The Challenges to Connectivist Learning on Open Online Networks: Learning Experiences during a Massive Open Online Course

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Abstract

Self-directed learning on open online networks is now a possibility as communication and resources can be combined to create learning environments. But is it really? There are some challenges that might prevent learners from having a quality learning experience. This paper raises questions on levels of learner autonomy, presence, and critical literacies required in active connectivist learning.

Keywords: Connectivism; networked learning; learner autonomy; presence; critical literacies

Introduction

Something fundamental has changed with the latest developments of the Web: The ease of communication and the possibilities of using aggregators to bundle and filter communications and information have meant that the context of learning has changed dramatically. People can now learn on online networks outside of the control of the institution, and depending on the nature of the connections made, the learning experience will vary. If the connections are one-to-many, from the top down, from the educator to the learner, networked learning might be completely different from a setting where the connections are many-to-many and where they might run in any direction between the participant(s) and the resources related to the learning.

In e-learning, two major traditions have been prevalent: one where connections are made with people and the other where they are made with resources (Weller, 2007). These two distinct streams show a different emphasis: the first one has communication and interaction between people at the heart of learning, and the second focuses on engagement with resources. Of course these distinctions have always been present even in traditional classroom learning; there has always been a triangle between educator, learners, and course content, and depending on the

emphasis on one of the three, different teaching and learning strategies have been employed, related to the views of knowledge and learning. Since the 1980s, a fourth component has been added to the mix: the context in which people learn has had more emphasis in learning theories. Initially through the emergence of andragogy and experiential learning (Rogers, 2002) and communities of practice (Lave & Wenger, 2002), and more so, since the emergence and proliferation of information and communication technologies (ICTs) and their increasing encroachment on everyday life, boundaries between settings in which people learn and in which they use technology for other activities have blurred, and perspectives such as connectivism have emerged.

These different views of learning have at their heart different perspectives on knowledge development. The question of how people become more knowledgeable and reach understanding is an old one and has in past decades ranged from a process of transferring knowledge, or a process of aligning new knowledge with earlier experiences and knowledge, to a process of conceptualization, contextualization, and active construction of knowledge, or reflection in action. Some theorists emphasize the social aspect of learning, while others emphasize the personal one.

Sfard (1998) used two metaphors to clarify how people engage with knowledge while learning. The first one is of acquisition, where learners acquire knowledge, pre-packaged by educators, as in behaviourist and cognitive theories, which have been the norm in formal education settings for a long time. The other metaphor is one of participation, where learners are actively involved in a participatory endeavour. This metaphor relates to situated and social theories, such as social constructivism, action theory, and communities of practice. Participation in knowledge development activities is central in these theories. Connectivist developmental theories also fit in the latter category (Kop & Hill, 2008).

Connectivism

Siemens and Downes proposed teaching strategies without formal teaching and dynamics that allow the educator to have the role of facilitator or a total absenteeism from the learning process as they trialled in their connectivism courses (Siemens & Downes, 2008, 2009). The participation metaphor would be the most appropriate here as this type of learning event involves the active engagement of people with resources in communication with others, rather than the transfer of knowledge from educator to learner. Connectivists advocate a learning organization whereby there is not a body of knowledge to be transferred from educator to learner and where learning does not take place in a single environment; instead, knowledge is distributed across the Web, and people's engagement with it constitutes learning.

It is envisaged that learning is enhanced by four major types of activity: 1) *aggregation*, access to and collection of a wide variety of resources to read, watch, or play; 2) *relation*, after reading, watching, or listening to some content, the learner might reflect and relate it to what he or she already knows or to earlier experiences; 3) *creation*, after this reflection and sense-making process, learners might create something of their own (i.e., a blog post, an account with a social

bookmarking site, a new entry in a Moodle discussion) using any service on the Internet, such as Flickr, Second Life, Yahoo Groups, Facebook, YouTube, iGoogle, NetVibes, etc.; 4) *sharing*, learners might share their work with others on the network. This participation in activities is seen to be vital to learning.

In the current complex learning environment, which is one of continuously changing and emerging technologies, new forms of learning are emerging and are possibly desirable (Conole, de Laat, Dillon, & Darby, 2008). Downes (2009) claimed that people can create and use their own personal learning environment (PLE) and network to find information, make connections with knowledgeable others of their choice, and become actively engaged in the four activities suggested above to advance their learning. This paper will highlight three challenges to such an approach, critically assess the challenges of connectivist, informal, personal, and networked learning, and highlight learners' perceptions and experiences related to these challenges on two connectivist courses.

Challenges to Connectivist Learning

Self-directed learning.

