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NEW DIMENSIONS TO SELF-DIRECTED LEARNING IN AN OPEN NETWORKED LEARNING ENVIRONMENT

Rita Kop and Hélène Fournier

Abstract

New technologies have changed the educational landscape. It is now possible for self-directed learners to participate informally in learning events on open online networks, such as in Massive Open Online Courses. Our research analyzed the agency and level of autonomy required by learners participating in a course of this nature. Using Bouchard's four-dimensional model of learner control, we found that there are new dimensions to self-directed learning in connectivist learning environments. The research also brought to light new challenges and opportunities for self-directed learners who might not be able to call on trusted educators for support in their learning endeavors, but rely on the aggregation of information and informal communication and collaboration available through social media to advance their learning.

The proliferation of Information and Communications Technology (ICT) in recent years has changed the educational landscape. It has added to the complexity of our lives and aided in the creation of a plethora of new opportunities for learning. Faculty members are changing their practice and are experimenting with open educational resources and cloud computing, such as Massive Open Online Courses (MOOC), acknowledging that informal and self-directed learning now form part of our everyday existence. The technology, however, raises new challenges and opportunities for the self-directed learner, who might no longer be able to call on a trusted educator for support in his or her learning endeavor.

The emerging technologies that are currently shaping the Internet and the Web provide us with access to information and the ability to work and learn with others in a creative global collaboration outside the educational structures that have been the norm for centuries (Downes, 2010; Fournier & Kop, 2010). New structures and environments are in place where people can learn autonomously, but one might question if people will be able to do so effectively (Kop & Bouchard, 2011). Two areas of research are foundational to examining learning in open networked environments: learner autonomy and connectivism.

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Learner Autonomy

Several researchers in the field of self-directed learning see learner autonomy as an important component of self-directed learning (Ponton, 2005; Bouchard, 2009; Boucouvalas, 2009). Bouchard (2009) and Boucouvalas (2009) both highlighted the learning environment, learning context, and the connections people make during their learning as determining factors in the success of self-directed learning journeys. These elements are aligned with Bandura's (2002) ideas on "human agency" (p. 269). He accentuated three types of agency: *personal agency* exercised individually, *proxy agency*, in which people secure desired outcomes by influencing others to act on their behalf; and *collective agency*, in which people act in concert to shape their future in whatever cultural context they inhabit. Bandura emphasized the importance of all three agencies and their interrelatedness in the complex world in which we now live.

Tough (1979) and Grow (1991) noted that learners move through different phases of self-direction, and Bouchard (2009) identified particular factors that influence autonomous learning strategies. He clustered them in four dimensions, one dealing with psychological issues, one with pedagogical issues, and two with environmental issues:

1. The first dimension, which he called the *conative* one, relates to psychological issues such as drive, motivation, initiative and confidence. In this dimension Bouchard also highlighted aspects of context and transitions, how these influence people's urges to take up learning, and the social networks that people are involved in and which act as affective support and resources. He noted that their past learning experiences might also influence autonomous learning strategies.
2. The *algorithmic* dimension relates to pedagogical issues, for instance the sequencing, pacing and goal setting in learning, the evaluation of progress, and final evaluation and preparation for validation. These are clearly tasks that in the past were carried out by the educator; in an autonomous learning environment, they become issues that learners themselves have to resolve.

Bouchard (2009) also saw two environmental clusters of factors that would influence learning strategies:

3. The dimension that Bouchard called the *semiotics* of learning is related to the delivery model of resources. This model has drastically changed in recent years and moved from the use of resources such as books and paper to electronic texts and multimedia, which might be stored in searchable databases that could be linked through hyperlinks. It could also include contributions in blogs, wikis, and synchronous and asynchronous communication. Information is obtained through social networks and learners will need to be able to evaluate and navigate this new information landscape.
4. The importance of aspects of *economy* was recognized as a fourth category: the perceived and actual value of the learning, the choice to learn for personal gain such as for future employment, and the possible cost of other study options.

While Bouchard's dimensions provide an important basis for exploration of learner autonomy, examining self-directed learning in an open networked learning environment also requires awareness of the challenges of *connectivism*.

Connectivist Learning in an Online Environment

A current example of self-directed learning promoted by Downes (2010) and Siemens (2008) is based on *connectivism*. They posit that being a member of an online network, communicating with others and filtering information and ideas that others provide will lead to knowledge creation and learning advancement. Connectivism advocates the active engagement of people with resources in communication with others, rather than the transfer of knowledge from educator to learner. Moreover, they promote 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. This model recognizes that the increasing influence of the Web and the global online connectedness of people will have implications for people's learning (Siemens, 2008; Fournier & Kop, 2010). The role of the educator is predicted to change (Downes, 2010) as learners have the option to move from a learning environment controlled by the educator and the institution to an environment where they find their own information and direct their own learning as they develop ideas and connect with (knowledgeable) others on networks away from the formal setting.

