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Sociotechnical Relations in the Creation of an Interest-Driven Open Course

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Abstract

The aim of this article is to present the findings from a small exploratory case study of an open course on cyberpunk literature conducted at the Peer 2 Peer University (P2PU), an online grassroots organization that runs non-accredited courses. Employing actor-network theory to inform an ethnographic-inductive approach, the case study sought to understand the performative effects of technologies on the creation of forms of learning and forms of presence in a setting of peer-based learning. Research data included observation of discussions in online forum and chats, course participants' blogs and P2PU's organizational documentation.

Three main findings emerged from a thematic analysis: (1) the participatory role of technology in the course was characterized by the use of an array of different open source and free tools, most of which were not integrated within the P2PU platform. This fluid technological space arguably led to a decentralized network; (2) people with different backgrounds affiliated around their common passion for the cyberpunk literature and the artifacts associated with it; and (3) knowledge was distributed and dispersed across many different people and artifacts, bringing about a shift from the subject-authority pattern of relations generally associated to teacher-led education to the agential pattern of relations associated to peer-led education, in which course organizer and participants can be on the same level of influence.

Introduction

Background and Literature Review

The phenomenal growth of digital technologies alongside other important social developments, such as the increasing number of older adults being enrolled in higher education, the changing demands of learners looking for ways to cope with the continuing growth of knowledge, and the breaking down of old fixed patterns of employment (McIntosh, 2005), are changing the ways in which people connect with each other and with information resources, learn, and create knowledge. In the new scenario of education and knowledge production at the global level, traditional universities are no longer the only player.

Increasingly, much learning occurs everyday outside of traditional classrooms, via digital technologies that are part of home, workplace, and community settings. These technologies offer unprecedented opportunities to support modes of learning not necessarily connected with formal education but motivating for many people for whom formalized settings of schooling were not (Gee, 2004). Peer-based learning is one of these modes in which learners interact with their peers in a context of reciprocity to share thoughts, give and receive information, and provide feedback and critique to one another (Ito et al., 2009). Peer-based learning is not a new approach and resonates with the attempts to move away from a transmissionist 'teacher to student' view of learning towards mutual guidance and teaching, individual responsibility coupled with group sharing, community of discourse, breaking of boundaries between school and out-of-the-school using computer technology, and adding to the world of knowledge (e.g., Bereiter *et al*., 1997; Scardamalia, Bereiter, & Lamon, 1994). The Web 2.0 applications can be used to reinforce features of peer-based learning such as participation, focused conversations and experimenting (Brown & Adler, 2008). The affordances of these technologies can transform the communicative/cognitive ecology of educational practices and the way in which people interact with each other and with information resources. For example, they afford a move from the traditional classroom model built on a central area of expertise towards the creation of decentralized networks offering opportunities for peer-based learning (Weller, 2009). Whereas the traditional classrooms model builds upon subject-matter authorities represented by academic teachers, enacted by way of filtering knowledge through recognized outlets, and reproduced via institutionalized assessment procedures (Weinberger, 2007), decentralized networks build upon the Internet and open educational resources (OER)[1]. Manifestations of decentralization include teachers becoming facilitators in multivocal and multicentered learning spaces, instead of playing the role of knowledge filter; publishing being freed of many traditional gate-keepers; abundance of formal and informal OER, and educational design principles trying to be open to multiple possible users and uses (Batson, Paharia, & Kumar, 2008). In decentralized networks knowledge is distributed and dispersed across many different people, sites, texts, tools, and technologies (Gee, 2004). In these networks participants can socialize with people with the same interests, share information, and gain new knowledge. Interest-driven participation is a type of peer-based learning, in which specialized interests are what bring groups together (Ito et al., 2009). Gee (2004) defined interest-driven networks as “affinity spaces” (p. 83), which are spaces organized around an interest which people have an affinity for. Unlike in more hierarchical and authoritative settings, participants in affinity spaces tend to have more comparable status and be in more reciprocal relationships. Digital technologies afford this shift by allowing participants to decentralize the control of the use of information resources and take, embed, remix and share content (Weller, 2009). Therefore, these technologies can transform the communicative/cognitive ecology of educational practices and the way in which people interact with information resources. But what can we say about these transformations?

Which educational practices are emerging from the performative effects of digital technologies? To respond to these questions it is necessary to understand how technologies interplay with human participants. Technologies and educational practices are not discrete entities, separated from each other. They are connected by a chain of relations and enacted in and through activities. Much educational technology literature has failed to describe the complex interplay of technical and social aspects in educational practices enabled by technologies, and has provided what have been described as "mechanistic" accounts, in which technological determinism is implicit in many assumptions about the relations between people, technology and learning (Walker & Creanor, 2009). Attempting to avoid both technological determinism and its mirror image that is social determinism, I assume that all relations should be seen as both technical and social (Law & Bijker, 1992). Therefore I adopt a sociotechnical approach from science and technology studies (STS), namely actor-network theory (ANT), to analyze the relations between digital technologies and humans in a peer-based course run at the Peer 2 Peer University (P2PU), an online nonformal educational organization[2] that offers non-accredited open courses.