A connectivist learner has to be fairly autonomous to be able to learn independently, away from educational institutions, and to be engaged in aggregating, relating, creating, and sharing activities. Whereas in a traditional classroom/learning environment, the educator was responsible for providing information, organizing time, and structuring the learning activities and goals, in a networked environment the learner him or herself takes responsibility for this. Adult learners make choices about the level of control imposed by others on their learning, and Bouchard (2009) identified several factors that are significant. Some of these are related to motivation, initiative, and confidence; others are related to control over the learning activity or to issues of language and communication used in the learning and teaching processes. He also highlighted issues related to the value of learning to learners' lives.

People learning on an informal network will choose the subject they want to learn about or the activity they want to engage in, but in a connectivist environment they have to make other choices as well. For instance, they have to manage time, set their own learning goals, find resources, and try out new tools and make them work. These choices would in a formal classroom be the instructor's responsibility, but are in an autonomous learning environment linked to tasks that the learner will carry out independently, which could be problematic. The availability of particular semiotic features, such as multimedia, might motivate the learner to take on a learning project. Similarly, the language and multimedia used could play an important role in who would be engaged online and who would not. These are related to *presence*, which will be discussed as another challenge later on.

The motivational factors in a traditional adult education classroom are very important in learners either participating in learning or not. If confidence levels are low, it is not likely that a person will take up connectivist learning. The technology itself, or the activity the learner is taking on,

could form a barrier and will have to be engaging and interesting enough for the learner to work his or her way through the problems that will undoubtedly come up during the learning journey. A personal learning environment that would aid the learner in this endeavour could play a positive role (Kop, 2010). A big difference between learning informally, both away from an educational institution and within one, is the level of intrinsic motivation that the learner has. There is clearly a much higher level of motivation that must stem from the self in an informal learning situation as some of the motivational factors in a formal context would more often than not be external, for example getting a qualification or learning a skill for the workplace.

Presence.

Intrinsic motivation has an affective dimension, and the literature highlighting the importance of affective aspects to networked learning is growing (Picard et al., 2004; Zaharias & Poylymenakou, 2009). Other issues related to motivation have been highlighted by Lombard and Ditton (1997) and by Dron and Anderson (2007) in the form of "presence." They argue that the closer the ties between the people involved, the higher the level of presence and the higher the level of engagement in the learning activity.

Lombard and Ditton (1997) emphasised as a main aspect of presence the illusion of non-mediation. In other words, there is a high level of presence when a participant in an online activity experiences the activity as if it were taking place in real life, without the mediation of the computer. Garrison, Anderson, and Archer (2000) argued that deep and meaningful learning results if three forms of presence play a role in education: "cognitive presence," which ensures a certain level of depth in the educational process; "social presence"; and, in a formal educational environment, "teacher presence." In PLE-based connectivist learning, the teacher would not necessarily be present, but one could argue that there are knowledgeable others on the Web who would take on that teacher role to a certain extent. For people to take an active, participative, and critical role in connectivist learning, they need communication and collaboration with and feedback from others, the same as in classroom-based learning.

The higher the level of presence, the higher the level of involvement in the online activity, which makes the level of presence in connectivist learning important as it should enhance the depth of learning and subsequently the learning experience. Another important factor is people's level of critical literacies. The lower the presence of others in the learning environment, supporting and providing scaffolds for learning, the higher the need for particular capabilities in the self-directed learner him or herself to find resources and information, create something with these, and push something out onto the Web for others to engage with and learn from.

Critical literacies.

It has been highlighted by several people in recent months that there are literacies critical to connectivist learning. Downes (2009) speaks of critical literacies, others of 21st century skills (Partnership for 21st Century Skills, 2009). To be able to make the most of a learning environment that is positioned outside the sphere of formal education and that fosters active engagement in

learning activities, learners need different competencies and abilities to feel comfortable. There is no overarching educator present to guide learners, to challenge their ideas and beliefs, or to help in aggregating information and in understanding the media and the way they represent information. The onus is on the learners themselves to make these judgments, to validate information and knowledge, and to find knowledgeable others who can help them. Moreover, the new learning environment requires learners to be active in their learning by editing and producing information themselves in a variety of formats and by communicating and collaborating with others in new ways. People need to have a certain level of creativity and innovative thinking, in addition to a competency in using ICT applications, to be able to do this. Learners need to be flexible to be able to adapt to new situations and are also expected to solve problems that they come across during their learning journey in this complex learning environment.