A connectivist approach and learning environment might pose new challenges for learners who direct their own learning; but it is likely that such an approach will also provide new opportunities to enhance their learning experiences. The current literature related to Web development highlights four challenges and pertinent developments to connectivist learning:

1. The *nature of the network* as a place to learn as opposed to a group in an educational institution and the levels of *presence* in each has been highlighted as an important factor in the willingness of participants to actively engage online (Dron & Anderson, 2007). Power relations in online networks and how these might influence the information and resources that self-directed learners will be able to access are other important issues. The structures of the Web are preventing it from developing into a network where equality is the norm, rather than the exception (Barabasi, 2003; Boyd, 2010b). In addition, the increasing influence of commerce on the Web might negatively influence the potential of the social Web for learning and education (Friesen, 2010, Lanier, 2010)
2. Some *literacies* have been identified that are critical for learners to be able to effectively direct their own learning in an open online networked environment. Apart from reading and writing, these include information and media literacy and the ability to critically analyze resources and information in order to understand the new semantics of the Web. Creative abilities and a flexible mindset in an environment that is characterized by change and complexity

have also been highlighted as important (Downes, 2009; Partnership 21st Century Skills, 2009; Sahlberg, 2009).

3. *Cloud computing* and the emergence of Web2.0 and social media have altered the dynamics of the Web. Moving away from a linear process of printed text, they increasingly involve the production of digital artefacts and the storage of these away from local computing devices, as well as the use of a variety of communication, collaboration and sharing tools that people find and use on the Web. These tools have created a new demand on human agency in the form of creativity, innovation and self-expression (Sahlberg, 2009; Fisher, Giaccardi, Eden, Sugimoto, & Ye, 2005).
4. The *Semantic Web and learning analytics* are the latest developments of the Web and can be used for the visualization of large amounts of data, creating a need for learners to be able to understand and critically analyze graphs and figures. The analysis of this “Big Data” can also be used to improve learning in new ways, and some observers envisage the use of analytics in learning recommender systems to aid learners in their information aggregation strategies (Rogers, McEwen, & Pond, 2010; Fournier, Kop, & Sitlia, 2011).

In order to develop empowering learning environments that foster active learning, designers and developers of such environments first need to understand the factors that influence people’s attitudes, intentions and behaviours. They must also understand the prerequisites for people to thrive in such environments in order to create favourable components and conditions. This paper will investigate whether the four dimensions that Bouchard (2009) highlighted in his research match the experiences and perceptions of learners in a Massive Open Online Course that was held in the autumn of 2010 and if additional dimensions might be justified by examining their connectivist learning in an online environment.

The Research on Self-Directed Learning in a Massive Open Online Course (MOOC)

Recognizing the challenges posed by innovations in Web-based learning, learning technologists have started developing structures to support autonomous learners in the negotiation of this new and ever-changing learning landscape. Carroll, Kop, and Woodward (2008) see the creation of a place where people feel comfortable, trusted, and valued as the crux to engaging learners in an online environment. The task would be to move towards a space that aggregates content and imagine it as a community, a place where dialogue happens, where people feel comfortable, and interactions and content can be accessed and engaged with easily: a place where the personal meets the social with the specific purpose of the development of ideas and of learning.

The National Research Council of Canada is in the process of designing and developing a place that might support autonomous learners online. It is a Personal Learning Environment (PLE) called Plearn. The development consists of two strands: The creation of a place, encompassing technological components, where people can

manage their own learning, and the creation of a pedagogical platform that would support learners in this endeavor. The research to achieve the design and development of such a PLE consisted of several strands, but this paper will report only on some components of the educational research: issues relevant to self-directed learning on a MOOC.

The Setting

The Massive Open Online Course (MOOC) researched was organized by the National Research Council of Canada as part of their research in Personal Learning Environments in cooperation with Athabasca University and the University of Prince Edwards Island. The subject under scrutiny was Personal Learning Environments, Networks and Knowledge (PLENK). It was a free course that lasted 10 weeks with a total of 1641 participants registered. PLENK2010 did not consist of a body of content and was not conducted in a single place or environment. It was distributed across the Web.

Two of the facilitators of the course were the founders of [*connectivism*](#), in approach to learning that has been earmarked by some as the learning theory for the 21st century. Siemens and Downes (2009) have highlighted on numerous occasions the importance of human agency and the necessity of active participation in *connectivist learning*. They stress the importance of four types of activity for successful learning: (a) *aggregation of information*, (b) *remixing and reflecting on the resources and relating them to what people already know*, (c) *repurposing*: creating something of their own, and (d) *sharing their work and activities with others*.

The central resource in the course was *The Daily*, a newsletter that participants could subscribe to if they wished, which displayed the aggregated resources and artifacts produced by participants in the course. In addition, the Moodle Learning Management System with wiki was used to hold discussions and to display course resources and the schedule for speakers of twice weekly Elluminate sessions. Throughout the course Twitter and participants' and facilitators' blogs developed around the course subject, and Facebook Groups, Second Life, and other social network environments were developed by participants.

Learner support was provided by four facilitators in the form of videos, slideshows, and discussion posts in addition to blog posts, feedback to blogs, and Moodle discussion posts. Once a week Elluminate was used by facilitators for a synchronous discussion and chat session on that week's subject.

Research Methodology

Research in the intricacies of learning taking place on online networks is one of the axes of the research into the design and development of a PLE. If people are encouraged to move away from the institution for their learning, it is important to find out the relevance to the learning experience of the informal (online) networks in which they find their information and where they might develop. A network in the context of this paper would be an open online space where people meet, as nodes on networks, while communicating with others and while using blogs, wikis, audio-visuals, and other information streams and resources. De Laat (2006) highlighted the complexity of

researching networked learning and emphasized as key problems the issues of human agency and the multitude of issues involved, such as the dynamics of the network, power-relations on the network, and the amount of content generated. Effective analysis would require a multi-method approach and would involve new ethics and privacy issues.