In this article I present the findings of a small exploratory case study which sought to understand the performative effects of technologies on the creation of forms of learning and forms of presence in the course. I begin by introducing the purpose of the study and the research questions addressed in the data analysis. I then describe briefly ANT and the conceptual repertoire developed by Sørensen's (2009), which I used to inform data analysis. In the subsequent sections I present the method and the main findings of this case study. They suggest that human participants were unable to start a process of active participation leading to a cooperative work because technologies, motivations of human participants, and social interaction did not appear to be tied together firmly. Finally, I draw some conclusions from this case study.

Purpose, Research Questions, and Value of Research

The purpose of this small exploratory case study presented here was to examine the relations between digital technologies and humans in a peer-based course run at the P2PU. To achieve this objective, I addressed the following research questions:

1. What role did digital technologies play in the course?
2. What forms of learning did digital technologies contribute to develop?
3. What forms of presence of human participants did digital technologies contribute to develop?

Although an exploratory study, this research takes a first step towards understanding the relations between digital technologies and humans in a peer-based course run at a web community of learners in a nonformal educational organization. In research terms, apparently there is a dearth of studies of peer-based learning enabled by technology in nonformal educations (Claro, 2007). Of particular interest is the question of whether ANT can shed useful insights into the entanglements of humans, technologies, texts, and other artifacts in online learning environments, and how it can account for the emergent and surprising characteristics they may take.

Methodology

Theoretical Perspective

ANT is an approach founded by Bruno Latour, Michel Callon, and John Law in Science and Technology Studies to describe and explain the entanglement of the social and the technological. ANT is not a stable and unified theory, because its founders have frequently revised elements of this approach over the years. Therefore, rather than treating ANT as a reified set of concepts, it is advisable to use it as a range of practices to examine empirically in detail how relations among people and things are started, maintained, and changed over time (Law, 1999). For the purpose of this article, I only draw upon the notions that are relevant for the proposed research questions. I build upon these notions within the case study and I use them in conjunction with the research methods to achieve the objective stated in the previous section.

ANT aims at reconciling dualities, for example between social and technological, and between object and subject, and maintains that entities, both people and objects, are not fixed and do not have significance in and of themselves, but achieve significance by creating relations with each other (Law, 2001). There are relatively few educational studies drawing from ANT, and several of these studies concern system-wide implementation of technologies in education (Fenwick & Edwards, 2010). ANT is not the only theoretical approach that can be used to examine the roles of technologies in education. Both situated learning and activity theory, for example, have considered carefully their roles in educational practices. However, these approaches give primacy to human participation and practices in their framings of the role of technologies in learning (Fenwick and Edwards, 2010). By contrast, ANT allows studying the participative role of technology, and not only human participation, because it considers both humans and non-humans as actors. An actor can literally be anything as long as it is a source of action (Latour, 1998). In a network, human and nonhuman actors are inseparable and act upon each other (Law, 1992). For example, a course can be conceptualized as a heterogenous network in which people, ideas, technologies and artifacts form relations and act upon each other. Drawing primarily on case material from the course, I used ANT to analyze the sociotechnical relations between technologies and humans in a course, based on the assumption that not only humans but also technologies can take part in and contribute to the course. As Sørensen (2009) argued, giving technologies a participative role allows studying what they do – and how they do it – in educational practices together with humans. In other words, it allows studying their performative effects on practices. Drawing upon Sørensen (op. cit.), I described the performative effects of technologies on forms of learning and forms of presence, by examining the *patterns of sociotechnical relations* formed by technologies and humans in a course. This means that I examined the ways in which technologies and artifacts, achieved through the sociotechnical arrangements they were part of, related to humans, and I focused on the patterns, that is, the formations arising through these sociotechnical relations. Following the performative effects of technologies and humans as they create forms of learning and forms of presence in their particular ways can help characterize the emergence of different learning spaces and approaches, and different ways of using technologies.

Research Design

I present a case of a course run at P2PU from March through June 2010 for six weeks. Data were collected retrospectively during a small exploratory study that I conducted from October 2010 to January 2011 primarily through observation of course activities. The case description

and interpretation that I present here was refined through an iterative process in which two active course participants engaged by email.

