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Goals, Motivation for, and Outcomes of Personal Learning through Networks: Results of a Tweetstorm

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ABSTRACT

Recent developments in the use of social media for learning have posed serious challenges for learners. The information overload that these online social tools create has changed the way learners learn and from whom they learn. An investigation of learners' goals, motivations and expected outcomes when using a personal learning network is essential since there have been few empirical studies in the domain. Previous research focused on the factors that influence learning in virtual environments, but these studies were mainly conducted in an era in which online social media were not yet used for personal learning networks. The current paper reports findings of a study that examined factors impacting professional learning through networks. A personal learning network identification session and a brainstorm via Twitter (*Tweetstorm*) regarding goals, motivational factors and outcomes of learning through networks were conducted. The article concludes that seven factors play a pivotal role in professional learning through networks: sharing, motivation, perceived value of the network, feedback, personal learning, trust and support, peer characteristics and peer value. Also, different perspectives, motivation, social media and collaboration, reciprocity, intrinsic motivation, innovation, status and reputation and networking strategies play an important role in motivation. Future work should focus on investigating the interplay between factors that influence networked learning identified in this article.

Keywords

Personal learning network, Social networks, Networking tools, Twitter, Networked learning

Introduction

Nowadays, it has become a norm for professionals to develop themselves as part of their job. They attend courses and seminars, and sometimes their reward or even continuation of their professional activities depends on such *formal learning*. However, Boud and Hager (2012) note "… a move from … development - to the input - the activity", whereas professional development chiefly takes place by "participation in the practice" (Boud & Hager, 2012), *informal learning* occurs during daily practice. Johnsson, Boud and Solomon (2012) report about cases in which interaction with others drives informal learning, by offering new perspectives from other working contexts that trigger new thinking in the professional learner's personal context, akin to the creative power of 'bridges' Burt (2004) reports. Nevertheless, unlike formal learning, informal learning is not rewarded nor recognised, mainly due to lacking information about how individuals learn through their network (networked learning) (Haythornthwaite & De Laat, 2010).

Monitoring social interactions (social media may be especially suited for this) can help identifying informal learning (e.g., De Laat, Lally, Lipponen, & Simons, 2007), but learners need to be motivated to exhibit the appropriate informal learning behaviour. To do so, one needs to investigate professional learners' strategy, or 'networking attitude' (Rajagopal, Joosten-ten Brinke, Van Bruggen, & Sloep, 2012). More explicitly, what motivates professional learners to engage in learning through their network? What do they learn (learning outcomes)? And why do they feel they learn (perception)?

We present findings from a new type of knowledge elicitation, the *Tweetstorm*. The Tweetstorm is an online, open brainstorm-like session via Twitter, a microblogging platform. The current article starts off with some background literature necessary for understanding the remaining part of the article. Then, two pivotal terms in this article are explained: Personal Learning Networks (PLNs) and the Tweetstorm. Next, we provide the methods that we employed to conduct the Tweetstorm. Subsequently, we present the results of the Tweetstorm, including the results of one of the phases of the Tweetstorm: the PLN identification session. Finally, we discuss the results and draw together our conclusions.

Literature review

The question *whom we learn from* has a long history in educational research and several learning theories aim to capture the social process of learning. Bandura (1977) defines social learning as learning from others; modelling and imitating others' behaviour. Vygotsky (1978) underlines that learning, internalising behaviour, occurs by imitation; we learn from others by example. Wenger (1998) contends that learning is practice-driven; people share a common interest or practice. Learners influence and learn from one another as they engage in their "community of practice". Connectivism (Siemens, 2005), a theory that explicitly refers to learning with technology, claims that "learning is a process of connecting to specialized nodes or information resources". This includes learning from resources, or organizations that possess knowledge.

Dillenbourg (1999, p. 2) defines that we learn collaboratively by having "a situation in which two or more people learn or attempt to learn something together". Social media can assist in social, collaborative learning, but these should be tailored to learning practice (Väljataga & Fiedler, 2009). Four main types of activities are distinguished to describe *how* we learn at the workplace (Eraut, 2004): (1) participation in group activities, (2) working alongside others, (3) tackling challenging tasks, and (4) working with clients. The first, second and fourth point towards social, collaborative actions, which may be important for our understanding of personal, professional learning networks.

What we learn in the workplace ranges from task performance, awareness and understanding, personal development, teamwork, role performance, academic knowledge and skills, decision making and problem solving, to judgement (Eraut, 2004). Schank (1995) states that we internalise so-called *scripts* of consecutive actions when we learn by doing. This is similar to the social learning view of Bandura (1977), who claims that we learn from others by constructing a model of what others do and try to imitate this.

The reason *why* learners engage in learning through networks may be that they share a common interest or practice (Lave, 1991), are keen to exchange of ideas (Pirolli, 2009) and want to receive and provide support (Berlanga, Sloep, Kester, Brouns, Van Rosmalen, & Koper, 2008; Fetter, Berlanga, & Sloep, 2010; Van Rosmalen et al., 2007). They also call on each other when they have a problem to solve or knowledgeability to offer (Dekker & Kingma, 1999). Social support theories posit that network relationships offer both instrumental and emotional support to network members (Gerstick, Bartunek & Dutton, 2000). Instrumental relationships encompass resources such as professional advice, information, and expertise, whereas emotional relationships provide encouragement, friendship, support and ways of communicating information (Ibarra, 1993). Access to knowledge resources may guide learner engagement in learning networks (Hollingshead, Fulk, & Monge, 2002). Also, learner engagement is subject to the learner's interest (Billett, 2004).