New ethics and privacy issues in networked environments. Every researcher has to consider the ethical implications of the chosen methods of obtaining the data for a study and the use made of it. Sometimes obtaining data is a matter of accessing statistics or documents. When human subjects are involved in the research, careful consideration of the level of informed consent by participants is also required. Miller and Bell (2002) argued that gaining informed consent is problematic if it is not clear what the participant is consenting to and where “participation begins and ends” (p. 53). Several ethical issues were raised in the literature, of which misuse of data and privacy issues were the most important. Van Wel and Royakkers (2004) and Boyd (2010a) caution that data could pose a threat to subjects when misused, or used for different purposes than what it was supplied for. Researchers should at least anonymise data in order to respect privacy issues (Van Wel & Royakkers, 2004; Rogers et al., 2010; Boyd, 2010a). It has also been suggested by network researchers that people should have the choice to opt in or opt out of the use of their data. If someone is not aware that the data is being collected or how it will be used, he/she has no real opportunity to consent or withhold consent for its collection and use. This *invisible* data gathering is common on the Web (Van Wel & Royakkers, 2004) and highlights some new decisions related to ethics that researchers will have to make. We feel that researchers have a responsibility to carefully consider the context of their research, and also the process that takes place between observing, collecting and analyzing “Big Data”; data that is left by traces of activities that might not at all be related to the visible participation of learners.

In this study “Big Data” was captured out on open networks. The research team set out the boundaries of the research on the consent form that participants were asked to read at the start of the course. They were informed that data collection would include learning-related activities in the course environment and also learning activities that happened outside the course, but where the course tag #PLENK2010 was being used.

Data on PLENK2010 was collected according to these principles: using quantitative as well as qualitative measures, asking for informed consent, and using the #PLENK2010 tag to identify course-related data outside the course environment that learners would consent to include in the research.

Quantitative data collection. Three surveys were carried out near the end of the course and after it had finished in order to capture and explore learning experiences during the course: including the End Survey (N = 63); an Active Producers Survey (N = 32), that was filled out by people after an invitation was posted in the course blog for people who had produced more than two digital artifacts; and a Lurkers Survey (N = 74) that was filled out after a similar call for people who had limited their participation in the course to producing less than 2 digital artifacts and whose behavior was characterized in a consuming rather than a participating nature.

The Moodle data mining functionality was used to gather participant details, their level of use and access of resources, information on course activities, and discussions taking place in the course forums.

Qualitative data collection. In addition, qualitative methods in the form of virtual ethnography were used. An ethnographer was working on the course, collecting qualitative data through observation of activities and engagement. She also interviewed and surveyed a number of participants during the final week and held a focus group with ‘silent participants’ (lurkers) after the course to gain a deeper understanding of particular issues related to the active participation of learners. The researchers were interested in the processes taking place and the perspectives and understandings of the people in the setting; what Hammersley et al. (2001) describe as the “details, context, emotion and the webs of social relationships that join persons to one another” (p. 55). Hine (2005) highlighted that on the Web the technology itself and the artifacts it produces should be taken into consideration in the online ethnography, as these are part of the research setting and might influence the human interactions researched. As vast amounts of discursive data were generated in this form of networked learning in an open environment, computational tools such as Nvivo were used for analyses and interpretation of the qualitative research data. It was fairly easy to capture vast amounts of qualitative data through the aggregation tools such as the gRSShopper aggregator that was being used to feed into the newsletter (The Daily).

Data analysis. Learning analytics tools were used as a form of Social Network Analysis (SNA) to clarify activities and relationships between nodes on the PLENK network. SNA also provided information on the importance of “connectors” on other networks, and the most relevant tools to facilitate this. Secondary data analysis was carried out on the Moodle logs. The gRSShopper aggregator statistics functionality provided details on course-related use of blogs and micro-blogging tools such as Twitter. Some analytics and visualization tools, such as the Social Networks Adapting Pedagogical Practice (SNAPP) tool, were also used to deliver real-time social network visualizations of Moodle discussion forum activity; while the visualization tool NetDraw was used to create an ego network for understanding the role of a particular actor in a discussion.

Because of the volume of data generated by the 1641 participants and facilitators, quantitative analysis of blog posts and Twitter and Moodle participation was used, but the analysis of qualitative data was restricted to the Moodle environment and some blogs that were representative of all the blog posts produced by participants.

Findings

Participants’ Ages and Locations

The professional background of participants on PLENK was mainly related to education, research, and design and development of learning opportunities and environments. Participants were teachers, researchers, managers, mentors, engineers,

facilitators, trainers, and university professors. Figure 1 shows PLENK participants' age, with a majority of participants in the course over 55 years old.