Case Selection and Participants

The Peer 2 Peer University (P2PU) is an online grassroots organization which defines itself in their home page as "an online community of open study groups for short university-level courses" (http://p2pu.org/). P2PU's stated core values are openness, community and peer-learning (http://p2pu.org/general/values). These values tend to inform all the activities performed by the organization. Courses are tuition-free, non-accredited, and open to anyone who wants to participate and can be about almost any topic. P2PU has no entry qualifications to its courses, and is only limited in the number of learners on a course by what volunteer organizers consider to be the right size for their courses in terms of number of applicants.
Learners can learn what they want, where and when they want, unrestricted by scheduled and specific locations. Currently, there are no degree programs but only single courses, and course organizers enjoy a good deal of freedom in the design and revision of their syllabi. Because P2PU courses are open, all course resources and materials must be freely available. P2PU's mission is to create community learning spaces around the wealth of free and open materials on the web, and contents produced by course participants are also licensed under a Creative Commons Attribution-Share-Alike license that allows anyone to reuse it as long as they share it back (http://p2pu.org/general/node/11464/forums/17516).

Used technologies are also open. P2PU provides community members only with a Drupal-based platform (featuring web site, forum and chat) operating as a central hub which members can augment with any tool for communication, collaboration and content-sharing they think works best for individual courses. Course organizers use several tools, including blogs, wikis document sharing, and audio-video conferencing applications, just to name a few. Using the internet and OER, P2PU aims to develop a model for lifelong learning alongside traditional formal higher education, and to provide more opportunities for high-quality low-cost education (http://p2pu.org/general/about). P2PU launched its pilot phase of free courses in 2009 and since then it has been joined by a diverse and geographically distributed group of people, including writers, teachers, designers, graduate students, artists, hackers, lawyers, and online activists. These people volunteer to organize or attend courses (or both), and what unites them is the interest in exploring new ways of learning relying on peer-based approach, in which voluntary facilitators engage in the courses on par with learning participants.

I chose P2PU as a case because its organizational characteristics and the ways in which courses are run make it unique and differentiate it from other nonformal educational organizations, either providing only open access to class materials or adopting a peer-based learning approach within a more traditional concept of a degree course. The non-typicality of P2PU provided for an intrinsic case study (Stake, 1995) of a decentralized network offering opportunities for peer-based learning, in which the intent was to understand better the case in all its particularity and ordinariness, and not to generalize from and beyond this case to other organizations.

To select a course for this study, I followed Flyvbjerg (2006), who suggested that the proper strategy to select a case is information – oriented, which means that a case is selected on the basis of expectations about its information content. This is important when the analyst needs to maximize the usefulness of information from a single case. To identify and recruit a course that could maximize the usefulness of content for my research purpose, I posted an introductory message in the mailing list of P2PU course organizers, where I described the

purpose of the study. On the basis of my expectations, I chose the course "Introduction to the Cyberpunk Literature", which was enrolled by fifteen globally distributed adult learners. Out of these 15, 11 introduced themselves during the first week and only three were still there during the last week of class. The course participants were from different backgrounds and geographical locations and took part voluntarily without any immediate extrinsic rewards such as achieving grades or earning a degree. According to the information they provided about themselves in their introductory posts, they all joined the course because of their interest in sci-fi and the sub genre of cyberpunk literature (see Table 1 for details). They all seemed to be well-read and knowledgeable about this genre, which looks like a niche subject seldom offered in formal educational curricula. Besides, they all were computer savvy and sometimes described themselves as being "information addicts". The course organizer was also a committed computer geek very passionate about the genre. When asked by the course organizer why they enrolled the course, all the participants mentioned their "passion" for cyberpunk literature and Sci-Fi.

Location	**Job**	**Gender**	**Stated motivation for joining the course (besides passion for the genre)**	**Self-described trait**
UK		Male	*unstated*	Information addict
USA	Software developer	Male	*unstated*	Information addict
Netherlands	Entreprenour (web/graphic design studio)	Male	Boredom with formal education and need for an alternative way of learning and writing outside the institutional walls.	
USA	Teacher in a local technical college	Female	*unstated*	Information addict
USA	Graduate student	Male	*unstated*	Information addict
USA	"Nine-to-five job"	female	Thinking of writing a cyberpunk book. Looking for a meaningful and rewarding activity away from the workplace. Looking for positive personal development.	
USA	Web developer	Male	*unstated*	Information addict
USA	Teacher of online classes in Geography	Male	*unstated*	
USA	Technician and publisher of free audio books	Male	Writing a book	
USA	Barista	Male	Excitement about talking about the genre with fellow punks.	
USA	Senior in high school	Male	Enjoyment and desire for fulfilling activities, even though they can appear odd choices. Love for a subject that is not covered at his school.	

