



Connectedness, Engagement, and Learning through Social Work Communities on LinkedIn

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ABSTRACT

Social networking sites have enabled a high connectedness leading to unprecedented interactive dynamics. Social workers are using these digital means and are generating communities of practice through which they cooperate and share information. Through netnography and analysis of social networking sites we have observed the presence, identity, and connectedness, and interaction patterns on LinkedIn of 170 social workers who worked at 41 organizations from specific contexts. Implicit communities were identified through various algorithms, thus analyzing leadership and cohesion of their members. Results show connectedness and interaction patterns that lead to the creation of communities of practice on LinkedIn based on social work domains and practices. The possibility of establishing and maintaining relationships on LinkedIn and applying social networking sites to social intervention as an innovative strategy to improve information exchange and cooperation between professionals and organizations is addressed in the discussion.

La conectividad, la implicación y el aprendizaje mediante comunidades de trabajo social en LinkedIn

RESUMEN

La mayor conectividad que ofrecen las redes sociales online ha posibilitado el auge de dinámicas interactivas inéditas hasta hace poco. Los trabajadores sociales están utilizando estos medios digitales, generando comunidades de práctica desde las que intercambian información y cooperan. Utilizando netnografía y análisis de redes sociales hemos observado la presencia, la identidad y las pautas de conectividad e interacción en LinkedIn de 170 trabajadores sociales que trabajaban en 41 organizaciones en un contexto determinado. Mediante determinados algoritmos hemos identificado comunidades implícitas, analizando la cohesión entre los miembros. Los resultados revelan pautas de conectividad e interacción que dan lugar a comunidades de práctica en LinkedIn en torno a dominios y prácticas de los trabajadores sociales. Se discuten las posibilidades de establecer y mantener relaciones en LinkedIn y la oportunidad de incorporar las redes sociales online a la intervención social como fórmula de innovación social que mejore el intercambio de información y la cooperación entre profesionales y organizaciones.

Social networking sites have progressively and exponentially increased connectedness between individuals and organizations, thus reducing social distances (Edunov et al., 2016) and enabling the development of unprecedented interactive dynamics. As observed by Boyd and Ellison (2007, p. 221) social networking sites are environments which aim at improving human relations that already exist in the offline reality, boosting expansive networks of weak ties. Social networking sites are “sites on the Internet that aim at allowing users to be in contact, to communicate, to share content, and to build communities” (Urueña et al., 2011, p. 12).

LinkedIn is a major social networking site that started in 2003 as a simple platform for job search. It has evolved over the years until

becoming the largest social networking site of professional nature in the world. Under the heading of “relationships matter” (LinkedIn, 2007), it comprises more than 645 million users worldwide (LinkedIn, 2019), 10 million of these users being from Spain, spending an average of 1.38 hours per day on social networking sites, from which approximately 17 minutes are spent on LinkedIn (Statista, 2018).

Users interact on LinkedIn through functions that favour self-promotion, participating in groups, exchanging work-related information, networking, following profiles, and building professional networks (Basak & Calisir, 2014). LinkedIn’s usefulness allows professionals to carry out complementary functions that they perform at their working environments on a daily basis, such as mediating and promoting

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relations in order to improve people's lives (Addams, 1910) and sharing information, both between professionals and with users (Ballesterero et al., 2013). Because functions of this type are facilitated by the usefulness of LinkedIn, we decided to analyse whether social workers are registered on this platform and if they connect with each other, thus building communities of practice and sharing information. For this purpose, we decided to study social workers who provide services related to the social-professional inclusion of users in a meso-specific context, that is, the city of Malaga, Spain.

Digital Identity on LinkedIn

Each profile on LinkedIn shapes an ideal portrait of users' professional identities (Van Dijck, 2013). LinkedIn invites users to spread information about themselves, fostering users' conscious self-promotion and unconscious self-expression. On LinkedIn, users are asked to highlight their specific skills, thus guiding users to build a summarised CV that emphasises their strengths. However, as it also happens on other social networking sites, the identities of LinkedIn users are not only built by users themselves through information provided willingly and the network's own activities, but also by connecting to other users on the network (Pempek et al., 2009). The explicit way in which users connect with each other is at the heart of social networking sites' functioning (Conole et al., 2011). In fact, LinkedIn encourages users to complete their profiles by including reviews from other users that may praise their knowledge (Skeels & Grudin, 2009). This increases the verification and validity of users' digital identities, what means that should any user present him or herself inappropriately or falsely, the people who know this user from offline contexts would realise that such user is not being truthful (Pempek et al., 2009). Control exerted by these ties decreases potential deviations between the offline and online realities shown. It also strengthens the social mirror effect, which refers to the idea that the online reality reflects the offline reality (Dunbar et al., 2015).