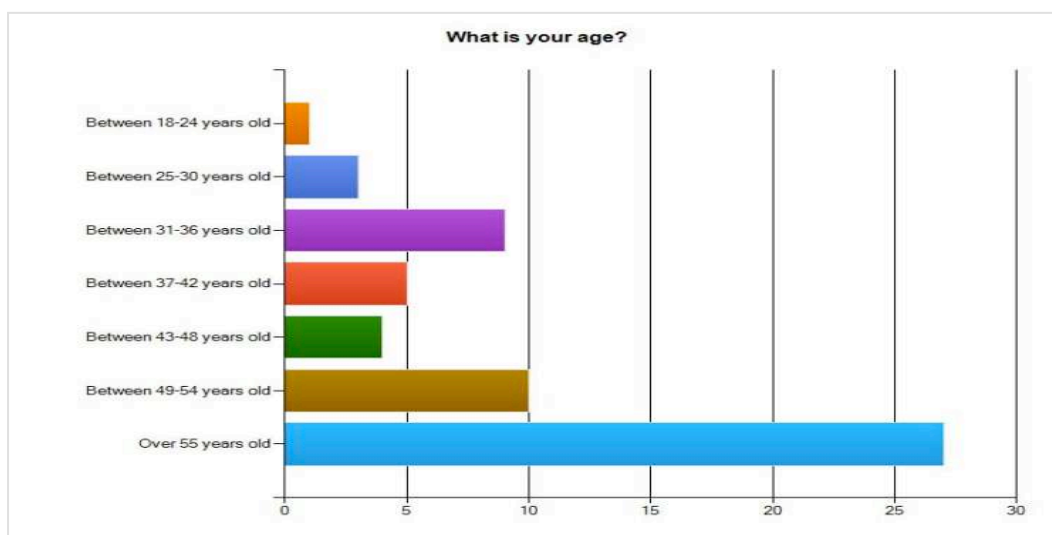


Figure 1. PLENK participants' ages.

Figure 2 shows a Google Map, instigated by one of the PLENK participants, representing participants' residence. A high number were from the USA, Canada, and Europe, although participants were from a total of 69 countries.



Figure 2. PLENK participants' locations.

Participation Levels

When the course started, 846 had registered; participation increased to 1641 by the end of the course, as shown in Figure 3. Twice-weekly meeting sessions were hosted on Elluminate; once a week with an invited speaker and once as a discussion session amongst 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 with a similar trend in accessing recordings for the sessions. Global participation and multiple time zones influenced who could be present and who accessed the recordings. A high number of blog posts were generated related to the course (900) and an even higher number of Twitter contributions (3104). The #PLENK2010 identifier facilitated the easy aggregation of blog posts, social bookmarking links, such as delicious, and Twitter messages produced by participants, which highlighted a wide number of resources and links back to participant's blogs and discussion forums; thus connecting 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 #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 by producing blog posts and discussion posts, while the remaining participants' visible participation rate was much lower. Figure 4 shows the number of times people used particular tools, but does not show how these interactions took place.

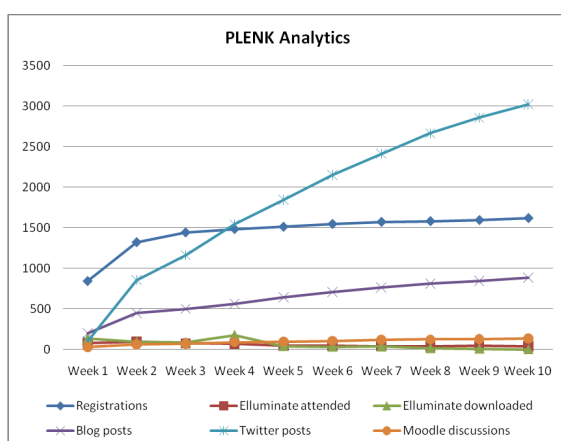


Figure 3. Plenk participation rates.

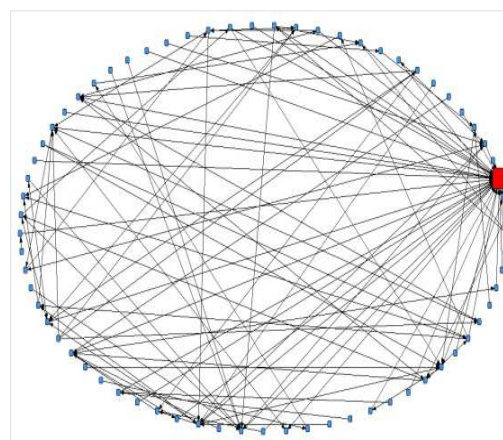


Figure 4. Connections between participants in a discussion.

Some additional visualizations provided us with some more revealing pictures in forum discussions and participation while using online tools. We have been experimenting with several analytics tools, such as the social network analysis tool SNAPP (Social Network Adapting Pedagogical Practice) used as a bookmarklet to the browser. The activation of the SNAPP tool resulted in network visualizations and the data generated was also exported to both VNA (Edgelist format) and GraphML formats. The creation of the network visualizations clarified the role that an actor might play in a particular discussion (Figures 5 & 6).

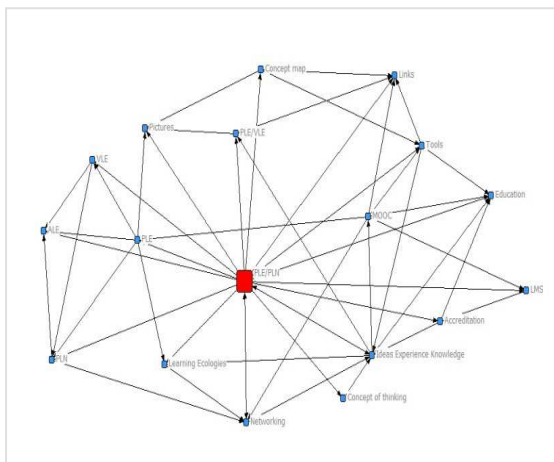


Figure 5. Relationship between topics in a discussion in week 1.