Location	Job	Gender	Stated motivation for joining the course (besides passion for the genre)	Self-described trait
Norway	Business Consultant	Female	*unstated*	

Table I. Details on Course Participants

Data Collection and Analysis

The method adopted was virtual ethnography (Hine, 2000) and an ethnographic-inductive approach (Kellehear, 1993) was developed. Research data included primarily observation of the discussions occurred over the six weeks of the course in the online forum and chats in the Drupal-based platform. Other data sources used to various degrees were participant blogs and P2PU's organizational documentation (selected texts on the web site, blog and wiki). Data was also collected through five open-ended questions asked via private email to two out of the three course participants which were active during the entire course[3]. The information elicited by the questions provided additional data on the perceived influence of technology on participation. To enhance research validity, I also asked the two interviewees to review the results of data analysis for accuracy and plausibility of my representation.

With regards to data analysis, ANT neither provides guidance, nor does it offer a set of clear rules to guide researchers through the research process (Law, 1992). Researchers must address this difficulty practically and locally in each empirical study. In this study, the method of analysis chosen was a hybrid approach of qualitative thematic analysis (Fereday & Muir-Cochrane, 2006), because it included a data-driven inductive approach but ANT was also used constantly as a sensitizing device. I used this approach to describe, understand, and reconstruct the relations among technologies, artifacts, and course participants. In this work, I interleaved data collection and data analysis. I started data analysis as soon as I gathered a first set of data. Furthermore, I did the analysis in an iterative fashion. That is to say, what I learned from the data gathered from one chat helped me learn what to watch for in other chats and other data sources. The level of analysis in chat transcripts and forum posts was the turn. In chat sessions, as in conversations, participants typically take turns communicating, with the communication of one individual establishing the direction of subsequent talk and the basis for understanding on the part of each participant. During coding I read thoroughly and carefully all data and I detected relevant concepts. For example, relevant concepts that emerged from the data included role of technologies and artifacts, communication patterns, authority and control, and information exchanges. The results were annotated in memos that included descriptions and evidence of the concepts discovered in the analysis.

Results and Discussion

In this section I combine the results of the analysis with a discussion to highlight the significance of a result as soon as it is stated. When considering the results of this small study, several limitations should be kept into account. First, the small size and exploratory nature of the study resulted in a limited scope of the analysis. Second, the possibility to interview only few course participants resulted in merely scratching the surface of participants' perspective.
An exploratory study can only be seen as a beginning, a base from which further research can continue. With this in mind, this study might be judged on the basis of the questions it raises regarding potential significance for further investigation from an ANT perspective rather than upon answers it may provide.

When presenting the results, I quote extensively from the chats. All names are either the avatars chosen by the course participants or real names, as they appear in the chats. Two course participants agreed to be presented with their real names.

Participative Role of Technology: Creation of a Fluid Space

In ANT terms, a course design can be seen as heterogeneous engineering, because it requires assembling human and non-human elements that work if they are aligned. Course organizers need to imagine how they wish this network would be like in order to build an assemblage of elements that stay together. Examining the patterns of sociotechnical relations among the human and non-human elements involved in the course, the data support the idea that the course organizer expected the course to be like "a book club". However, several elements – such as the platform, the course structure, and human participation – did not stay in place as suggested by his imaginary. Several instances appear in the data to which this network imaginary (Sørensen, 2009) did not quite fit. In particular, the two interviewees reported that the unfriendly interface of the Drupal-based platform did not fit and seemed to have affected human participation. This sequence from a chat between the course organizer and two participants also suggests the adverse effects of the platform on participation:

> [6:05pm] <Dorene>It just seems like our participation is struggling a bit...how are the other classes doing?
> [6:06pm] <Balaur>I'll ask, nobody complained, well, they complained about the server, and students not interacting with the discussion feature as it is cumbersome
> [6:06pm] <Balaur>and they are now discussing to have wikis for each course
> [6:06pm] <zombieToast>wikis, really?
> [6:06pm] <Balaur>to allow each course to self-organize and not be bound in the form fields of the current thingie
> [6:07pm] <Dorene>I really love the concept...but feel like in our case it's not working as well as it was envisioned
> [6:07pm] <Balaur>the previous iteration was all on wordpress, it was perfect
> [6:07pm] <zombieToast>yeah the current site has some serious interaction design issues
> [6:07pm] <Balaur>I find a pain to post something on the current system, as the visual editor doesn't work OK for me
> [6:08pm] <Balaur>if I re-edit something I loose all the formatting, well, tech issues
> [6:08pm] <Balaur>I doubt that for a p2p thing we need a VLE or something, a wiki should suffice

The course participants lamented the poor usability and functionality of the Drupal-based platform, apparently to be imputed to its engineering – that is, volunteers' work, invisible work that becomes visible when things go wrong – and the "beta" version of the web site, which means that features were unstable and issues could come up:

> [5:26pm] <sundance_kiddo>Balaur what info repository shall be use? only p2pu.org? for the essays i mean
> [5:26pm] <Balaur>p2pu.org site is still, let's say beta... write your work safely somewhere, google docs, etc, your own blog, and repost it to p2pu
> [5:28pm] <Balaur>sundance_kiddo: the site was developed around the clock, and yeah, there are still issues, blame Drupal...
> [5:29pm] <zombieToast>you can get an account on the bug tracker if you want to mark up stuff you nitice is boken