Connectedness on LinkedIn

LinkedIn is used to keep lists of contacts that users already know and whom they trust within their work environments. These contact networks are used to keep in touch and exchange professional information and references. LinkedIn's connectedness principle is to connect professionals. At present, LinkedIn provides an interface called "People You May Know" (PYMK), a highlighted tab on each user's profile which invites users to connect automatically with people that might be interested in knowing or might need to know (Van Dijck, 2013). This mechanism is tightly linked to the offline mechanism of group pressure, which also takes place between professionals with similar specific skills and experience (Quan-Haase & Young, 2010). Users who find potential contacts with whom they share interests feel encouraged to connect with these contacts through this mechanism (Ellison et al., 2011). Many of these new contacts on LinkedIn are pre-existing, since users already know each other in the offline reality and they simply activate these latent ties in a new online context (Haythornthwaite, 2002).

The degree of connectedness on networking sites is directly linked to users' access to content. Connectedness on social networking sites implies connection because at least a passive communication channel which gives users access to information shared by other users is established, whether there is interaction or not (Burke & Kraut, 2016). The benefit of connectedness on social networking sites is not only being able to share information but also active listening to what contacts share (Bakshy et al., 2012). The number of contacts users have on social networking sites determines the so-called bandwidth, defined as the amount of information which users are able to access based on their social connectedness (Stutzman et al., 2012). This bandwidth includes information from those contacts with whom users have direct ties and also allows them to reach, indirectly, information from third contacts.

Users' interest about certain information or the identification of shared interests with other users may lead to the creation of new contacts.

Interaction and Engagement on LinkedIn

LinkedIn users exchange information related to professional aspects (Eklinder-Frick et al., 2011) and interaction or the lack of it directly affect engagement dynamics (Leece & Campbell, 2011). Mutual engagement is described as a dynamic relation that is constantly being rebuilt (Bryson et al., 2009).

According to Burke and Kraut (2016), there are three types of interaction on social networking sites: (a) communications meant to be spread, such as a state of mind, which are addressed to a wide public; (b) specifically addressed and written communications, which consist of an original text written for a specific user, such as comment; and (c) "one-click" communications, such as "recommendations" on LinkedIn, which provide low-effort addressed feedback and which is shared on contacts' timelines.

A LinkedIn-type user will communicate directly with a core group of strong ties by sharing information through comments, private messages, or recommendations, while it will also follow a majority of weak ties passively by observing their new content (Burke et al., 2010). Every time a user clicks on "recommend" on LinkedIn, such content will be shared and visible for the user's contacts. One might say that this type of direct interaction plays an amplifying role regarding content that is "recommended".

Through social networking sites, "the interpretation and mediation of meaning occurs at the level of interaction, and these interactions represent explicit ties that bind people together" (Fresno-García et al., 2016, p. 24). These interactions are perceived as forms or support. The nature of the support provided on social networking sites can vary depending on the intensity of interactions. This intensity is closely associated with frequency of interaction. Higher intensity implies higher frequency of interaction, thus allowing the creation of strong ties that would provide emotional support (Greenhow & Robelia, 2009) and social support (Kim & Lee, 2011). Conversely, lower frequency of interaction with others leads to the creation of the so-called weak ties. Granovetter (1973) evinced through his theory of weak ties that non-redundant information in the context of embedded networks comprising strong ties is usually spread by those with whom the frequency of interaction is lower. In the context of social networking sites, weak ties are sources of support that provide information and advice that are more diverse (Ellison et al., 2007).

Communities of Practice on LinkedIn

In the context of LinkedIn, individuals and organizations create closer ties based on specific knowledge and practice, thus giving rise to communities of practice. Wenger (2006) defines these communities as "groups of individuals who share a concern, a set of problems, or a passion for a specific topic, and who further their knowledge and experience in this area through continuous interaction" (Wenger et al., 2002, p. 4). A community of practice defines itself by its members, their mutual engagement and the set of resources shared throughout time (Wenger, 1998).

Communities of practice are organised based on domain, community, and practice (Wenger, 1998). When these three elements work well together, the community of practice becomes a social structure that can develop and share knowledge. The domain represents a common ground where participants share ideas and knowledge, thus building a shared understanding, a meaning and a strategic relevance (Wenger et al., 2002). In communities of practice, members share and develop practices, learn from interactions with other members and obtain opportunities to grow at a personal, professional, and/or intellectual level (Lave & Wenger, 1991). The community is a group of individuals

who learn and interact together, thus building relationships that lead to a sense of belonging and mutual engagement (Wenger, 1998). Mutual engagement represents the interaction between individuals that leads to the creation of shared meaning on issues or a problem (Li et al., 2009). They are built through debate and conversation, giving selective sense to past and present experiences. Finally, practice is the specific knowledge that the community develops, shares, and keeps (Wenger et al., 2002).

A growing number of informal groups and networks create opportunities for knowledge exchange. Some researchers argue that a community of practice is analogous to a well-run network. Unfolding the network to show reciprocal ties and their interactions can be also of interest to provide an indication of the implicit communities involved in this endeavor, as well as demonstrating the lack of cohesion among most of the network (Norman & Huerta, 2006).

Wenger and his colleagues suggested that social networking sites can be identified as communities of practice (Wenger, 2006; Wenger et al., 2009). However, it is difficult to assume that social networking sites themselves can be communities of practice.