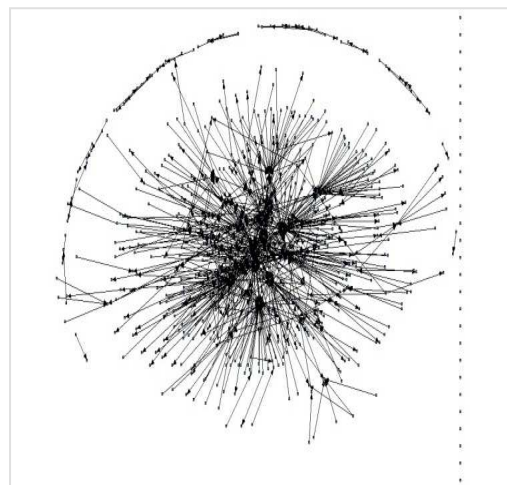


Figure 6. Learners as nodes on Twitter.

Agency and Active Participation

Some people with experience in learning in a MOOC were very involved in the course. One participant produced a Google Map (see Figure 1) that has received 22307 views and a [blog](#) that has been read in 69 countries. The technical tools motivated several people to produce course-related artifacts. Some examples: one learner produced a creative concept map (Figure 7). Another used Wordles to ‘skim-read’ papers and develop a visual impression of the content of a paper as shown in Figure 8.

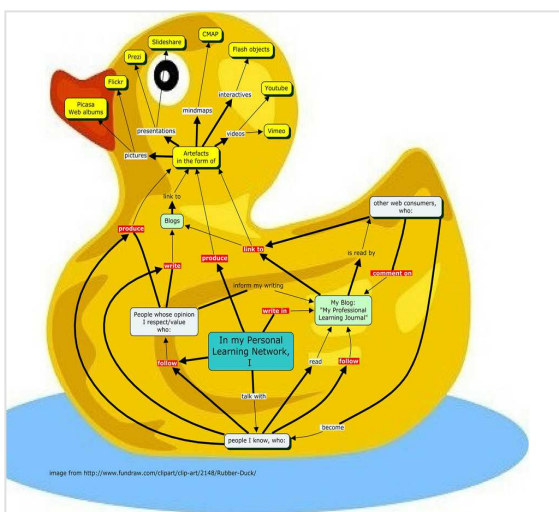


Figure 7. Example of learner concept map (<http://bit.ly/hRBMSR>).



Figure 8. Wordle of paper by Drexler on the networked student (<http://bit.ly/g14Gov>).

Not all participants contributed in a visibly active way. Many participants accessed resources, but were not engaged in producing blog posts, videos, or other digital artifacts. The basis of MOOCs has always been four activities:

1. Actively aggregating.
2. Actively relating these aggregated resources to earlier experiences and knowledge, what Downes (2009) calls remixing.
3. Actively repurposing; producing a digital artifact with this mix of thoughts.
4. Actively sharing.

It was clear that in this course only a small percentage of participants engaged in the production of digital artifacts. Between 40 and 60 were active producers; the other 1580 were not active in this way. This outcome was unexpected to the course organizers as they saw the production phase as vital to the learning in a networked environment. As some participants mentioned in the discussion, if nobody is an active producer, it limits the resources that all participants can use to develop their ideas, discussion, thinking, inspiration and learning. The research data showed some interesting reasons why the majority of participants were lurkers, rather than active producers. As Figure 9 shows, 54.5% of respondents to the lurkers survey indicated that they have always been self-directed learners and do not think they have to actively share and reply to discussion forums and blogs to learn. In addition, 50.9% highlighted that they are tactical lurkers who use particular strategies that are especially useful in their learning.

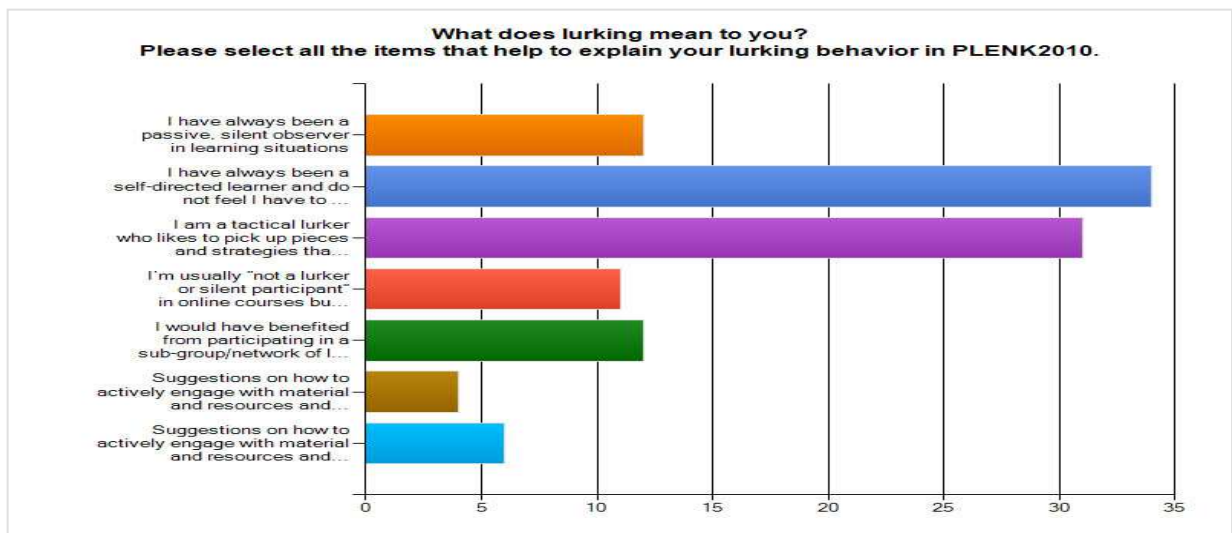


Figure 9. Explanations of lurking behavior.