The above literature review very much describes the 'how and why' of social learning, but to make a link between theory and praxis, we need to understand what drives one to learn via her network. We need to understand why one engages in learning via her personal learning network, in order for managers to attach proper rewards to informal learning actions. In other words, we need to bridge the gap between networked learning and the recognition, valuation and rewarding of it by managers of learners, for instance teachers (in the case of students) or line managers (in the case of organizational learning). Therefore, the current study attempts to explore how professionals utilise their networks and what motivates them to use their network for learning. Hence, this article investigates the following main research question:
What makes professional learners learn through their network?

To answer this question, we first need to lay out the definition of a personal learning network. In addition, we present the workflow and pros and cons of our elicitation method: the *Tweetstorm*.

Personal learning networks and the Tweetstorm

There are mainly two approaches to personal learning networks: a top-down, and a bottom-up approach. From a top-down perspective, a learning network can be part of a collaborative learning *solution* that consists of introducing a networking environment for learners to become more motivated, or less isolated, by recommending them knowledgeable peers (Fetter, Berlanga, & Sloep, 2010; Sie et al., 2012). From a bottom-up perspective, connectivists such as Siemens (2005) contend that learning is a social *phenomenon*: learner interactions constitute a learning network. We refer to this act as *networked learning*. Networked learning can, for instance, be extracted from a personal learning environment (PLE) by monitoring who reacts to whom in a PLE's forum to guide interventions in the learning process (Corallo, De Maggio, Grippa, & Passiante, 2008). When a learning network is tailored to the individual, for instance to give learner-centric feedback or advice, it is called a personal learning network (PLN).

The PLN identification session we employ here as part of the Tweetstorm introduction is an instance of egocentric network elicitation. That is, we explore the relationships that are formed during networked learning. In detail, *egocentric networks* are networks from the perspective of an individual, a well-known data type in Social Network Analysis. The data collection method is simple: the researcher asks a participant for his or her contacts, and then draws a social network consisting of nodes (contacts) and edges (relationships). The 'networked learning'-relationships that we investigate are two-fold: we investigate from whom the participants learn, and which tools they use to do so.

The Tweetstorm is an online knowledge elicitation method. It uses the open, online character of Twitter combined with the strength of freely uttering statements from brainstorming. Also, it draws on expert knowledge to arrive at core statements, akin to concept mapping (Stoyanov & Kirschner, 2004) or the Delphi method. It consists of six phases: First, a *context* should be provided. This can be a short introduction of the subject of the Tweetstorm, or in this case, we additionally held a personal learning network identification session with the participants present at a workshop. Second, *questions are presented* through Twitter using a *hashtag*, a short, unique, textual code to denote the subject of a *tweet*, a Twitter message. Third, the participants *answer the questions* using their personal Twitter account and the designated hashtag. Fourth, the *tweets are aggregated* using the hashtag and an aggregation tool such as YourTwapperkeeper (https://github.com/jobrieniii/yourTwapperKeeper). Fifth, the *tweets are categorised* by a team of experts using a card sorting tool such as Websort (www.websort.net). The experts put the tweets in categories that they can name themselves. Finally, the *categorisation is analysed*. The agreement between the experts' sorting is computed, without the need for experts to agree upon a category name. Based on this agreement, hierarchical cluster analysis software computes core clusters of tweets. Figure 1 shows an overview of the distinct phases.

The advantages of the Tweetstorm are numerous. First, it allows for easy display: search for a hashtag and all twitter statements, so-called *tweets*, containing the hashtag are returned. These can be easily displayed using a so-called *Twitterwall*, an aggregator specialised in the display of tweets of a particular hashtag. Second, and following the previous advantage, it allows for easy aggregation as participants' statements are already in digital format, and can be traced back to individual participants. Third, Twitter is a well-known medium, which allows for smooth setup of a Tweetstorm session. Fourth, the categorisation of tweets is performed online, which allows for experts to take part from any place, any time. Fifth, experts can take part anonymously, which prevents them from experiencing production blocking by other experts. That is, they can utter their statements without having to wait for their turn. Sixth, experts can work independently: experts can put tweets in a category they define themselves. In contrast to methods such as the Delphi (Hasson, Keeney, & McKenna, 2000), there is no need to reach consensus with other experts, which saves a lot of time. Finally, in contrast to many other idea generation or knowledge elicitation methods such as brainstorming (Osborn, 1954), Think-Pair-Share or Progressive Inquiry (Hakkarainen, 2003), the Tweetstorm is not limited solely to a selected group of invitees; due to the nature of Twitter, it is open to anyone who has knowledge of the session's hashtag.

The main drawback of the Tweetstorm method is that it is not entirely suited for in-depth discussion among participants. Participants are able to react to one another, and they are able to concur with one another by retweeting. However, tweets are limited by 140 characters, making it difficult to sufficiently make an argument.

