes, and learner-teacher interaction is one of the most influential characteristics of online learning. Identifying levels of teacher-learner interactivity can offer pedagogical frameworks for the design of online learning, which can assist reflective learning processes. The results of a small-scale university study of first-year education students revealed four pedagogically meaningful insights: i) students' perceptions of online collaborative learning are an important factor influencing active participation; ii) none or low peer engagement discourages students to develop higher quality and more frequent communication with peers, iii) teacher participation and intervention are highly prized by students, and iv) students in this study were evenly distributed on the five levels of activity from active to passive participants. The study demonstrated that an online learning model needs to be facilitated according to levels of student participation, and where activity levels are low, supported by more frequent teacher interventions. This argument provided a little theoretical support for an application of LPP in an LMS-based collaborative learning. It can be concluded that teacher participation and intervention can be strategically positioned when designing curriculum, particularly for first-year students, to facilitate and support students at each level of interactivity in adopting LPP.

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