They are rather spaces where communities (or groups of individuals) can be hosted and whose interaction is equivalent to that of communities of practice. There communities can be of two types: explicit and implicit (Arora et al., 2012). Explicit communities are those to which users adhere voluntarily, such as participating in a group on LinkedIn. Conversely, implicit communities are those to which users belong based on their connectedness on social networking sites and to which users, occasionally, belong without realising it. Belonging to these communities arises from connectedness and interactions from social networking sites users with others, which is often determined by socialization and similarity factors from the offline reality (Dunbar et al., 2015).

Social Capital on LinkedIn

Belonging to such online communities generates a type of social capital that complements offline social capital, rather than substituting it (Wellman et al., 2011). As it occurs on all social networking sites, on LinkedIn, the more connections users establish with other users and organizations, the more social capital they will gather (Ellison et al., 2007). However, if several individuals comprising a social structure are not well connected with each other, such structure will not generate social capital (Burt, 2005). In the context of social networking sites, connectedness and interaction determine users' positions in the network, as well as the degree of leadership, influence, and access to information. More precisely, the higher number of connections a user has on LinkedIn, the higher leadership capacity, influence, and access to information this user will have. Intermediation positions also allow higher information control.

Burt (2005) states that in order to reach social capital, the structure needs to have a certain balance between homogeneity and heterogeneity. This balance is provided by the so-called closure and aperture mechanisms. Closure occurs in those environments where most of the members are similar, the same topics are talked over, and there is a tendency towards monolithic knowledge. This leads to 'bonding' social capital (Putnam, 2001), a type of social capital in which ideas and information flow between group members, based on trust between equals. On the contrary, aperture takes place when nodes move from a close group to another, thus bridging between the so-called structural holes and conveying new information and ideas to different groups, which gives rise to 'bridging' social capital (Putnam, 2001).

Lin (2001) notes, nonetheless, that accessing a specific social capital is of no use if such capital is not mobilised. He differentiates between access and mobilisation of social capital and points out that there are mobilisation strategies. He incorporates purpose as a strategic formula.

Access to social capital on social networking sites can be conditioned by users' connectedness patterns, while mobilising such capital depends at a greater extent on users' interactive implication.

Purpose of the Study

The purpose of the present study is to confirm whether certain connectedness and online interaction patterns can give rise to communities of practice on LinkedIn. To this effect, from January to June 2019, connectedness, interaction, and leadership patterns on LinkedIn from professional social workers who provided social services in Malaga (Spain) were analysed. Implicit communities of practice in the observed online structure were detected.

The hypothesis leading the above-mentioned analysis was the following:

Social workers who participated in this study have LinkedIn profiles and tend to connect and interact with each other, thus creating implicit communities of practice based on knowledge and practices shared in the offline reality.

Method

Participants

Social workers who provided Social Services in Malaga (Spain) and who had LinkedIn profiles were identified during 2018, until reaching a final sample of 170 professionals who worked for 41 organizations. Participants were found through the "data crawling" technique. During the netnographic procedure, data on the identities shown by social workers on their LinkedIn profiles were analysed. Analysing the sociodemographic and professional features shown by participants on LinkedIn and their interactions enabled the progressive identification of social work professionals.

Procedure

In order to comply with ethical criteria, a neutral profile was used. Such profile specified that it had been created for research purposes. Once professionals were identified, they were sent an invitation containing a message that explained the purpose of the study and requested their informed consent. Out of the total candidates, 85% accepted the invitation, which resulted in the final sample of 170 subjects. Direct communication from researchers with participants was avoided, as suggested by the Institutional Review of Boards (Solberg, 2010). During the process of extracting and analysing data looking into social workers' personal information was avoided (Reamer, 2013), thus ensuring confidentiality and anonymity of professionals and organizations involved in the study was respected (Kosinski et al., 2015). Likewise, ethical criteria regarding informed consent, confidentiality, and personal data protection were also complied with. The credibility, truthfulness, and limitations of the study on social networking sites were assessed according to ethical criteria from the NASW (National Association of Social Work, the Association of Social Work Boards, the Council on Social Work Education and the Clinical Social Work Association, 2017).

Netnography

Observation was carried out through netnography, which is defined as a set of methods to register and interpret digital environments and which tries to adapt traditional ethnography notions to the new technological environments of mediation (Hine, 2005; Kozinets, 2015).

This type of ethnology enables a better understanding of new research objects of digital societies and, in particular, those

phenomena derived from the globalisation of the Web 2.0 – social media, blogs, etc. – where collaborative, cooperative, and dialogic dynamics are increasing in presence and frequency (O'Reilly, 2006). The principles of netnography are based on the continuous immersion of netnographers in a place of communicative interaction (Hine, 2005). In order to carry out the observation, instead of observing from the corner of a street, as Whyte (1943) did in his masterpiece, *The Street Corner Society*, an ad hoc profile was created to observe and analyse on LinkedIn. Carrying out research on this type of digital contexts can be fairly beneficial. Social networking sites provide highly spontaneous information because users are the ones who provide information on their personal and professional identity willingly, based on their explicit contact networks and interactions.