A major concern is that because people need to aggregate information and resources autonomously, either by (RSS) feeds or through the use of human filters, they require a high level of critical analysis skills to be able to do so effectively. We have seen substantial growth and development of the Web over the past 10 years, and even though many applications and tools started out bottom-up by users who could see their use, increasingly concern is being raised about the influence of commerce on the Web (Lanier, 2010; Mejias, 2009). Lanier (2010) and Mejias (2009) emphasised the high level of influence by a low number of companies, such as Google. The market seems to slowly but steadily influence and control new tools. The freedom and creative potential of the Web for all seems to be increasingly influenced by other interests. Research shows that the Internet and the Web are not value-free and do not act as non-hierarchical networks (Barabasi, 2003; Mejias, 2009; Bouchard, 2010). Barabasi's research shows that power relations prevent network "surfers" from having access to all information at the same level:

> The most intriguing result of our Web-mapping project was the *complete* absence of democracy, fairness, and egalitarian values on the Web. We learned that the topology of the Web prevents us from seeing anything but a mere handful of the billion documents out there. (Barabasi, 2003, p. 56)

It becomes clear that if people are learning on these vast, disparate information networks, they need the ability to understand the intricacies of the networks in order to negotiate their structures. The need for high levels of critical capabilities, in addition to knowledge of the sub-systems of the Web, is important in order to be able to access the information and resources that are relevant and required. It should be questioned if all adult learners are able to do so without help from knowledgeable others. These knowledgeable others are their information brokers, and Boyd (2010) emphasized problems with free access to information even when it comes to these people. She states that the information brokers—rather than the creators of the Web content themselves—have the power, which means that an interpretation of the resources takes place. These free agents do not have a responsibility or an obligation to provide a critical point of view. One could argue that the way in which Twitter is developing might overcome this, as it is now possible to fairly simply aggregate information from a high number of people (Rusbridger, 2010).

Researching Connectivist MOOCs for the Design and Development of a PLE

The three challenges to connectivist learning highlighted previously are 1) the need for critical literacies and the power relations on the network; 2) the level of learner autonomy; and 3) the level of presence. These can all be overcome by what has in traditional formal educational practice been seen as crucial to teaching and learning: social interaction.

What type of structure might then aid learners in overcoming the aforementioned challenges? What can be done to engage learners in critical learning on an open network? Carroll, Kop, and Woodward (2008) see as the crux to engaging learners in an online environment the creation of a place where people feel comfortable, trusted, and valued. The task would be to move toward a space that aggregates content and to imagine it as a community, a place where dialogue happens, where people feel comfortable and where interactions and content can be easily accessed and engaged with, a place where the personal meets the social with the specific purpose of learning.

The National Research Council of Canada's Institute for Information Technology is currently engaged in the research and development of such a structure, a PLE named Plearn, by using a design-based research approach. The research investigates the development of a pedagogical platform that could support networked learning in all its facets outside formal education by combining (intelligent) information streams and editor and publishing tools and by providing scaffolding, communication, and support structures for learners.

One component of the research involves investigating educational issues to find out the requirements for such an environment. This research is still in progress as Plearn is currently under development, but the first part of the educational research, the learning on a "PLE-like" place, has been explored during two connectivist massive open online courses (MOOCs). This paper will share some of the preliminary research findings on the MOOCs run during the summer and fall of 2010. The summer course was Critical Literacies (CritLit) (377 participants) and the fall course was Personal Learning Environments, Networks, and Knowledge (PLENK) (1610 participants).

These courses were based on the four principles to facilitate learning by creative engagement on connectivist courses: the aggregation of information and resources, a reflection on these resources and a sense-making stage in which earlier developed knowledge and experience might be related to this new knowledge, a repurposing of the resources by perhaps creating a digital artefact, and then the sharing on the Web of the newly produced resource.

The course structure of the MOOCs investigated did not change from the earlier formats used by Siemens and Downes on CCK08 and CCK09 (Siemens & Downes, 2008, 2009). It included a Moodle environment, a course wiki on which all resources, course information, and recordings were stored, and a Daily newsletter that was emailed every day to participants and that was generated by gRRShopper software from online contributions by participants on the Moodle

discussion board, blogs, and Twitter. Resources offered at the start of each week were extensive and grew throughout the week with links provided by participants and speakers on discussion boards, on Twitter, on blogs, and during Elluminate sessions.

One of the research questions was whether the four activities highlighted as being crucial to learning (aggregating, relating, creating, and sharing) were actually as important as envisaged by the course planners. Another was to see whether the challenges identified from the literature (critical literacies, presence, and self-directed learning) were actually perceived as being as problematic as identified in the literature.