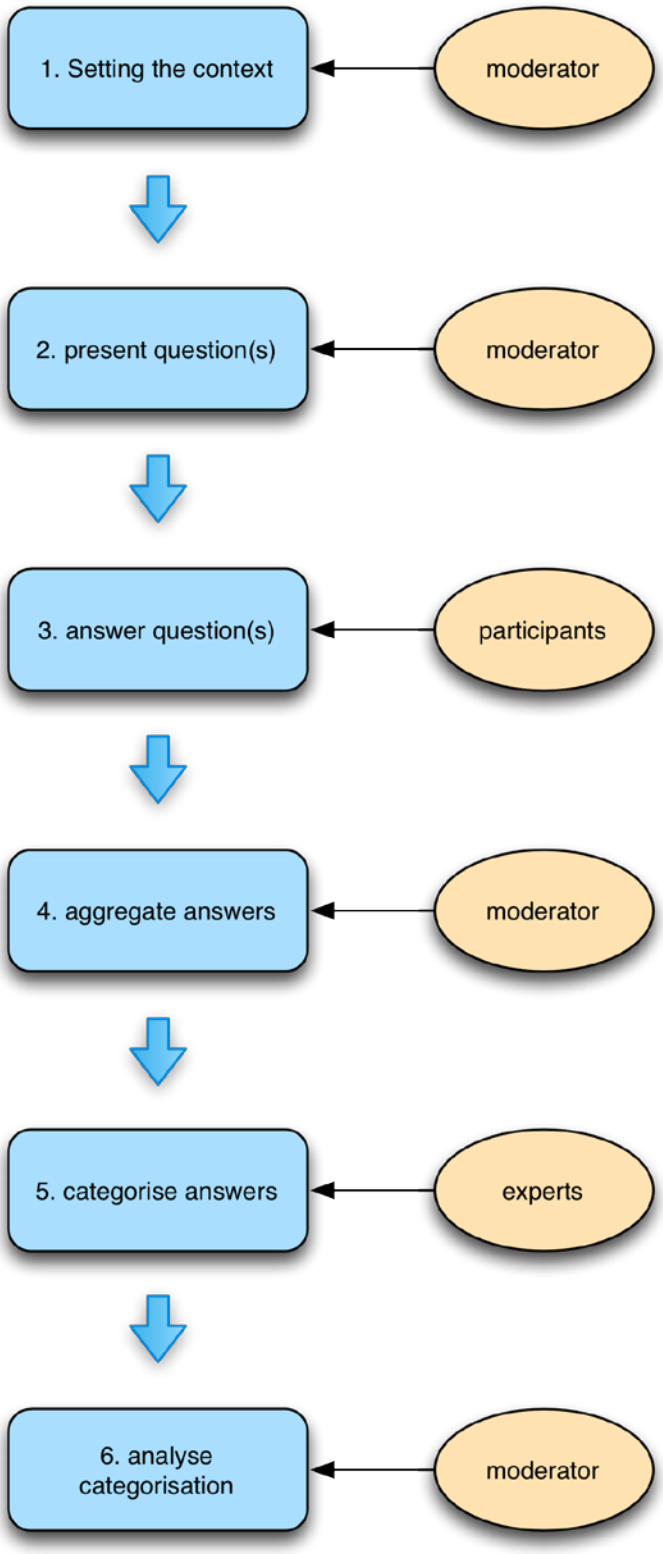

Figure 1. Overview of the Tweetstorm method

Method

Participants

Setting the context: PLN identification session

Participants were attendants of a workshop at the PLE conference 2011, which was announced before the start of the conference. Akin to Scardamalia and Bereiter's "quality circles" (1994), a conference allows scholars to learn from one another, to advance their knowledge more efficiently and effectively than going it alone. The six 'live' participants, attendants of the workshop that is to say, which excludes the online participants, were chiefly educational researchers with an interest in Personal Learning Environments. The participants' main characteristics are provided in Table 1. No inducement was offered for their participation.

Table 1. Overview of the 'live' participants' main characteristics.

ID	gender	age range	profession	discipline
1	m	35-44	PhD student	education
2	f	45-54	teacher	cultural and ethnic studies
3	m	35-44	professor	other
4	m	25-34	post-doc	education
5	m	25-34	PhD student	computer science
6	f	25-34	teacher	sociology

Presenting and answering questions

Due to the public nature of Twitter, the Tweetstorm was open to anyone who was interested and managed to spot it. The Tweetstorm was announced through the website of the PLE conference. A total of 31 participants actively engaged in it by *tweeting* (uttering 'tweets') or *retweeting* (forwarding tweets). This included the six participants that engaged in the antecedent PLN identification session. The use of Twitter meant that we could only identify participants by their Twitter username (quasi-anonymity). As indicated, passive, read-only participants ('lurkers') could also join the Tweetstorm. As Twitter does not allow for tracking of 'reads', lurkers could have (indirectly) influenced the Tweetstorm by discussing with active participants offline. No inducement was offered for participants' cooperation.

Categorisation and analysis

We invited a group of experts to participate in a sorting experiment to independently categorise the statements that were extracted from the tweets. Since the statements were about learning in networks, 34 experts from affiliated universities, researchers in the educational domain, were invited via email, of which nine responded positively. Their occupation varied from PhD student to associate professor. Again, no inducement was offered for their help.