The first stage of the netnography process was carried out by identifying relevant actors through data crawling. Key words and the PYMK mechanism were used in LinkedIn's browser to identify key actors. By observing posts and interactions between actors, focused on the object of the analysis, and applying the snow ball technique to this online context, other potential key actors were identified. Profiles of each actor on LinkedIn were subsequently analysed in order to determine whether their professional identities and trajectories matched the characteristics of the strategic sample of the study. Based on the "personal and professional identity" section information on the sociodemographic, affiliation, and professional career characteristics of participants was analysed.

Observing interactions that appeared in the timeline of the profile created ad hoc on LinkedIn allowed us to verify the identity of subjects. Creating an ad hoc profile made it possible for online interactions to come from the subjects observed. Being immersed in this online context gave meanings to interactions. A first test on the interpretations of symbols and patterns of interactions was carried out during this stage. These interpretations were shared with researchers and were iteratively analysed and discussed. Interpretations and interactions' meanings were not always agreed on, though, as the analysis continued, some consistency was found in the interaction patterns of each subject. Perceptions and intangibles were observed in these patterns, which were noted down and which shaped the identity of each professional and his/her role in the core of the implicit communities detected, as well as in the online structure analysed.

In parallel, the explicit relational articulation of each user on LinkedIn was analysed, in order to determine connectedness, since it provides information on who connects to whom. Based on the analysis of connectedness, which also appears in the "contacts in common" section of the LinkedIn profiles of each user, possible implicit communities between members were initially perceived. These communities were related to the meso-level characteristics of organizations in the offline reality and to professional trajectory of each subject. This method enabled the verification of how certain changes in the connectedness of some users responded to possible connectedness patterns of other users. This means that such connectedness patterns were replicated. The evolution of subjects' connectedness showed changes in interaction patterns. These changes were noted down, analysed, and discussed, thus identifying the concurrence of similarities between subjects, as well as changes in their roles and professional trajectories.

At a later stage, interactions were analysed, that is, who communicates with whom, whether this is through posts, comments, or recommendations. These interactions were reflected in the timeline and the "activity" section of each user. The procedure involved accessing and identifying the type of content shared on LinkedIn, as well as carrying out an introspective and reflexive procedure during which the environment culture and the meaning of symbols derived from users' behaviour patterns on this digital context were analysed. The netnographic analysis involved interpreting texts, images, photographs, videos, and other digital content linking to other websites such as blogs, Youtube, and other networking sites such as Facebook, Twitter, and Instagram. Netnography is considerably linked

to semiotic research because key images and symbols are interpreted in order to better understand the intersections of language (Bartle et al., 2013). For the purpose of better understanding the object of analysis, notes were taken on how participants communicated with each other (Emerson et al., 2011) as well as screenshot with first impressions were taken from communities, key events, relevant posts, and eventualities regarding the users observed. So as to minimize potential validity and reliability biases during the interpretation of interactions, the analysis was carried out by two people simultaneously, who debated on interpretations and agreed on the meaning of the content of interactions.

When categorising interactions, not only is shared content taken into consideration, but also languages and other forms of interactions are understood and symbols, messages, and every type of information each user shows on LinkedIn are unravelled. Some symbols allow the identification of intangibles, thus enabling the filtering of irrelevant data and getting closer to the online structure observed according to each implicit community. The dynamics of information, interactions, and roles of community members are valued. During this process, notes on similarities regarding the domain and practice of professionals were taken, which were subsequently and iteratively discussed by researchers. Based on certain perceptions, verifying which users and to what extent they actively shared content related to specific domains and practices was considered appropriate. Some of these users were observed to support each other through "recommendations" and "comments" and other were considered active observers. These observations were systematised and subsequently compared to the results from the analysis of interaction networks.

A part of this netnographic procedure was carried out through content analysis, based on the Grounded Theory (Glaser & Strauss, 2017). This comparative constant method consists of saturating information for its subsequent analysis, rather than aiming to the achievement of universal certainties. In order to carry out the saturation, content was deconstructed based on an iterative process through coincidences, oppositions, and variations. Based on the information extracted, conceptual categories that organised and differentiated the type of information obtained were established. This enabled us to obtain an organised classification based on the different types of content. Concurrently, interactions were analysed in order to assess whether they gave rise to informative, emotional, or instrumental support.

In accordance with our aim to detect and analyse implicit communities of practice, we paid special attention to content related to domains and practices. Domains that could be potentially common to users and which were liable to be identified were proposed, such as working in the same field (Counselling, Training, Intermediation and Entrepreneurship), working with the same collectives (migrants, people with disabilities, etc.), and belonging to the same organization (NGO, local institution, regional institution, etc.). These stages, as well as others such as the analysis of online networking sites and community detection, were intertwined and pierced one into another thus providing the real added value of netnography, which is its hermeneutic interpretation capacity. This means a capacity to see the whole in its parts, building a synthesis, that is, a representation of the research.