Research Methodology

A mixed-methods approach was used in the research. Surveys were conducted, consisting of a mixture of quantitative and qualitative questions, while observations, discourse analysis, and secondary data analysis in the form of learning analytics were also carried out to capture data and analyse it. (For more information on the research methods and research ethics, see Kop, Fournier, & Sitlia, 2011, forthcoming.) A focus group of *lurkers* was also conducted as it was impossible to gain an understanding of their experiences from activities on the learning environment because they were invisible to the observer. Data were collected on the Moodle course forums and wiki, the participant blogs, and Twitter posts, and on any other online activities using the #PLENK2010 tag. Because of the volume of data generated by the participants and facilitators and the restrictions on time to produce this paper, a limited quantitative analysis of blog posts, Twitter, and Moodle participation was achievable, and the qualitative analysis of data for this paper has been restricted to the Moodle environment and a sample of the participant blogs.

Who Were the Participants?

To give an impression of the participants' backgrounds, Figure 1 shows a Wordle visualizing the professional backgrounds of participants on the CritLit course. This is also representative of the participants on PLENK.

Chart 1 shows the ages of the PLENK participants and Figure 2 shows a Google Map representing participants' residences. It is available online as a two-page interactive map and was instigated by one of the PLENK participants.

Figure 1. Wordle of participants' professional backgrounds.

Chart 1. PLENK participants' ages.

Figure 2. PLENK participants' places of residence.

Results

What Did PLENK Participants Think of the Learning Environment?

PLENK's subject of study was personal learning environments, networks, and knowledge, and the course's learning environment resembled a PLE-like structure. This resulted in close scrutiny of the learning environment itself by participants throughout the course.

Participants indicated that course resources such as the Daily newsletter, the Moodle, and the wiki were enough to make them understand what the course was all about before starting (40.4% of the 55 respondents strongly agreed and 36.5% somewhat agreed). During the first few weeks of the PLENK course, however, it was clear that especially participants who had not engaged in a

MOOC before found its distributed nature confusing and the high level of resources and contributions by participants overwhelming. In the words of one of the participants,

> I am so lost. While I do enjoy really the information presented and the fantastic blogs, I am in "over my head" with the technology. But I am not giving up and will keep reading and find f2f support to get me going.

And from one participant's blog post:

> Yes indeed, I found this first week of the #PLENK2010 MOOC totally overwhelming as this is really my first experience of such an environment. Moodle has taken on a life of its own, blog posts are mushrooming left right and centre, the "Dailys" are piling up in my inbox, and then there's Twitter and a plethora of side discussions I am probably not aware of. I feel swamped because everything is interesting. The expertise and experience of the participants, the quality of the discussions is simply phenomenal.

Facilitators provided support by producing videos on how applications and tools worked and by creating posts in the Moodle discussion area about the impossibility of reading and viewing all resources; this helped the learners. One of the participants also started a discussion thread with scaffolds and helpful hints that had 106 replies and that led to the participants' development of a tools wiki and several groups outside the course learning environment (i.e., on Facebook, Friendfeed, & Flickr). Participants used visualization tools such as the Figure 3 Wordle to find out the essence in readings for a particular week.

Tim Berners-Lee on the Next Web (TED, 2009)
Wordle of the transcript of Sir Tim Berners-Lee TED talk, the Next Web.

Figure 3. Participant Wordle related to a particular PLENK resource.

What Else Did PLENK Participants Do throughout the Course?