The participatory role of technology in the course was characterized by the use of an array of different open source and free tools (e.g., blogs, content-sharing site, and chats), partly

because of the instability of the platform. Except for the chat, these tools were not integrated within the platform, thus they created a fluid and decentralized information infrastructure that arguably led to an expanded "participation" space (Brown & Adler, 2008). It must be said that since the beginning the course could hardly be imagined as a tight network but rather as a fluid space (Mol & Law, 1994), because P2PU courses show characteristics of emergence and interaction (Lanzara & Morner, 2005) The observed course, as the majority of courses run at P2PU, was a voluntary project emerging from the actions of a small group of individuals with a shared interest for a limited time. Although there were predefined goals, which the course participants agreed upon when they decided to sign up, and the course showed some organizing characteristics – e.g., weekly chats – much of the activity appeared as the emergent outcome of interaction among participants and was based on communication among them. This characteristic of interaction was deeply intertwined with a web of artifacts and electronic tools that supported human activities, including coordination, communication, and writing of assignments. The various tools and the artifacts such as films, videos, texts, and hyperlinks create a space whose boundaries were not clearly defined and the relations among these objects were not stable. This is a major difference from an integrated virtual learning environment (VLE) that can be difficult to change when it becomes a centralised and monolithic information infrastructure (Weller, 2009). VLEs are the result of a process where administrative and educational interests of academic institutions have been turned into large heterogeneous networks encompassing learning and teaching assumptions, assessment procedures, resource managements, access control, and tracking mechanisms. All together these elements can form an aligned network into which participation of learners is inscribed. By contrast, the space in the observed course was not closely integrated. It was not a "walled garden" as in an institutional VLEs, but rather it displayed the character of an unfinished artifact.

Forms of Learning: Creation of an Affinity Space

In this section I present how the fluid relations between the social and the material elements involved in the course performed effects on learning. Few active course participants took part in the discussions of cyperpunk materials such as the movie Blade Runner and the course readings. These artifacts were involved in the course from outside, for example in the form of books from physical libraries and online bookstores, ebooks, and DVDs, together with several hyperlinks to external information (e.g., articles, stories, and videoclips) and the Drupal-based platform. Specifically, the use of hyperlinks brought people's affiliations "inside" the course and seemed to strengthen the character of an affinity space (Gee, 2004), which is a space organized around an interest which people have an affinity for.

The following sequence from a chat held during the second week of the course suggests how the process of bringing external information into the conversation developed features of an affinity space (Gee, 2004). The excerpt starts with the references to three external sources of information linked by two participants in previous posts in the course forum. The first reference is to the hyperlink to a newspaper's article about Brian Aldiss, one of the most famous Sci-Fi writer, and his opinion on the feature film "A.I. Artificial Intelligence*"*; the second reference is to the hyperlink to a videoclip titled "AI in 5 Seconds" (referred to as "AI in a nutshell" in the chat), and the third reference is to the hyperlink to Aldiss' story "Super-Toys Last All Summer Long", which was the literary basis for the first act of the feature film "A.I. Artificial Intelligence", an unrealized film project of Stanley Kubrick, posthumously developed and filmed by Steven Spielberg. Furthermore, in the sequence course participants share information about other cyberpunk books to read, specifically written by Philip K. Dick, in addition to that included in the course reading list and titled "Do Androids Dream of Electric Sheep":

[5:32pm] <zombieToast>I thought it was funny what Brian Aldiss said
[5:32pm] <Balaur>and a bit too sweet (blame Spielberg) and with a happy end (not that cyberpunk)
[5:32pm] <sundance_kiddo>Dorene Sjef has posted an "AI in a nutshell"
[5:32pm] <Dorene>Kind of the Cliff Notes version? ;-)
[5:32pm] <zombieToast>haha yeah kind of
[5:33pm] <Dorene>I did enjoy the Wired article someone linked earlier this week about little boy
[5:34pm] <Dorene>and I've started reading Do Androids Dream of Electric Sheep
[5:34pm] <Balaur>I love Philip K. Dick
[5:34pm] <Dorene>but I keep getting derailed from watching AI by the availability of Farscape on Netflix Instant Play :-D
[5:34pm] <zombieToast>I havn't read much of his stuff tbh, definately on the list
[5:34pm] <sundance_kiddo>started reading that too, pretty cool
[5:35pm] <Balaur>I will lookup some short stories of Philip K Dick, lovely things with crazy end twists
[5:35pm] <sundance_kiddo>do that, I'm also curious for some more
[5:35pm] <Dorene>I haven't run across much of his stuff...in fact, the copy I am reading is the only one that was available at the library
[5:36pm] <Dorene>they had to dig it out of the basement and it's a Large Print novel
[5:36pm] <zombieToast>abebooks.com
[5:36pm] <Balaur>btw, on top of my memory, movies after Philip K Dick: Blade Runner, Total Recall, Impostor, Screamers, Paycheck, Minority Report, A Scanner Darkly
[5:36pm] <Dorene>that's almost as hard to read as super small print!
[5:36pm] <sundance_kiddo>I think I'll have to order the books, my eyes become fuzzy when reading off the screen
[5:36pm] <sundance_kiddo>yuhuu
[5:36pm] <sundance_kiddo>havent seen impostor and screamer
[5:37pm] <zombieToast>screamers was ok, haven't seen impostor either
[5:37pm] <Balaur>I rented Screamers by mistake a century ago (on VHS), and seen it 7 times in one night...