Materials

PLN identification session

A custom-built online environment (PLN identification tool) was used in which participants could register themselves and identify the contacts in their PLN (Figure 2). The environment was accessible through the Internet URL 145.20.132.20/rse/test/page/PLE. For ease of use, the URL given to the participants was shortened using an online service called Bit.ly. The environment was tested during a pilot session at Glasgow Caledonian University. Five participants, all educational researchers, tested the environment and were given the opportunity to 1) reflect on clarity and usefulness of the questions, and 2) to provide suggestions for improvement. As a result, the survey instruments and questions were refined prior to the actual session. Although some of the answer options that were added seem to overlap with the existing ones, the participants of the pilot felt these needed to be added. For instance, 'external colleague' and 'research collaborator' may have overlap in meaning.

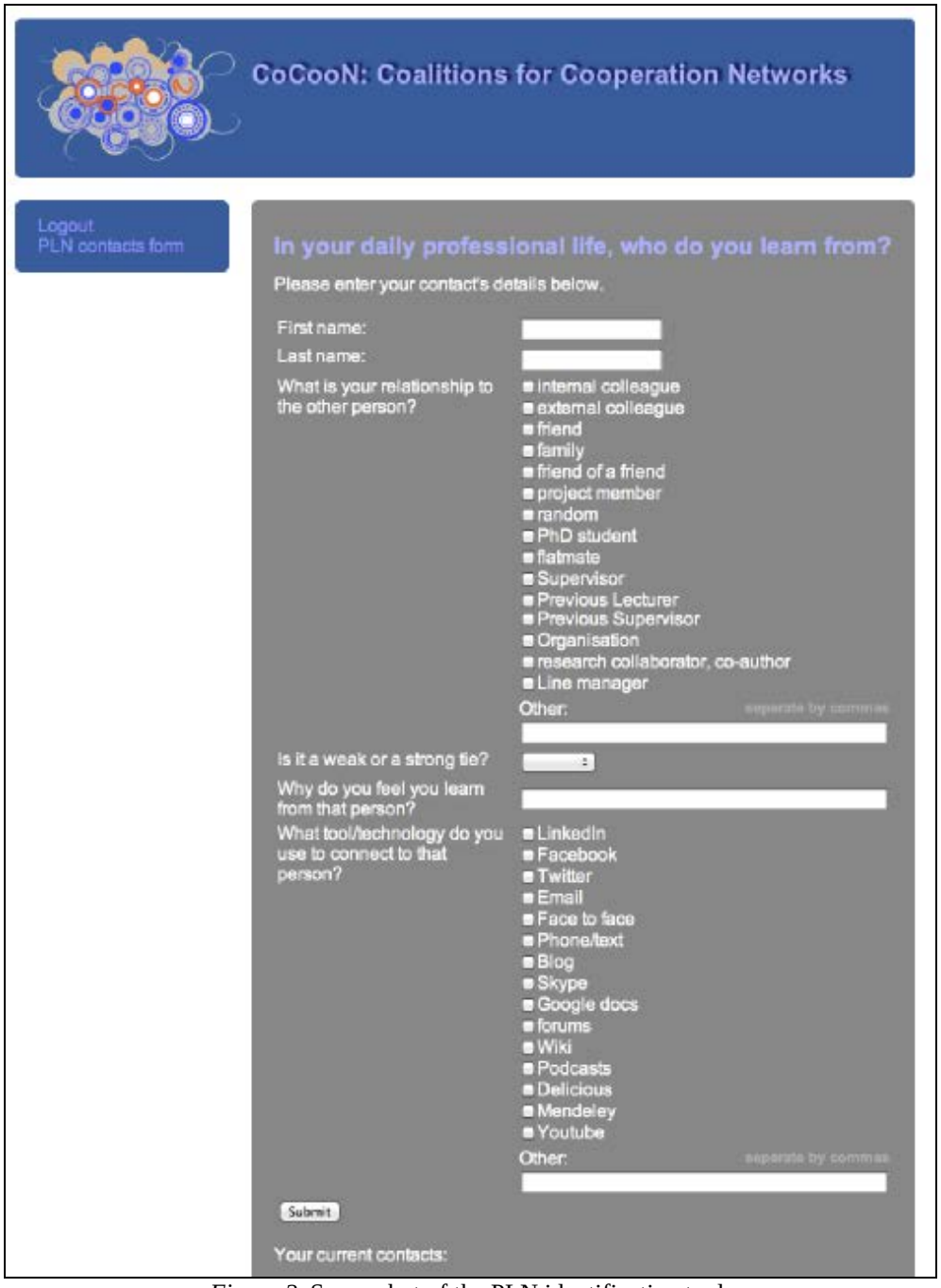

Figure 2. Screenshot of the PLN identification tool.

Presenting and answering questions and aggregation

The YourTwapperkeeper aggregation tool, a so-called *twitterwall* (Figure 3) was shown at the workshop venue to present an overview of all tweets with the hashtag #plntweet. Participants could easily view what questions were asked, and what other participants answered. Also, the YourTwapperkeeper tool allowed for easy aggregation of the tweets for analysis.

Figure 3. Part of the YourTwapperkeeper twitterwall used at the workshop venue.

Categorising and analysing categories

The statements that resulted from the tweets were categorised by experts using Websort (www.websort.net), which is designed to do card sorting experiments and corresponding data analysis. Having the statements in digital form allows for card sorting online. WebSort provides a number of data aggregation (e.g. items vs. items, items vs. categories) and visualisation methods (e.g. tree structure, tables). Participants were not able to see each other's categorisations. Also, the categorisation did not impose any time-constraints.