The PLENK MOOC started with 846 participants, and that number steadily increased to 1616 by the final day, as shown in Chart 2. People valued the twice-weekly Elluminate sessions, once a week with an invited speaker and once a week as a discussion session among the group and facilitator(s). Actual presence at these synchronous sessions decreased over the weeks from 97 people in week two, when attendance was the highest, to 40 in the final week, and there was a similar trend in the access of the recordings. A high number of blog posts was generated during the course (886) and an even higher number of Twitter contributions (3022). The #PLENK2010 identifier made it easy to follow the Twitter contributions by participants, which highlighted a wide number of resources and links back to participants' blogs and discussion posts, and thus connected different areas of the course. Although the number of course registrations was high, an examination of contributions across weeks (i.e., Moodle discussions, blogs, Twitter posts marked with the #PLENK2010 course tag, and participation in live Elluminate sessions) suggested that about 40–60 individuals on average contributed actively to the course on a regular basis, while others' visible participation rate was much lower.
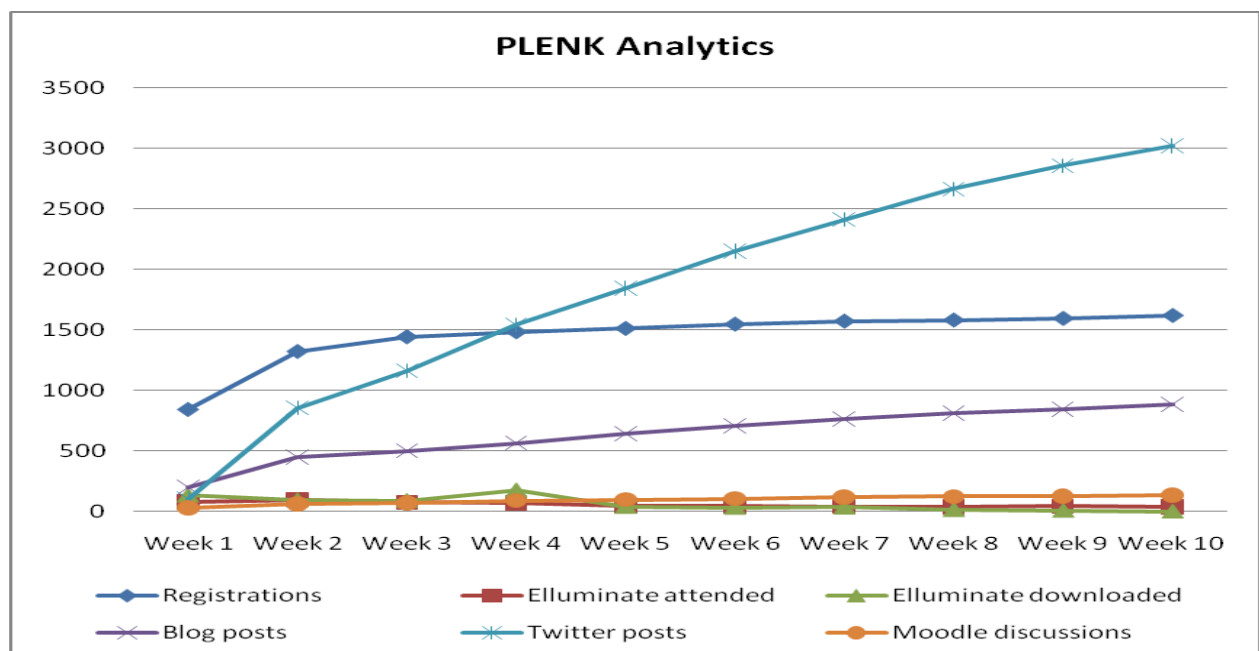
Chart 2. PLENK participation rates.

Some MOOC old-timers were very involved in the course and made things happen, as one participant's blog post highlights:

> The Google Map I made has got 15751 views until today and hundreds of links. So it was useful. My blog has been read in 68

> countries in all continents (more than ever) and I have got some
> new friends. And this has happened in spite of my absence.

Not all participants contributed in a visibly active way. There was a high number of people "following the pulse of the event" rather than getting involved in producing digital artefacts such as blog posts or videos. They preferred to read, view, or dip in and out of the conversation, as this participant's post shows:

> My lurking provided me with a wealth of information and education into MOOC, PLE, PLN, PLC, and how information and knowledge will be shared by all—teachers, students, kids, adults. . . . PLENK has provided me an opportunity to listen to the experts. . .I come in and read the posts that are of most interest to me. I wanted to know how it affects my teaching efforts, my learning, and how to share this with others. The discussions did give me a clear idea of how they are used by different people. . .Thank you for allowing lurkers, who may not know enough to post, but have learned a great deal in just lurking.

Self-Directed Learning

How easy or hard was it for learners to study independently, with four facilitators available to guide participants, rather than the higher level of direction that an instructor would provide? Here is an excerpt from a [blog post](#) by one of the participants:

> I am not a typical course student and I do not want anything from the facilitators. It is enough that they offer the structure and the platform (Moodle). I am ready to study "alone" and find my way. All depends on the time I can and want to use for finding new friends, trying new tools, checking materials, etc. I see no difference between students and facilitators, we have many 55+ students who have much to give to others.

A learner on CritLit said: "I enjoyed the experience of autonomy in relation to my own learning. I learned to design my ple, and all the process helped me to substantiate my ideas on didactics and education."