Social Network Analysis

Social network analysis allowed us to measure different reticular features of the social online structure observed. Different measures of centrality for the assessment of positions were used, both at individual and structural level. In order to analyse centrality, firstly, degree centrality was used, which is the number of actors to which one actor is directly linked (Freeman, 1979). Operationally, individual degree centrality was associated to level of connectedness of every

actor within the framework of the social structure observed. Secondly, betweenness centrality was also measured. This metric indicates the number of intermediaries that must be used in order to connect with others (Brandes, 2001), thus reflecting intermediation positions and network control. Furthermore, closeness centrality was also obtained, which is defined as the average distance from one node to the other nodes in the network. Closeness emphasizes the average distance from one actor to others, focusing on geodesic distance (Freeman, 1979), that is, the shortest path an actor needs to follow to reach the other actors in the network.

In order to analyse cohesion, the density of the network was firstly observed, which is the proportion of all ties that can be theoretically present (Wasserman & Faust, 2013). For the purpose of assessing how embedded nodes were with regard to neighbouring nodes, the clustering coefficient algorithm was used. Latapy's (2008) algorithm defines clustering coefficient of a V node as the probability for any pair of nodes randomly chosen to be neighbours of V and linked between them. To know if the structure was cohesive to a greater or lesser extent, special attention was paid to the distribution of positions held by professionals in the structure. Secondly, the short average distance separating any node from the rest of nodes in the online structure observed was measured. Thirdly, in order to determine whether the aphorism that the friend of my friend is my friend, the transitivity measurement was used. In the context of several relations, it indicates if it is possible to expect that when A and B have a relation and B and C do too, then A is likely to have a relation with C . When networks have high levels of these triads, then the structure is comprised of nodes that are highly embedded.

Networks of interactions were also analysed, verifying who interacts with whom regarding actions such as providing information, commenting on it or recommending on LinkedIn. This provided information on the existence and types of communities of practice. The content of interactions and their patterns observed in LinkedIn users were analysed in order to know whether there was a sense of belonging and commitment. Once these interactions were counted, centrality measures were used in order to represent them in the network of interactions. Because interactions are addressed, they can be inbound or outbound. The indegree centrality is the sum of the interactions received by an actor from other actors in the network. On the contrary, the outdegree centrality refers to the sum of interactions emanating from actors in the network towards other actors.

On the other hand, the frequency of interactions performed by each professional was related to the intensity of commitment. In terms of networks, the intensity of interactions between social workers indicates the type of ties between them. Higher frequency of interactions means stronger ties and, visually, of higher size. Conversely, the less frequency of interaction there is between two professionals, the weaker and visually thinner the ties.

Community Detection

In order to detect implicit communities of practice in the online social structure observed, the modularity algorithm was used (Girvan & Newman, 2002). This method consists of decomposing the analysed social structure into communities. This algorithm initially considers all nodes in isolation to determine, at a later stage, whether ties are within a community or between a community and the rest of the network. It follows a cumulative strategy. Conglomerates are formed in succession based on the higher increase of modularity. The process is interrupted when the maximum possible modularity between pairs is reached. The way in which this algorithm optimizes the division of communities makes it empirically reliable. It adjusts based on the degree centrality, that is, based on the possibility that a tie might exist between two nodes, which is proportional to its degree centrality. This optimization is particularly relevant for the object of this study,

because degree centrality is related to the number of contacts each user has. On social networking sites this measurement is related to the level of connectedness, which also appears to be linked to the leadership, influence, and access to information each social worker might have in the framework of the sample analysed on LinkedIn. Each time a LinkedIn user uses the "recommend" function, such content will be directly linked to the user's contacts. Based on this interpretation pattern, the centrality degree of each user determines the access and the scope of the domain and the practice, which are key in the creation of communities of practice.

Once implicit communities of practice on LinkedIn were detected, the reasons why professionals connected with each other was analysed and combined with the netnographic analysis. The purpose was to confirm whether connectedness is conditioned by the ideal characteristics of the creation of communities of practices postulated by Wenger (2006): domain and practice. The netnographic analysis of the different levels of domains and practice shared by professionals was key to interpret how communities are formed, thus allowing us to determine the degree of coincidence concerning the domain and practice of each community.

Both the measurements for social network analysis and community detection were developed and obtained with the Gephi application (Bastian et al., 2009), version 0.9.2.

Non-Parametric Correlations

The relation between the level of interactions and the centrality and cohesion measures – represented by social workers' degree centrality and transitivity respectively – was analysed through Spearman's rho non-parametric correlation, developed with the application SPSS, version V.20. This correlation was used because the parametric assumptions that Pearson's correlation would require could not be guaranteed.

Results

Results linked to the three main pillars of the present study are presented in this section: digital identity and analysis of interactions content, connectedness networks, interaction networks, and community detection.