The multidendrograms software package (Fernández & Gómez, 2008) was used to perform agglomerative hierarchical cluster analysis (AHCA) with complete linkage (Defays, 1977) to find core clusters of statements. AHCA starts with *n* statements in *n* distinct clusters. In subsequent iterations, high similarity clusters are merged, until the appropriate number of clusters is reached. The main advantage of such an iterative, hierarchical method is that one can see how the assignment of statements to clusters occurs.

Procedure

PLN identification session

The PLN identification session lasted 45 minutes in total. At registration, participants of the PLN identification session described their profile in terms of their age range, gender, occupation, discipline and work experience. The main advantage of providing and keeping login credentials is that participants can be asked to identify contacts at a later point in time (repeated measure), to see how their network and perception of this network evolves. Afterwards, participants could add contacts that they learn from through the PLN contacts form. For each contact, the participants had to answer the following questions:

- What is your relationship to the other person?

- Is it a weak or a strong tie?
- Why do you feel you learn from that person?
- What tool/technology do you use to connect to that person?

Participants could edit or delete the contacts that they entered (bottom of Figure 2; actual entries are left out for privacy reasons). Although participants were asked to identify their learning contacts, the relationships between contacts and contacts' characteristics were not analysed. Using SPSS statistical software version 18, we calculated averages per type of contact and tool that learners used to connect to their learning contacts.

Tweetstorm

During the Tweetstorm, which lasted 45 minutes in total, participants were asked to tweet their personal opinion using the #plntweet hashtag. In that way, the moderators could aggregate all tweets after the Tweetstorm had ended. The moderators (three) tried to trigger participants by posting three main questions about PLNs to Twitter using the #plntweet hashtag:

- What motivates you to engage/learn through your network?
- Why do you feel you learn from your peers?
- What do you learn from your network?

Statement sorting

The tweets were aggregated and split up into smaller pieces of information, as most of the tweets addressed multiple questions at once. One tweet could answer both the question on motivation (what motivates the learner) and on the content (what is learned) of learning. As the researchers posted (tweeted) the triggering questions separately, it was not expected that participants would answer multiple questions in a single tweet. Moreover, some of the answers contained distinct parts that could possibly be interpreted and categorised differently from each other. For example, one part of the answer could be about feedback, whereas another part could be about inspiration. After splitting up these tweets into separate statements, we uploaded these in the Websort.net environment. Following this, we asked the experts to categorise the statements. To prevent researcher bias, no pre-defined categories were provided. Experts could define and name categories themselves.

We used the Websort environment to export the sorting data to an *item-item* similarity matrix. This matrix is too large to be reported here in full, however it is available on http://www.open.ou.nl/rse/Rory_Sie/Downloads.html. Finally, AHCA with complete linkage was performed to find core clusters of statements.

Limitations

The results of the PLN identification session were difficult to analyse by character, as they consisted of some multiple response questions, which means that a contact could be a research collaborator and an external colleague at the same time. Also, the response rate was relatively low. Further investigation with a larger group of participants is needed to allow more robust PLN identification. A further study with a larger group of participants would also allow us to aggregate the egocentric networks and compare the participants' view of their network to existing learning networks of which they are a part.

A further limitation of this study was that participants were mostly researchers already with a shared interest as evidenced by their attendance at this particular conference. Thus, the answers are likely to be in line with this type of profession. Future research should try to focus on participant groups beyond academia, in order to arrive at more general findings. Finally, the Tweetstorm results may have been influenced by the fact that it was a brainstorm that took place via Twitter. The participants were inexperienced with such type of elicitation, which may have had its influence on the way participants expressed their statements.

Results

PLN identification session

Whom do participants learn from?

Fifteen types of connections and fifteen different tools for communication were identified in the answers by the participants of the introductory session (Figure 4). From the six participants, one participant had named only five contacts. The rest had identified more than ten contacts, ranging from ten to twenty-four. In total, 261 contacts were identified. The participants could be connected to the same peer by more than one type of connection or tool. For example, a research collaborator could also be the participant's friend and use face-to-face as well as email communication. The findings revealed that the most common type of relationship in a learning network was research collaborator, friend and external colleague. 40% of research collaborators were at the same time friends. Following in order of meaningful connections were internal colleagues and supervisors.

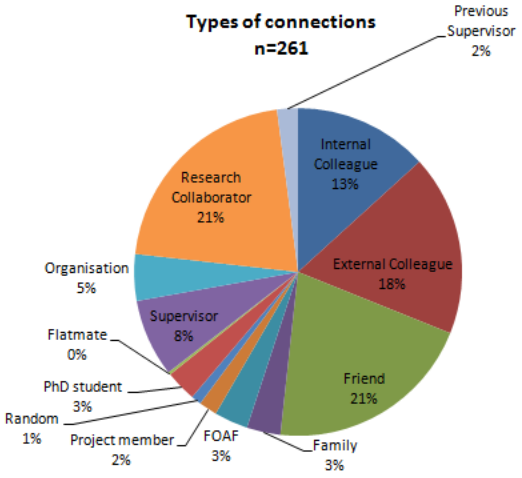

Figure 4. Whom do people learn from?

What tools do they use?