Another participant highlighted on his blog the importance of an understanding of the change-process and the steps required to achieve it. During the lurker focus group, however, thoughts were expressed that especially novices might not have this understanding and might miss a sense of community to help them.
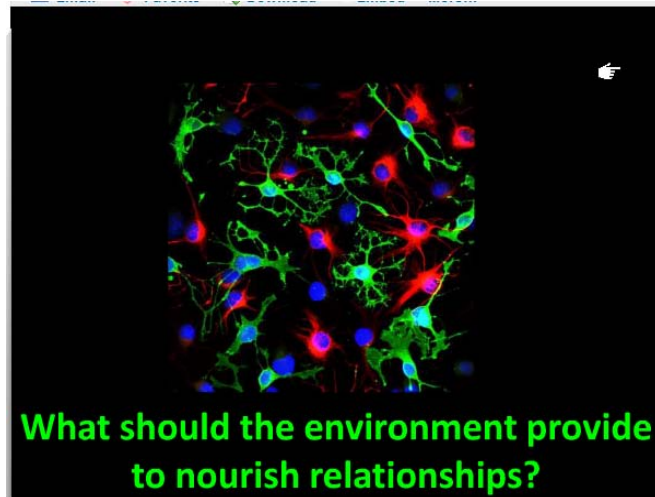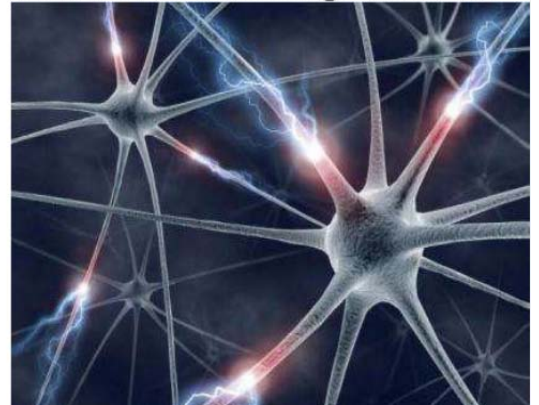
Figure 4. The learning environment.

Figure 5. The community.

Another participant wondered in a [presentation](#), as expressed in Figures 4 and 5, what the environment itself might do to enhance communication and what the learning community might provide to entice people into becoming generators of content, rather than consumers. Another participant clearly found active participation important, as his discussion post shows:

> I believe we are all "self-directed" learners because we all log in to the MOOC forum on our own initiative without being coerced by anyone. But once you are in the forum, it's the appreciation of other participants' ideas and postings that makes us hit the keyboard and type something. . . I am not too sure whether lurking is both acceptable and beneficial. . . To me, there is more to learning than gaining benefits for our own individual needs. . . Individuals have worthwhile ideas that need to be shared. Through sharing, ideas are tested and refined. And that will not happen if we lurk.

Another participant clearly was not happy about this value judgment without further investigation into the nature of different types of learning:

> yep let's condemn modes of learning that are not conforming to some arbitrary personal standard, remain as ignorant as possible as to the forms & variations & motivations of those modes, hand out "names" & pronounce judgment - failure!
>
> Enforced active, energetic participation shall be the rule. Nothing good has ever come from someone quietly observing & going off to have a good think about it all.

And another participant on power relations in a social setting that might be detrimental to expressing oneself said,

> If one is highly socially sensitive and he or she feels included, accepted, and empowered, does that necessarily mean that participation in a collaborative work will result in creative and/or complex problem-solving and thinking? If one feels threatened, he or she might flee or fight back... or not. For example, one might decide to ignore provocation, reserve judgment, ask for clarification, take on the point of view of the other so as to understand the argument better, or just let that pony run and get on with life...

It seemed that on the one hand, some people found it motivating to direct their own learning, and on the other hand, some people would have preferred more coordination and some assignments to give their learning direction. In the lurker focus group there was a consensus that people need time to digest what they read, what transpires in Elluminate sessions, or what happens in the discussion forums and that it might not be possible or desirable for people to respond by producing a digital artefact within the course time frame. They agreed that the benefits, such as developing their own PLE/PLN, the sharing of PLE/PLN practice, and the introduction of social media, which they learned about through PLENK or in their workplace or teaching practice, were significant. These benefits would be invisible to other PLENK participants and also not help their learning but would be valuable to the participant.

Other benefits were seen in the form of the extension of personal networks and in new blogs and Twitter participants to follow. Participants highlighted the need for a sense of trust and feeling comfortable and confident to be able to participate, a sense of presence and community that some participants found on the PLENK Second Life site.

We have to take into consideration the number of people who were involved in particular activities visible during PLENK and the number who were not. As mentioned earlier, 40–60 participants were highly engaged and involved in the course by producing discussion posts, blog posts, Twitter messages, videos, and other digital artefacts. The others, however, were not as much or not at all engaged in these activities, but clearly felt that they were active in different ways: by aggregating, reading, listening, and reflecting and thinking about what was produced and highlighted by others as good resources. It seemed that they did their sharing in a different setting, away from PLENK, for instance in their workplace.

We should also not underestimate the influence of people's mother tongues on confidence levels in expressing themselves; several remarks were made about this. English was the dominant language on PLENK, although a Spanish-speaking and a German-language group were set up, and especially the Spanish group was visible in their own language on Twitter, in blog posts, and bilingually in the forums. Around two thirds of participants came from English-speaking countries, while the others came from countries where another language was spoken.