Figure 10 indicates that the most important restricting factors to participation in PLENK were issues outside the course, related to people's everyday lives, such as time, job, family, and other commitments, for 80.6% of respondents to the lurkers survey. Other factors highlighted as important to lurkers were: being a listener and

reflector, so not being active was the natural thing to do (34.3%) and the perception that lurking is a legitimate learning strategy (29.9%). Factors related to the chaotic nature of the course and lack of confidence seemed to be less important, although novices indicated that it took them time to adjust to the unfamiliar course structure.

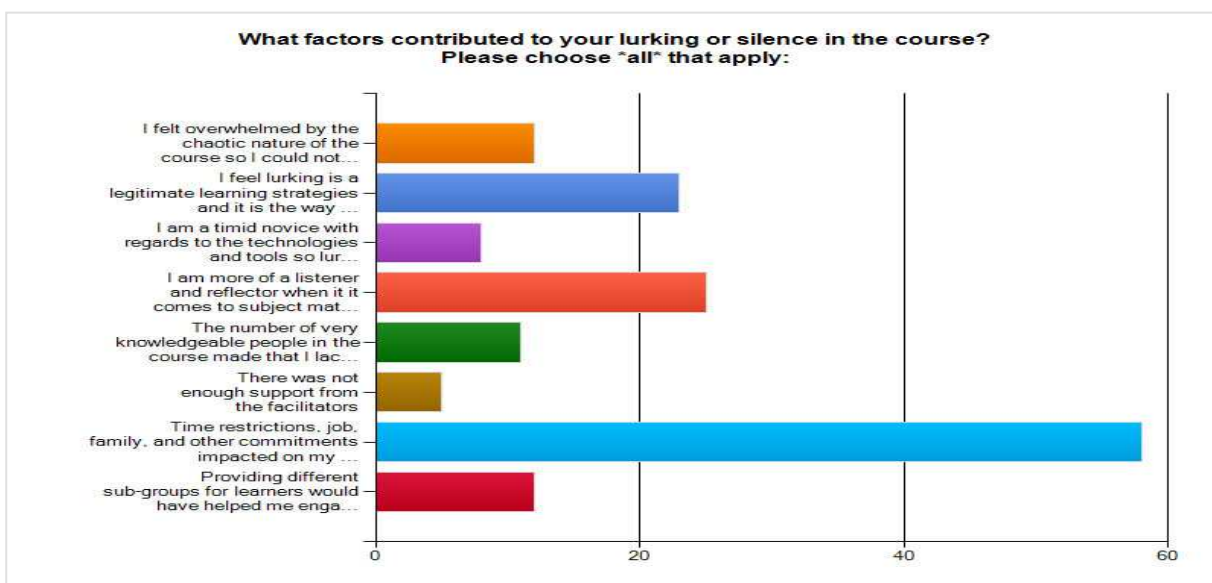


Figure 10. Contributing factors to lurking behavior.

For a variety of reasons (e.g. lack of confidence at the start of the course, the way tools and language were being used, trust and comfort levels, power relations in the course), lurkers preferred to read and view rather than join into a conversation. An understanding of the change process itself was also highlighted as important--the process of transformation and the steps required to achieve it. During the lurker focus group it was highlighted that novices might need more time for this change process to occur, especially in relation to building self-confidence and a sense of community in such a large course. These perceptions were expressed by a participant in the following blog post:

I'm new to the world of PLNs. I certainly don't post as much as others but I'm learning and contributing as I go. Could I be considered a "lurker"? Perhaps, but I'm getting more and more involved as I go on and as my comfort level increases. . . . PLNs, despite best intentions can be quite cliquey (sp?) and as a newcomer, that can be quite intimidating. Will I get more comfortable sharing and experimenting? You bet! However, I need to do it in an environment where I feel supported and not judged for my perceived involvement or lack thereof.

Support by facilitators was highlighted in the literature as one way to make learners feel more at ease, but this was not confirmed in the end-of-course survey results. Responses to statements regarding the level of advice and support received

from facilitators and other participants in the course remain ambiguous with regard to support and feedback mechanisms. This ambiguity is highlighted in the higher percentages of neutral responses displayed in Figure 11.