This excerpt indicates that people with different backgrounds affiliated around their common passion for the cyberpunk literature and the resources associated with it, such as books and films. The hyperlinks played both a functional and a symbolic role (Beaulieu, 2005, p. 183). They were functional because they were used to gain access to other resources on the web. Yet, these links were also symbolic as they indicated agreement and affiliation with the stances and causes of actions represented on linked-to resources. This symbolic role is evident in the link to the newspaper's article about Aldriss where he expressed a strongly negative opinion about Spielberg's movie. The participant ZombieToast posted that link to use Aldriss' arguments to ground his own distaste for the movie. Thus hyperlinks played a symbolic role because participants used them to bring into the course their personality, ideas, cultural background, likes and dislikes, and to engage in an informal exchange of views.

This excerpt, together with other instances from the analyzed data, points to three features of an affinity space (Gee, 2004). The first feature is that the strongest generators are the recommended course materials, that is, the movies ("A.I. Artificial Intelligence" and "Blade Runner") and the stories. These materials were the main sources of content that the group interacted with, and created a shared context that brought people together in the course.

The second feature is that knowledge was distributed because active participants shared bits and pieces of what they knew. The third feature was that knowledge was dispersed because it was garnered from several different external resources (e.g. web sites and books). This feature suggests that course participants could pursue their own interests and explore additional materials to find ideas for writing their assignments.

The following sequence from the same chat is about writing individual assignments for the course. Although there were core course materials used as generators (source of content) (Gee, 2004), the organizer encouraged participants to draw on their background knowledge, which could be used as generator:

> [6:01pm] <Balaur>what would you expect that the assignment regarding this book and Blade Runner would be? what would you like it to be?
> [6:06pm] <Balaur>how about some steampunk optional readings
> [6:06pm] <sundance_kiddo>I'd go for several threads
> [6:06pm] <Dorene>I just read brand new steampunk
> [6:06pm] <Dorene>"Boneshaker" by Cherie Priest
> [6:06pm] <Dorene>Loved it!
> [6:06pm] <Dorene>combination steampunk and zombies!
> [6:07pm] <zombieToast>difference engine was ok
> [6:07pm] <zombieToast>never really went past that
> [6:07pm] <Dorene>I had to tough out difference engine
> [6:07pm] <Balaur>hmmm, I'll make one assignment in which everyone would have to talk about their favourite books, movies and recommend them, but without spoilers

Through the involvement of external resources into the course no boundary was created to separate background knowledge from the knowledge regarded by the course organizer as required for participating in the course. Instead, an opportunity was established to integrate additional "outside" resources and to form extended patterns of relations.
Supposedly, hyperlinks played also a cognitive role as they were a means through which participants connected to other cyberpunk resources. These connections provided peer learners with opportunities to learn more about the genre (Siemens, 2005) and allowed knowledge to become extended (Rheinhold, 2006). This is visible in numerous instances of the data. For example in the following excerpt, ZombieToast created a group repository of bibliographic information using *diigo*, a social bookmarking website. The repository is still available and it is open and public:

> [5:37pm] <Dorene>I love how this class is opening up new directions for my reading...I have Diamond Age by Neal Stephenson just taunting me on my table...
> [5:38pm] <zombieToast>by the way, there is quite a bit piled up here now: http://groups.diigo.com/group/p2pu-cyberpunk

In all the chat conversations and the forum discussions three main actions can be observed: reading, adding information (text and embedded media and hyperlinks), and commenting on such information. Unfortunately, the little social interactions among peers (generally only three out of 15 participants plus the course organizer attended the weekly chats) determined a lack of 'critical mass' in terms of discursive interaction, as lamented in this talk between two of the three active participants, Sundancer and ZombieToast:

> [7:11pm] sundancer: has anything else happened?
> [7:12pm] zombieToast: nah, not much tbh
> [7:12pm] zombieToast: apparently Balaur has sent out some emails trying to get people back on board
> [7:12pm] sundancer: mhm
> [7:13pm] zombieToast: but not much response from what I gather
> [7:13pm] zombieToast: I think the whole deal kind of suffered from the slow start & fragmented communication in the beginning