Presence

Several attempts were made during PLENK to increase the level of presence, and this was seen to be important. At the start of the course, participants were asked to introduce themselves, and one of the participants created a PLENK Google map (see Figure 2) to give people a sense of who their fellow learners were. Facilitators were actively blogging and posting on the discussion forum. The Daily newsletter also provided a presence-building function. One learner suggested a buddy system to enhance presence:

> There's a literacy to online presence that seems distant and too neutral. Regular contact can build something human but it all seems so big with so many choices that detachment almost seems the native condition. As a suggestion, these courses could build in a buddy system or affinity groups that hold for at least the duration of the course. Also, aside from course content, no link-passing "in class." It's become a substitute for talking. Links to things a person has made to aid their expressiveness are enough to keep us all busy.

Another student saw that immersive learning environments play a role in the heightening of presence: Second Life will come and go, but the immersive, telepresence experience of virtual reality could be the big change that will make the next-generation Web a sea change. Another participant saw the creation of a community as the answer:

> Perhaps the biggest factor in communication in a networked environment might be the presence and development of genuine community, which is a term that gets bandied about a little too indiscriminately. Communities require a pretty significant buy-in, some known roles, and coordination. Coordination is always the single greatest challenge, especially in the new networked landscape. It is sorely lacking in most instances.

The facilitators provided a certain level of coordination, especially at the start, but left this to participants later on in the course. The importance of learning about the same subject in close proximity to others in order to reach a level of depth in the learning was highlighted by several participants. The importance of feedback to blog posts and discussion posts from participants and facilitators alike to stimulate engagement was emphasised, but as Charts 3 and 4 show, activities by both went down after about week four. It was clear that it is time-consuming to participate in a course with a high number of activities and participants and that it is impossible to sustain the high level of reading, thinking, and engaging with materials and people that happened at the beginning of the course.
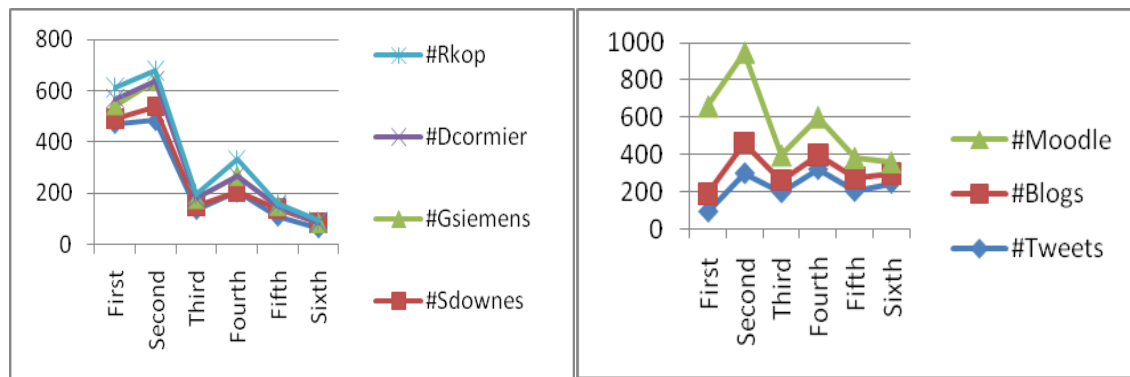
Chart 3. Posting by participants.   *Chart 4*. Posting by facilitators.

The role of the technologies in PLENK in creating presence and trust was also emphasised:

> It is the persistence in the environment that provides our voice with the possibility to be listened to and to contribute to sense-making together with other participants. . . I think of a MOOC as a good simulation (so, in a controlled environment) of what it means to "live" in social media, in which building identity and reputation is being developed over time and requires the invention and re-invention of individual strategies of social networking.

In other words, the two important issues are the enculturation in the network and the technologies that can support this. The role of Twitter as a tool in humanizing learning was mentioned to facilitate this, while it was also noted that an awareness of power issues on the network and the literacies required to navigate these would help in this process.

Critical Literacies

There are some competencies, abilities, and skills required to thrive in a complex learning environment. People need the critical ability to not only use network resources, but also to look at them critically in order to "appropriate them and redesign them," as one of the learners stressed. In the Moodle environment, he quoted bell hooks (2010, p.7), who said, "The heartbeat of critical thinking is the longing to know—to understand how life works." And another argued that critical thinking is not what it was 10 years ago: "Critical thinking doesn't stay put, it evolves, and when used as a set of literacies, it becomes practice. PLEs embed practice and not just enable thinking."