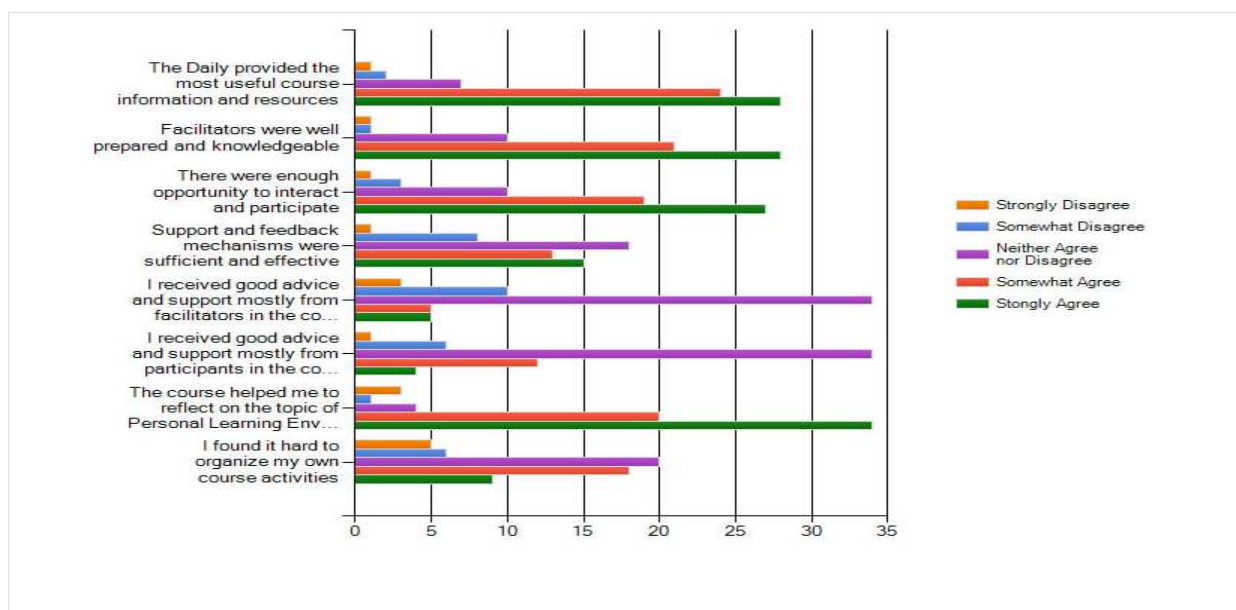


Figure 11. Agreement by lurkers with the level of support received during the course.

A majority of active participants (56.3%) indicated that “Writing and producing something” was “very important” in their learning and/or active participation in the course. These same participants also indicated that active production and interaction with others increased their positive learning outcomes; it helped them to reflect, involved them in a creative process, and they wanted to give something back to the group, as shown in Figure 12. However, the others with whom they interacted did not necessarily have to be facilitators.

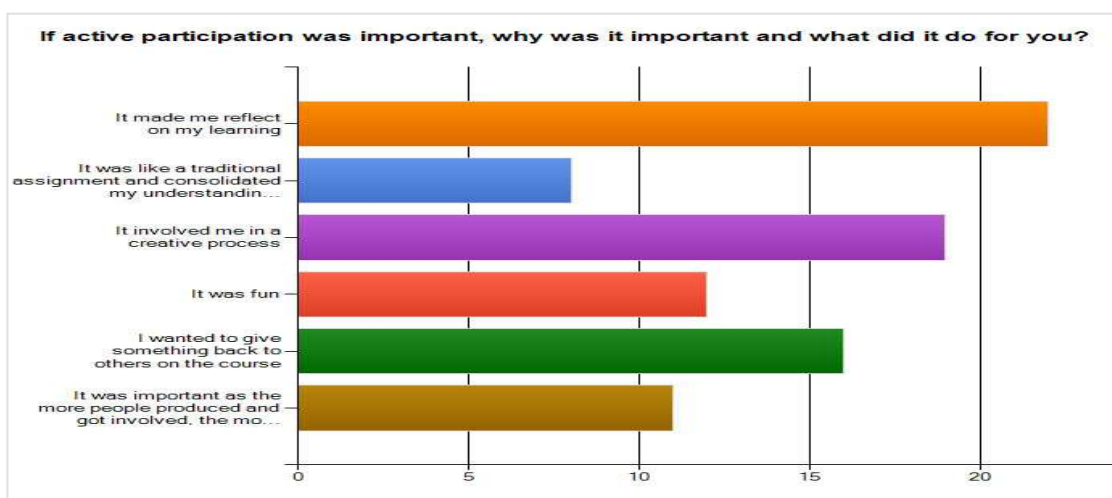


Figure 12. Why active participation was perceived to be important.

Motivational Issues Relevant to Networked Learning

The end-of-course survey highlighted factors that were important to participant motivation. What seemed to motivate participants most was finding particularly striking resources and information, getting involved in an online community, and the opportunity to learn something new. One participant highlighted, for instance, that learning alongside self-motivated peers was what motivated her as opposed to traditional training days where people were forced to be present. Learning how the new environment might improve their teaching and the learning of others was one of the motivational factors, while the topic of discussion was another. One participant highlighted the issues of self-evaluation, self-orientation, and self-regulation as important in relation to motivation in connectivist learning:

Deciding to build a self-managed PLE must be a strongly (professionally or personally) motivated choice, and requires a high initial engagement and a constancy during the time, to be really useful. I put the "strong motivation" in the top of my list of personal requirements to build and use successfully a PLE/Ns. That signifies also having clear objectives, before starting a learning experience: what do I want to achieve? How long I can dedicate to do it? ... Other personal qualities: critical thinking, self-evaluation; self-orientation, self-regulation. I think the major challenges for people to feel comfortable learning in PLE/Ns are related to the "self" role, in learning activity.