In total, thirteen out of fifteen distinct tools were selected by participants (Figure 5). The tools used most commonly were Twitter (18%, per participant: M=.68, SD=.47), email (19%, per participant: M=.65, SD=.48) and face-to-face communication (18%, per participant: M=.65, SD=.48). Although the social bookmarking tools Delicious and Wikis were an option, they were not mentioned.

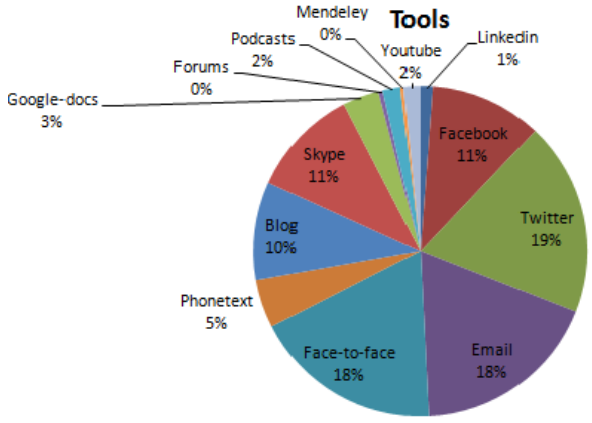

Figure 5. Tools used to learn from peers.

Tweetstorm

Participants posted a total of 139 tweets (M = 4.48; SD = 6.28) (38 retweets) with the requested #plntweet hashtag. Sorting of the tweets entailed that we had to remove retweets, triggering questions, and split up tweets with multiple statements in them. A total of 83 statements were extracted from the Tweetstorm (see http://www.open.ou.nl/rse/Rory_Sie/Downloads.html).

Statement sorting

There was no time-constraint set for the sorting exercise. Experts spent 51 minutes on average sorting the statements (SD = 35). Nearly no overlap between experts' category names was found (Appendix A). The reason for this is clear and expected; the experts could define the category names themselves. Nevertheless, latent agreement between experts could be detected using agglomerative hierarchical analysis (Figure 6). On the lowest level, seven core clusters of statements can be found. When taking a closer look at the widest rectangle toward the bottom left, one remarkably notices that this cluster actually comprises eight subclusters. In an attempt to merge the single-statement cluster (a70) with, or assign to other clusters, the complete linkage clustering algorithm merged it with seven other clusters.

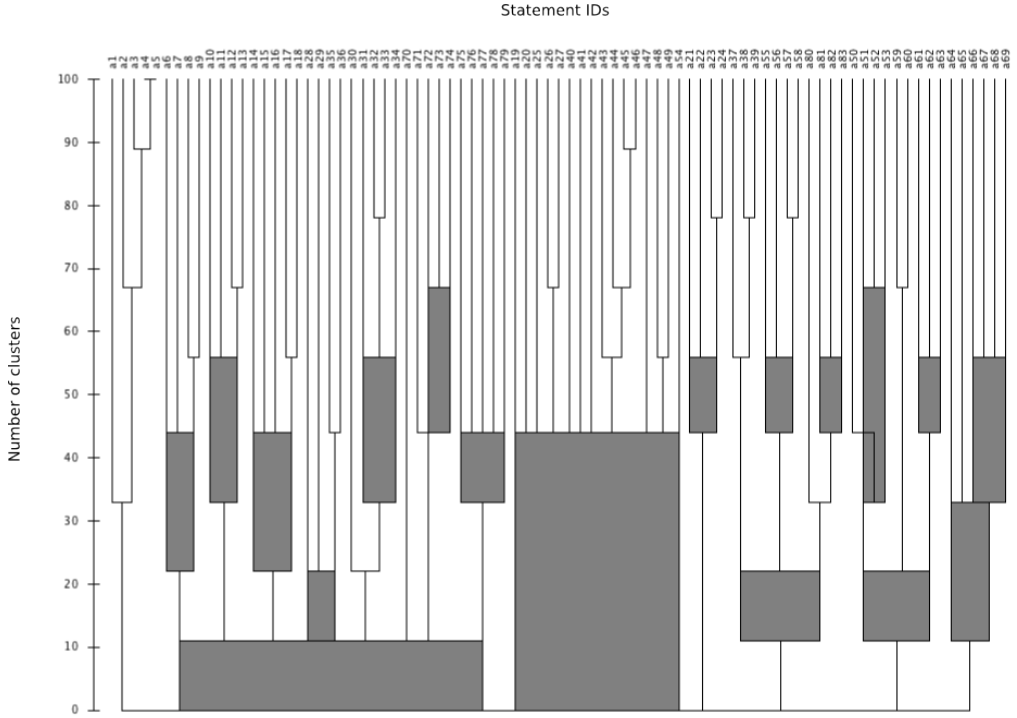

Figure 6. Results of hierarchical cluster analysis. Statements are coded, and can be found at http://www.open.ou.nl/rse/Rory_Sie/Downloads.html .

Table 2 shows the number of statements per cluster, and typical statements for that cluster. Cluster 2 is the cluster corresponding to the abovementioned cluster that actually contains eight subclusters. For clarification, an overview of these clusters is given in Figure 7.

Table 2. Statements per cluster at the level of seven core clusters.