Learners on the CritLit MOOC provided their ideas on the skills and competencies they gained through the course, as seen in Chart 5.
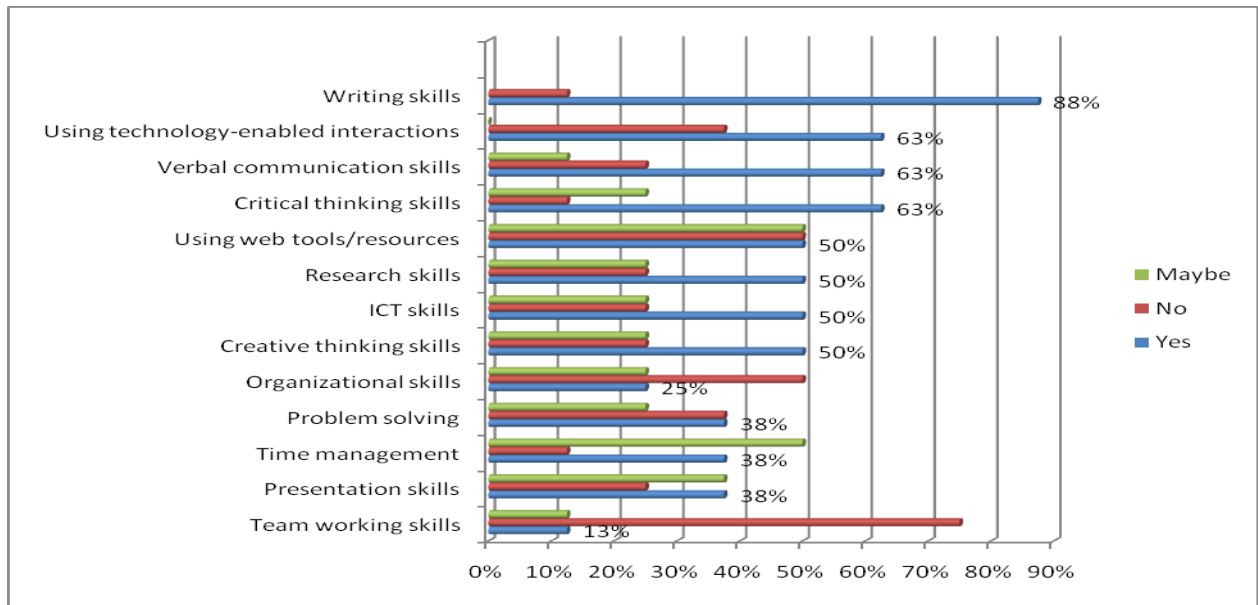
Chart 5. Skills and abilities gained during the CritLit MOOC.

It is interesting to see here that the skills related to organizing and managing learning, which one would expect to be very important in self-directed learning, scored relatively low but that capacities for critical thinking, collaboration, research, and creativity—and especially writing—scored high. Perhaps the student profile (high-level professionals, the majority over 55 years old) played a role in this as their natural development as human beings would involve being more autonomous than younger learners. The participants enjoyed learning about new tools and thought this important, but the most important feature a person might have would be the mindset to deal with complexity within a minimally structured environment.

Conclusions

From observations on PLENK it seems that for networked learning to be successful, people need to have the ability to direct their own learning and to have a level of critical literacies that will ensure they are confident at negotiating the Web in order to engage, participate, and get involved with learning activities. People also have to be confident and competent in using the different tools in order to engage in meaningful interaction. It takes time for people to feel competent and comfortable to learn in an autonomous fashion, and there are critical literacies, such as collaboration, creativity, and a flexible mindset, that are prerequisites for active learning in a changing and complex learning environment without the provision of too much organized guidance by facilitators. Especially at the start of the learning journey, support by more knowledgeable others proved to be helpful in this.

The research showed that there are some other conditions that clearly encouraged people's involvement and engagement in learning in a connectivist learning environment, including the

"social presence" of the facilitators and of participants, which enhanced the "community" forming and the sense of belonging that built confidence and stimulated active participation.

It became clear during the research that the four activities mentioned in the introduction—aggregation, relation, creation, and sharing—were not achieved by the majority of participants. They mostly felt happy to aggregate, relate, and share resources, but only a minority of 40–60 PLENK participants were engaged in the creation of digital artefacts, such as blog posts and videos, and in the distribution of these. It seems that people needed time to feel comfortable and confident to get involved in this type of activity, while it also seems that people needed some time to digest readings and resources that were published and produced during the course before being able to get involved in this active production process themselves. Early indications from this preliminary research were that people were still learning without this type of activity.

Further research and analysis will be conducted to find out if this "creation" stage is really necessary to enhance learning in a connectivist learning environment and exactly how the challenges identified with connectivist learning might best be overcome.

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