Digital Identity and Analysis of Interactions' Content

During the netnographic analysis, the identity and behaviour patterns of social workers in the context of LinkedIn were gathered, analysed, and interpreted. All participants are social workers; 67% of the total participants are women and 43% are men. They work for three types of organizations: the public administration, an NGO, and a private company. Participants work based on four segments: counselling, training, intermediation, and entrepreneurship. They also work with collectives of unemployed users with specific characteristics: unemployed users, people with disabilities, migrants, ethnic minorities, women who are victims of gender violence, etc. The excess of positivism expressed by their professional identities and interactions was surprising. Descriptions such as "social worker, coach, and connector of people and ideas" or "architect of dreams" reflects roughly how participants presented themselves on LinkedIn. There is also remarkable self-promotion: "I am conveying youth labour workshops from a motivational approach" or "Here you can find my updated CV".

At the interaction level, remarkable support was observed to be provided between professionals, by exchanging reviews and sending motivational and thankful messages, such as "She is a great professional" or "I invite you to read this article from our colleague" or "Excellent post. Thank you for sharing it", and motivational

messages are repeated: “If you really want it, you can do it”, “You can choose the course of your life” or “Initiate a new path to success, we will support you”. Some support with affective nuances was also noted, with comments such as “We were utterly moved” or “How nice is to see dreams come true”. The positivity in these messages is, to a certain extent, excessive. Negativity is avoided and there is no criticism nor demands for the practice to improve. Irony, sarcasm, and humour do not appear on posts and comments. It seems as if this digital context is used for professional promotion and the promotion of the organizations for which they work. Posts such as “Amazing workshop organised by organization X, always achieving excellence”. We are unsure if there is a pattern established by organizations for professionals to behave this way, as the cognitive involvement of employees is absolute. Based on the comments shared by the employees, it is possible to determine that some of them would like or would be interested in working for a different organization.

The contents of posts included strictly professional topics. We were surprised by the fact that there was no other topic commented on. It seems like an unnatural, artificial scenario, which casts the idea that they feel observed by colleagues and/or hierarchical superior from the organizations they work for. Personal photographs are not shared, there are only professional photographs in work environments, meetings, training courses, etc. Tools and work models and approaches are shared with posts such as “What is the best way to work our self-knowledge? With a tool like CANVAS!”. It was also observed that content shared is often addressed to integration policies’ users, rather than between professionals.

From January to June 2019 a total of 4,509 interactions were registered, from which 849 were original posts, 3,546 recommendations, and 114 comments. Interactions were performed by 49 professionals (29% of the total sample), who comprise the most relevant core of the community of practice. However, because recommendations are mediated by connectedness, when a LinkedIn user performs this interaction, the content this user recommended is automatically shared in his/her profile and it is therefore visible to all his/her contacts. The way this function works on LinkedIn broadens the spread and access to content, so those participants who did not interact actively appear as non-participating observers.

The most common posts shared included counselling resources (tools for counselling, motivation, etc.) and amounted to 846. Information on training activities was also shared (conferences, fairs, courses, etc.) in 830 posts. Based on the meaning of each post or comment, 95% of interactions (3,401) were informative, only 145 interactions included emotional support, and none instrumental. After comparing data on prominent communities with levels of information, we found a general pattern that indicates that the greater the size of the community, the higher the interaction of its members (Figure 1).

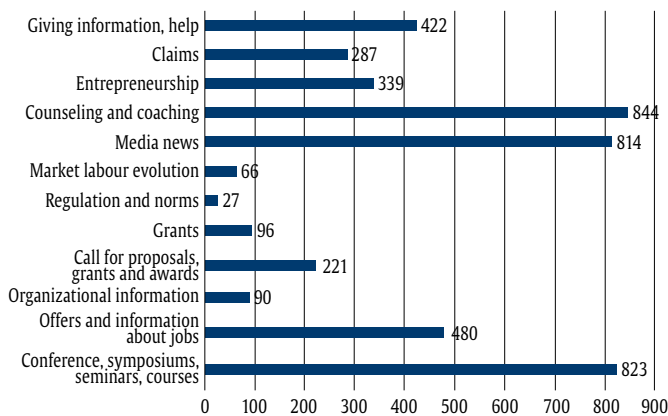


Figure 1. Types of Information Shared. Source: Extracted from LinkedIn.

Those participants who work in the area of counselling showed the highest levels of interaction. On the contrary, those who work for the public administration showed the lowest levels of interaction.

Connectedness and Interaction Networks

The results from the relational features analysed defined the morphology of the different connectedness and interaction networks.

On one hand, the connectedness network (Graphs 1 and 2 of Figure 2) shows who connects with whom and it reveals 170 nodes that are connected to the rest of nodes through 5,815 ties between them. The average degree centrality was 35.

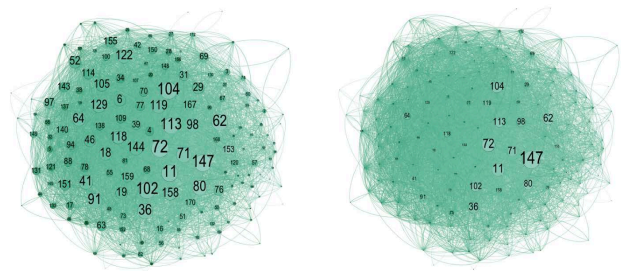


Figure 2. Connectedness based on Degree Centrality (Graph 1) and Betweenness Centrality (Graph 2).