In the following chat, the third active participant, Dorene, also felt that motivation and participation lagged behind as a consequence of the lack of such "critical mass" of discursive interactions among peers:

> [6:01pm] <Dorene>I just wish the class, me included, were a little more dynamic
> [6:02pm] <Balaur>any suggestions on how to animate the others?
> [6:03pm] <Dorene>I don't
> [6:03pm] <Dorene>it's hard to do even when students HAVE to participate
> [6:04pm] <Dorene>in this situation, while we all have enthusiasm for the subject, life has a tendency to derail us for some reason
> [6:04pm] <Dorene>I feel if there were more overall activity, though, I'd be more excited to participate
> [6:05pm] <Dorene>It's like there is a critical mass of activity we haven't been able to achieve
> [6:05pm] <Dorene>Hard to gain momentum without it

Dorene's statement "*life has a tendency to derail us for some reason*" suggests that the sociotechnical worlds of human participants did not connect to the sociotechnical world of the course. Despite good initial explicit intentions and enthusiasm for the subject, busy scheduled, different timezones and platform issues contributed to people dropping off and constantly slipping deadlines for submission of assignments. The data show that people did not start to interact only because they could, or because they were driven by good motives to take part in the course.

While data analysis in this small study did not attempt to gain a better understanding of the complexities of the online social interactions in the course and of aspects that influenced such interactions (or lack of), it appears that sharing interest in the cyberpunk literature was not sufficient to sustain commitment from the participants. Although the decentralized learning environment afforded participation in the exchange of information and production of content, most of the participants who signed up did not take part in the course. The lack of sustained engagement through reciprocal social interactions seems to have affected the possibility to leverage this interest-driven network and develop forms of knowledge production centered on peer-based learning (Ito *et al.*, 2009). The importance of social interaction for learning has been affirmed in theories (Dewey, 1938; Vygotsky, 1978) and has been documented in the research literature (e.g., Brown & Duguid, 1989; Scardamalia & Bereiter, 1994). Discursive interaction allows a process of internalization-externalization through knowledge sharing, communication of ideas, reflection and critical analysis, and determines when and why external activities become internal and viceversa (Vygotsky, 1978). Therefore, discursive interaction is requisite to make the experience of peer-based learning valuable.

Forms of Presence: Redistributing Authority

In this section I present how the relations between the social and the material elements involved in the course performed effects on forms of presence. Specifically, I describe how the virtual environment influenced the relationships between the course organizer and the participants over learning and authoritative knowledge. In choosing the term "presence" I followed Sørensen (2009) who preferred this term over other terms, such as individuality, subjectivity, or agency, because she considered it as more devoid of meaning compared to the others for the purpose of her study.

Authority vis-à-vis peers in the course

This study found that the nature of the relationship between the course organizer and the participants differed from that of the traditional teacher-student model. This is how the course organizer introduced himself at the start of the course:

> <Balaur>I'm going to be your tutor, well, I wouldn't call it this way; I'll be a guide through material we'll *study,* and we are all here to learn from each other.
> <Balaur>So basically this is the idea, the course is made by you, suggest other stories, write essays point to reviews of books as not everyone will have time to read them all, etc.

These statements exemplify the shift from the subject-authority pattern of relations generally associated to teacher-led education to the agential pattern of relations associated to peer-led education, in which course organizer and participants are on the same level of influence. Arguably, this shift is connected to the distribution of knowledge. The course organizer acknowledged the distribution of knowledge in the course: he was not the only one who knew about the topic, he did not play the role of the sage on the stage, because the other participants were also well-read about the genre:

> [5:09pm] <Balaur>so, I'm in this course to set a direction and force all of you collaborate; as you all know more than me
> [5:09pm] <Dorene>Isn't that what it's supposed to be?
> [5:10pm] <Balaur>yup, but apparently in other p2pu courses the things were slower
> [5:10pm] <Dorene>Peer to peer is an unusual direction for education
> [5:10pm] <Dorene>so I could see why some people might be slow to adapt
> [5:10pm] <sundance_kiddo>Dorene: why? I find this is the best way to learn
> [5:11pm] <Dorene>Everyone is used to the traditional teacher-student model
> [5:11pm] <Balaur>sundance_kiddo: sit down and speak only when asked :) LOL
> [5:11pm] <Dorene>I agree it's a fantastic way to learn
> [5:11pm] <Dorene>and I encourage the same type of dynamic with my own students
> [5:11pm] <Dorene>But we spend most of our lives being "led" through education, so to speak