The relevance of learning to everyday life was highlighted as important by several learners. One emphasized the importance of having choices at the start of the learning activity to increase motivation and the need for a negotiation process regarding content, skills, and process to make courses meaningful and relevant to everyday life. Affective issues were also highlighted as motivational factors. Some people found it particularly motivational to be learning about connectivist learning in the company of the originators of the connectivism theory, while other drew inspiration from learning in the company of self-motivated persons with a similar interest. They valued the opportunity to come in contact with, collaborate with, and meet people who would help to expand their personal network.

Critical Literacies for Learners Operating in an Open-Networked Learning Environment

Participants found different skills, abilities and competencies important to learn in a complex learning environment such as in the distributed PLENK2010. Some emphasized the particular mindset required, while others emphasized during the lurker focus group that novices might need more time to feel comfortable with this change process, especially in relation to building self-confidence and a sense of community in such a large course. One participant commented:

People need to develop . . . a host of new critical literacies in order to learn and to work effectively with intelligent data, with people, and within the network.

I see the PLE as a way to process data, expand learning capacities of participants, and grow the network.

Participants highlighted a role for the educator in supporting this development: for instance, by introducing them to tools and resources and by teaching them how to critically evaluate information while using these new resources. Participants also emphasized responsibility for their own learning and their own lives in the new learning paradigm.

Discussion and Conclusions

The level of activity by participants in the course was particularly interesting. Although course organizers and promoters of connectivist learning posit that actively producing digital artifacts is an important stage in the networked learning process, most participants had a different view and participated in a different way. The large group of silent participants, “lurkers,” who did not produce artifacts nor participate extensively in discussions, felt that they were actively engaged in the course through the other three activities: aggregating information, remixing of it and sharing it with others. The percentage of lurkers was similar to that of consumers versus producers on the Web as identified by other researchers and consequently should not be seen as too low (Nielsen, 2006). Our research showed that people were actively engaged in these other activities, although the sharing mostly took place outside the PLENK course structure, in their workplaces or at home and sometimes after the course had finished because people needed time to think and reflect on the resources, information, and communication made available during the course. Agency and activity are required in an autonomous learning environment, but it was clear that learners have their own ideas on what type of activities would suit them and their lifestyles, which might not necessarily be the same as those of the course organizers.

Some of the dimensions delineated by Bouchard (2009) clearly influenced the level of participation and types of activities learners engaged in. The *conative* factors, related to psychological factors such as drive, motivation, and confidence, were important. Participants who had already engaged in MOOCs before this course clearly participated more in the active production stage than novices, while they also motivated novices by sharing new tools relevant to educational practice. Novices also indicated their lack of confidence at participating on a worldwide stage where experts in the field of PLEs were sharing their research; they highlighted the power-relations as an inhibitor. On the other hand, these high-profile contributors were mentioned by others as a motivational factor to participation in the course. Opportunities to exploit the expertise in the MOOC amongst willing and active participants are therefore worth exploring in future courses.

Time management, goal setting, and time availability were mentioned as the most important *algorithmic* factors influencing people’s participation. Learners found it hard to pace themselves and were, especially at the start, overwhelmed by the volume of resources and communication that needed to be managed, shaped, and organized, even though facilitators told participants that it would be impossible to read

and view everything that would come their way. People did make decisions about this at a later stage and devised coping strategies with the help of others.

It seemed that the *semiotic* dimension as highlighted by Bouchard (2009), the way in which people would access particular types of information and resources, was very important as it was different from what participants were used to in the past. Participants valued the new (to them) and different ways of aggregating information, by using RSS feeds and (#) tags through social networks and new tools. It was important for learners to learn about new tools and find out what these could mean for their own teaching practice. Participants helped each other to find tools that could aid them in supporting their learning and information aggregation.

The *economic* factors were also relevant to the course participants. Learners were intrinsically motivated to participate and placed a high value on the knowledge they developed on the course subject, Personal Learning Environments, Networks and Knowledge, and the new tools they could use to enhance their own teaching and work practice, as well as the extension of their personal networks.

Additional issues played a role in learners' participation and engagement, the major ones being the critical literacies required to learn actively in an open networked learning environment, such as a different mind-set and higher level of critical analysis of resources than is the case in a more organized classroom environment. People should clearly not have an aversion to risk and change to benefit most from learning in a MOOC. This ability to thrive in a changing environment will be influenced by all four of Bouchard's factors, and the research showed that there is an inter-relatedness of Bouchard's (2009) dimensions.

Based on analysis of the findings, it seems that to bring out the creative potential in people and to inspire them into the production of digital artifacts, dimensions of activity, engagement, and learning would have to be heightened and at their most favorable. Heightening the level of engagement and active participation is one of the main challenges of learning in an open networked environment and one in which educators could play a role. Educators and institutions might introduce more openness in the curriculum by using social media and global participation outside the boundaries of the institutional classroom to invigorate the learning experience of their students. Their participation as a critical knowledgeable other on the network could, at the same time, enhance the thinking process of all involved.

The combination of research methods used, and especially the use of analytics, added to the understanding of learning in a distributed, open networked environment. The analytics provided some clarity on the nature of the interactions between course participants, resources and networks; however, the ethnographic approach, using comment functions on blogs and questionnaires, was indispensable in arriving at an in-depth understanding of the learning process and the learning experience of participants. For instance, data regarding the learning experience of passive learners (lurkers) would have been impossible to obtain without these measures. This paper presents preliminary research findings and a more in-depth analysis is currently in progress. We expect that results of these analyses will provide us with indications of the most favorable conditions for facilitating learning for all participants in an online networked learning environment.

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