This means that the average information bandwidth reached an average of 21%; 28% of participants exceeded this average online connectedness and are represented in Graph 1 of Figure 2 in bigger size. Graph 2 of Figure 2 shows those nodes that stand out due to their level of betweenness, which are represented in bigger size. These nodes are leaders and information intermediaries and are able to convey non-redundant information from one group to another.

The analysis of cohesion evinced the distances between professionals. The maximum distance between any pair of nodes was 4. Conversely, the minimum distance scored 0, thus indicating which nodes remain in the periphery of the network. The average distance was 1.88 leaps. Transitivity is reflected by the total number of triads, 26,362. Density reached 0.22. Denser and less dense areas were detected. The clustering coefficient draws these areas with darker colours. The average value of the clustering coefficient was .60 during the period analysed. This value can vary between 0 and 1 reached an optimal level. This means that the community of practice observed appears highly embedded.

On the other hand, three types of interaction networks were analysed: network of posts, network of recommendations and network of comments. Figure 3, 4, and 5 show these three networks.

The network of posts reflects who shares posts with whom. It measures how many times each shared post reaches each node. It is represented in a weighted way, that is, the more often a node shares a post with other node, the stronger the ties linking them. Based on the size of each node, Graph 1 of Figure 3 shows which are the ones sharing most of the posts. This is represented through the level of outdegree. Those nodes that have bigger sizes are those who have higher levels. In Graph 2 of Figure 3 it can be observed which nodes have higher levels of indegree, which are represented in bigger size.

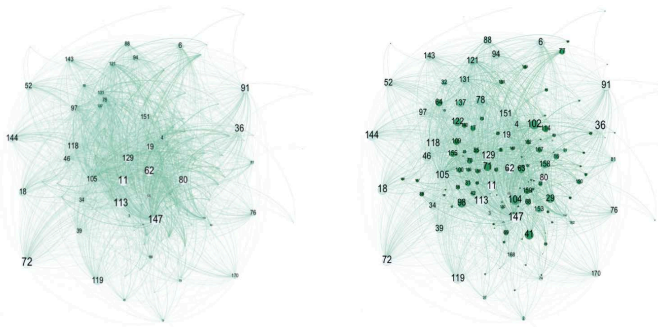


Figure 3. Graphs of Posts according to Clustering Coefficient and Indegree (Graph 1)/Outdegree Centrality (Graph 2).

The modularity algorithm was applied to the network of recommendations, with an optimal result of 0.471. Five communities were detected. All communities detected reached very high ratios of belonging to the same domain. The level of similarity varied between 80% and 95% in each community. It was therefore evinced that if professionals share the same domain they are very likely to interact on LinkedIn, thus forming implicit communities. The community in light-blue is formed only by professionals who work in the entrepreneurship domain, while the yellow is composed of professionals who work in the counselling domain. The green community is comprised of professionals who work in training. This means that identifying themselves with equals was a reason to connect on LinkedIn. Likewise, professionals who work with specific collectives were also connected between them. The case of professionals who work with people with disabilities (red community) was very evident, as well as those who work with migrants (blue community). However, ties with scarce similarities were also detected, the so-called weak ties. In some cases, these ties have the ability to act as bridges due to their high ratios of betweenness. Those nodes represented in bigger sizes stand out due to their ability to recommend content. Conversely, nodes with high indegree, those that receive more recommendations, are represented with bigger sizes in [Figure 4](#).

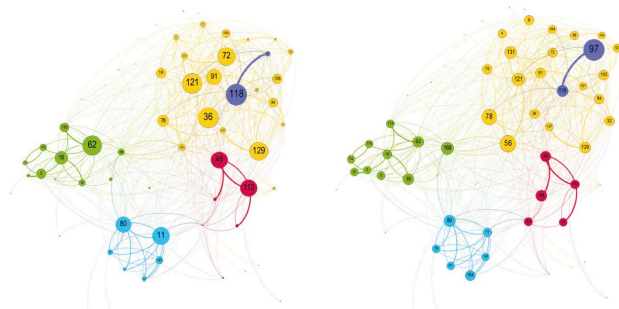


Figure 4. Graphs of Recommendations according to Modularity and Outdegree (Graph 1)/Indegree Centrality (Graph 2).

Despite active participants only represent 29% of the total sample, the expansive effect of recommendations can be seen in [Figure 6](#). The total number of indirect interactions was 107,764. The average of interactions based on this number was 107 per participant. The size of nodes varies depending on the indegree. This means that the more interactions based on the effect of recommendations users receive, the larger the node will be.