The participants did not need a teacher *teaching* them about cyberpunk literature and telling them what to read. Each of them had already read many books, knew the main authors, and brought a considerable lot of knowledge to the course. As Jordan (1997) noted, authoritative knowledge does not reflect access to complex technologies or the existence of hierarchical knowledge structures, but power relationships within a group. The horizontally distributed knowledge among participants and the dispersed knowledge drawn from external resources marked the relationship between the course organizer and the participants with an egalitarian ethos, which was also afforded by the participatory architecture of technologies (Lessig, 2002). The participatory architecture enables this peer-led approach and seems to contradict the conventional classroom approach exemplified by Dorene's statement "*Everyone is used to the traditional teacher-student model*" that refers to a legacy of didacticism, in which educational practices are controlled by the teacher who decides when and how resources should be used within the framework of a predetermined syllabus and learners are expected to be passive (Bennett, 1976). The course organizer's initial statement "*I'm in this course to set a direction and force all of you collaborate, as you all know more than me*" makes clear that his approach is different: by acknowleging that the other participants are as knowledgeable as he is, he affirmed the peer-led approach to the course, in which the control shifts from him to the peers.

The decentralized online environment characterized by openness and architecture of participation (Lessig, 2004) affords horizontal connections, in contrast to vertical hierarchy dominant in teacher-led education. The data suggest that this online environment – combined

with the voluntary human participation and the lack of contracts and sanctions for withdrawal and non-compliance with course requirements – influenced the shift from the subject-authority pattern of relations generally associated to teacher-led education to the agential pattern of relations associated to peer-led education. This finding also supports the idea that this combination of aspects did not allow the course organizer to predict what the other participants would do next. The first of the following quotations relates to the uncertainty perceived by the course organizer about the submission of assignments. The deadline for submitting the first assignment had passed but only five people submitted theirs. His question to the other participants indicates perplexity:

> [5:43pm] <Balaur>btw, what should I do with the assignments' deadlines?
> [5:44pm] <Dorene>What is the participation? I'm not seeing much coming through...is it just us or are there others?
> [5:44pm] <Balaur>Dorene: there are no others, just us
> [5:45pm] <Dorene>wow, darn
> [5:45pm] <zombieToast>dana & j9...
> [5:45pm] <Balaur>yup

As Sørensen (2009) argued, predictability is a crucial component of authority and needs stable materialities that the course did not provide. Therefore, given the lack of stability throughout the course, the online environment combined with the voluntary participation and the lack of contracts and sanctions for withdrawal and non-compliance with course requirements appeared to have contributed to the shift to an agential pattern of relations.
The quotation above indicates that the regions (Mol & Law, 1994) of the course organizer (authority) and the participants (subjects) were not clearly demarcated. This instance suggests that the course organizer did not exert top-down authority over participants, but was willing to have some honest feedback from Dorene, who felt it was safe to be open with him.

Conclusions and Further Research

This paper drew on ANT to examine the performative effects of digital technologies on forms of learning and forms of presence in a in a peer-based course run at a web community of learners at the P2PU. ANT helped view the course as a network in which technologies and humans were entangled and not as a container in which separate locations could be assigned to them. The findings suggest that the course was a fluid space whose constituent elements were misaligned. For example, technologies, motivations of course participants and social interaction were not tied together firmly, and this led to failure to start a process of active participation. Technologies were not entangled in a web of social production but remained entangled in individual contributions (e.g., individual use of hyperlinks, individual writing of stories), and the collective learning experience was limited to few course participants sharing individual thoughts and reflections. Had the platform worked properly, it could be argued that course participants might have benefited from being involved in a cooperative assignment requiring communication for its completion, instead of writing individual stories. However, given the poor functioning of the platform, it is also arguable whether assigning cooperative assignments would have helped. The findings point to the perceived need for a single space of interaction able to support asynchronous conversations and sharing of resources to reduce misunderstandings and the impact of participants being geographically located in different timezones.
Within the limitation of this small study, the findings give some support to the claim that peer-based learning can open up possibilities in educational practice for the development of new concepts and new activities if technologies and co-creation are entangled. Forms of peer-

based learning do not seem to emerge spontaneously around networked technologies but need to be associated with them in order to be developed. In the case of this course, a functioning platform might have supported better the commitment and engagement that course participants could have through their shared interest in cyberpunk literature.

As said earlier, this study represents a preliminary, exploratory examination of the relations between digital technologies and humans in a peer-based course run at the P2PU. More research is needed to study the role of technologies in decentralized online environments and understand whether they expand the boundaries of a learning environment or disaggregating it, with the result of scattering course materials and communications all over the place without a mechanism of aggregation back to the central hub at P2PU.

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[1] A widely used definition of OER is "digitized materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research" (OECD, 2007 p. 10). OER includes learning content, software tools, and implementation resources such as open licenses.

[2] UNESCO (2010) defined non formal education as "education that takes place outside the formal system either on a regular or intermittent basis" (p. 6).

[3] The course organizer and the three active course participants were invited for an interview, but only two of them accepted the invitation.