#	name	no. of statements	example
1	Sharing	5	"sharing is key"
2	Motivation	32	"Learning with others is more rewarding and rich than on your own"
2.1	Different	4	"Learn from your peers - Views I hadn't considered, opinions I disagree

	perspectives		with, ideas that inspire me"
2.2	Motivation	4	"For me, learning through my network is the most fun way of learning"
2.3	Social media and collaboration	5	"Twitter is a fine balance between the personal and the social. No-one learns in a vacuum, but we all learn uniquely"
2.4	reciprocity	4	"Conversation is 2-way. I can give to my network as well as take from it"
2.5	intrinsic motivation	5	"I use my PLN because of the autonomy it provides me"
2.6	Innovation	1	"By results collaboratively achieved - new methods under construction e.g. by MOOC ing. Old scales don't work."
2.7	status and reputation	4	"Not everyone has equal status in my PLN"
2.8	networking strategies	5	"My PLN allows me to connect to new people, communities and artefacts"
3	Perceived value of the network	16	"Finding out about latest research"
4	Feedback	4	"Feedback on thoughts and ideas"; "Instantaneous feedback, news, useful links, arguments and opinions"
5	Personal learning	11	"Using my network to find information and learn is the most effective and fast way to get the things I need"
6	Trust and support	9	"Ask for help and they will engage and help me"; "I can also discuss some of the concerns and insecurities I have within a peer group informally"
7	Peer characteristics and value	6	"Members of my PLN are very intelligent, inspirational, insightful and innovative"; "The people I learn from are passionate, critical and informed. They are my role models learners [sic] in this digital age"

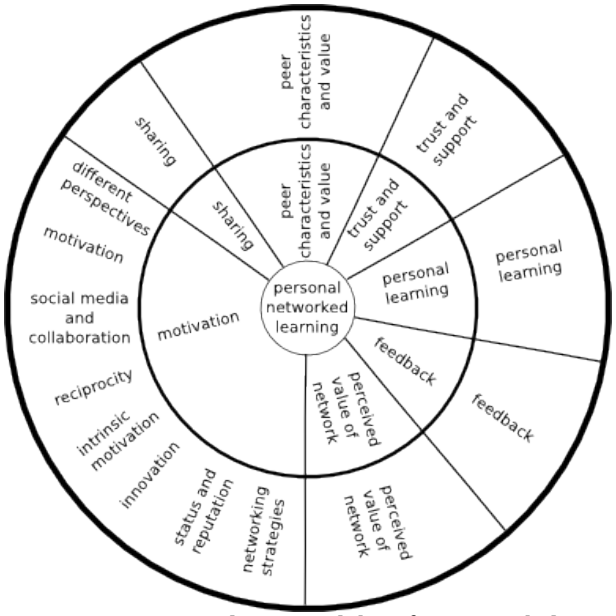

Figure 7. Seven core clusters and their fourteen subclusters.

Discussion

The PLN identification session, which focused on identification of egocentric networks, revealed some interesting findings. The results show that participants learn mainly from research collaborators, friends and external colleagues. This is partly inline with research by Hoffman and Vance (2005), who found that individuals learn IT skills mainly by themselves, from family, or from friends. Though, Hoffman and Vance report that instant messaging was, at that

time, “a relatively new technology task”. Now that instant messaging and social media have integrated in daily lives of people, it may well be that a shift has taken place from learning mainly from offline contacts to learning from online contacts as well. Our findings of which medium was used to learn from peers support this: Learners mainly used face-to-face, email and Twitter as main modes of communication. Twitter did not yet exist back in 2005, which may explain the shift in whom people learn from.

The Tweetstorm and the corresponding agglomerative hierarchical cluster analysis resulted in a core set of seven clusters and a core set of fourteen clusters, of which eight subclusters were part of the larger cluster motivation. At the level of the seven clusters, the cluster ‘sharing’ is consistent with research by Olson, Grudin and Horvitz (2004, p. 1) who state “*Information sharing is of immense value in the workplace because it reduces duplication of effort, and sits at the foundations of collaboration*”. On the other hand, Fogel and Nehmad (2009) report that a majority of men and women included a picture of themselves in their profile, but did not share their phone number and home address. Thus, people only share personal information to a limited extent. Though, Swan (2002) stresses the importance of interaction for teaching and learning in a network.

The opposing views of Olson et al. and Fogel and Nehmad support that trust (cluster 6) is important in a personal learning network, but also call for a balance between information sharing and trust. Furthermore, the importance of trust and support for learning is partly supported by Lankau and Scandura (2002), who contend that there exists a positive relationship between vocational support (mentoring in the workplace) and personal learning. In that same study, it was found that roles are an important indicator for skill development, which supports our findings that ‘peer characteristics and value’ play a significant role in personal learning networks.

Ames and Archer (1988, p. 264) report that “*a mastery goal orientation may foster a way of thinking that is necessary to sustain student involvement in learning as well as increase the likelihood that students will pursue tasks that foster increments in learning*”. This is in line with our cluster motivation and its subclusters motivation and intrinsic motivation. Though, the concept of mastery or control itself was not mentioned in any of the statements. Networking strategies, a subcluster of motivation, is consistent with research by Zimmerman, Bandura, & Martinez-pons (1992), who conclude that learning strategies play an important role in academic self-motivation. More specifically, the statements in the cluster networking strategies point towards connecting to the right peers in the network. In research about creativity and innovation it is found that connecting to the right peers in a network leads to more creativity (Burt, 2004; Kratzer & Lettl, 2008). This ability to combine perspectives is part of the key competences necessary for lifelong learning (European Commission, 2010).

Conclusions

This paper presents findings of an exploratory study using an innovative elicitation technique called the Tweetstorm; the study aims to discover how learners perceive their personal learning in a network. Especially now that learning is increasingly using online, social technologies, a new study was needed to investigate the question at hand. Findings suggest that these professional learners, scholars, learn mainly from research collaborators, friends and external colleagues. This is supported by the social tools that these learners use: mostly email and Twitter. However, a larger sample is needed to draw definite conclusions.

The Tweetstorm results are mainly inline with current literature, which indicates that the motivation for networked learning, as well as why and what learners learn, has not changed with the increase of social media use. For example, a learner may be motivated through reciprocity (Kogut, 1989; Song, 2009) in the network (Aviv & Ravid, 2005). Learners want to have a *quid pro quo*; something in return for what they share in the network. For instance, in exchange for their participation and knowledge sharing, networked learners expect to receive feedback from other participants in the network. Furthermore, a personal learning network should keep a balance between an appropriate amount of information sharing and interaction in the network and a trustworthy and supportive entourage (Rusman, Van Bruggen, Cörvers, Sloep, & Koper, 2009). Future work should therefore focus on the interplay between factors that influence the interaction between networked learners. This entails further investigation about the importance for each factor for networked learning.

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Appendix A

Categorisation by experts

Category	Experts	Total items	Unique items	Agreement
(Learning) benefits	1	24	24	1
Advantages	1	16	16	1
And take	1	9	9	1
Autonomy	1	1	1	1
Balance between give and take. Economic/rational approach	1	3	3	1
Based on a negative attitude	1	2	2	1
Characteristics of PLN	1	13	13	1
Characteristics/features of a network	1	12	12	1
Collaboration and community	1	5	5	1
Collaborative learning (with peers)	1	8	8	1
community identity, less relevant for me	1	4	4	1
Competences needed to be part of a Network	1	4	4	1
creation of a community of learners	1	13	13	1
definition of a network	1	16	16	1
Different conceptions of a PNL	1	15	15	1
Difficulties/problems	1	2	2	1
diversity	1	3	3	1
don't agree	1	5	5	1
effectiveness	1	3	3	1
efficiency	2	2	1	1
Expectatives	1	11	11	1
experiences	1	6	6	1
Feedback	1	4	4	1
Fun, happiness	1	3	3	1
fun, passion	1	13	13	1
General benefits of learning in a network: acquiring reputation/status based on quality of ideas	1	6	6	1
General benefits of learning in a network: efficiency/easiness/efficacy	1	2	2	1
General benefits of learning in a network: motivation/inspiration/passion	1	5	5	1
General benefits of learning in a network: quality/diversity/newness of ideas/perspectives	1	5	5	1
General benefits of learning in a network: role-modelling/examples/(common)reference framework	1	11	11	1
General benefits of learning in a network: supporting each other	1	6	6	1
General benefits of learning in a network: tailored to personal learning needs	1	4	4	1
Getting the world inside	1	12	12	1
Getting your world outside	1	5	5	1
Give	1	6	6	1
Goals	1	2	2	1
hmmm	1	1	1	1
hype	1	7	7	1
I don't understand :(	1	2	2	1
Ideas, information, inspiration and opinions	1	19	19	1
innovation	1	1	1	1
instruction	1	8	8	1
Interaction and support	1	6	6	1
interpretations	1	1	1	1
intrinsic motivation	1	8	8	1
intrinsic motivation from connecting to people	1	8	8	1
Knowledge, expertise	1	10	10	1
learning by interactions	1	23	23	1

learning goal	1	5	5	1
learning in networks	1	2	2	1
learning mainly as social learning=social exchange	1	13	13	1
learning to learn	1	9	9	1
learning=individual benefit receiving	1	39	39	1
limitations	1	1	1	1
maintain relations	1	3	3	1
make work interesting and inspirational	1	27	27	1
Misconceptions	1	5	5	1
models and expertise	1	6	6	1
Motivation	2	21	14	0.75
motivation: give and take	1	1	1	1
Motivations to be part of a Network	1	9	9	1
opinions	1	3	3	1
passion	1	2	2	1
pathetic statements	1	3	3	1
peers	1	3	3	1
People in My Network	1	13	13	1
perceived support by the network	1	12	12	1
Personal development	1	2	2	1
personal drive	1	7	7	1
personal gains by the network of learners	1	29	29	1
Personal learning due to participation in a network	1	12	12	1
platitudes	1	2	2	1
Problem solving and ask for help	1	6	6	1
Real-time interaction	1	3	3	1
Reasons for PLN	1	12	12	1
Reasons of learning (general)	1	3	3	1
Reflection and feedback often with peers	1	11	11	1
relying on others	1	14	14	1
reputation	2	6	5	0.6
resources	1	10	10	1
Roles	1	3	3	1
self-confidence	1	1	1	1
sharing	4	36	23	0.39
Social, informal interaction	1	5	5	1
Status	2	11	7	0.79
Stay in touch, connecting	1	5	5	1
Stay up-to-date	1	4	4	1
Support	1	3	3	1
trust, secure	1	3	3	1
Twitter	1	2	2	1
use network strategically	1	19	19	1
use of ICT	1	6	6	1