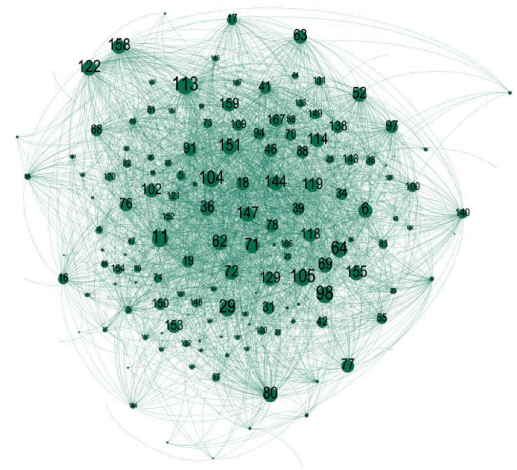


Figure 5. Graph of Undirected Posts Based on Recommendations to Posts, according to Indegree Centrality.

Regarding the network of comments, the modularity value is 0.559. There were 5 communities detected and they are related to different types of similarities. For instance, all nodes in the yellow community belong to the same organization. All nodes in the green community work in the same domain of intermediation and the light-blue community comprises nodes that work in the counselling domain. The size of nodes varies based on their outdegree in Graph 1 of [Figure 5](#) and indegree in Graph 2 of [Figure 6](#).

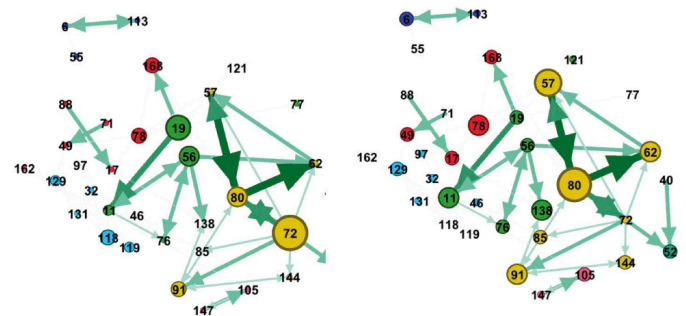


Figure 6. Comments according to modularity and outdegree/ (Graph 1) indegree centrality (Graph 2).

Analysis of Correlations between Interactions and Social Network Measures on LinkedIn

[Table 1](#) shows Spearman’s Rho non-parametric correlations between interactions and network measurements on LinkedIn. Calculations were exclusively carried out on the 49 participants who performed interactions – 121 participants did not perform any interactions and were therefore removed from the analysis. Relations between degree centrality and transitivity relate positively to all interaction variables. However, this relation is only statistically relevant regarding comments. Clearly, an increase in degree centrality (connectedness) and transitivity (cohesion) results in an increase in original comments and posts. The more social workers connect in triads and the better positions they hold in the network in terms of transitivity, the more actively they participate, particularly regarding comments.

Table 1. Spearman's rho Correlations between Interactions and Network Measurements on LinkedIn

	Degree	Transitivity
Original posts	.058	.043
Posts based on recommendations	.076	.080
Comments	.399**	.378**
Total direct interactions	.104	.105

** $p < .01$.

Discussion

It must be noted that interactions have been analysed by observing the interactions of each user that could lead to the creation of an implicit community, rather than looking for the thread of interactions of an online group, which is a type of explicit community. We focused on those communities to which users might belong without being aware of it and which are created as a reflexion of offline socialization patterns and similarities (Arora et al., 2012; Dunbar et al., 2015).

Professionals present their identities in an excessively positive manner. Participants seem hyperactive on LinkedIn, always doing things, meeting deadlines, and making the most of their time at work. Their commitment is reflected in their interactions, which were only performed by 29% of participants. This group formed by 49 social workers is the core of the community of practice, the rest being non-participant observers who form the public. This can be depicted as an analogy of what occurs in the offline reality. For instance, attending a meeting without participating. This means that the level of mutual commitment has considerable room for improvement, particularly in the domain of the public administration. Participants who work in the public administration were the least involved, perhaps because they have more resources at their disposal.

The effect of interaction mediated by connectedness broadens the commitment of the community's core towards the rest of members. It seems that the similarity between the "recommend" function on LinkedIn and "likes" on Facebook has been well used by LinkedIn's algorithms, as it multiplies interactions. This type of interaction, mediated by connectedness, makes users think that when they share a post on LinkedIn it will reach all his contacts, without being aware of the actual scope of that post should it be recommended by any of his/her contacts. This pattern allows social workers to access information about different domains and practices leading to a type of learning that creates knowledge, which is the previous state for innovation.

The set of resources shared by active professionals reflected their professional identities. Users shared, commented, and recommended content tightly linked to their professional domains, which in this case, roughly speaking, is the social and labour inclusion of the users they work with. Professionals support and strengthen each other through recommendations, particularly those who share the same domain and practices. They also write comments to each other, which shows how often professionals who work in the same areas interact with each other, perhaps because they feel more comfortable with colleagues they know.

Domain and practice are the backbones of interaction. Implicit communities detected confirm the influence of professional domains (Wenger, 1998). Working in the same field (counselling, entrepreneurship, etc.) or with the same collectives (migrants, people with disabilities, etc.) favours a tendency towards higher online interaction, thus conforming implicit homogeneous communities, which comprise members who work in the same domain (e.g., counselling professionals who exchange job offers). These communities are implicit, that is, they are formed based on the connections and interactions that occur on LinkedIn whether their members are aware of it or not. Communities formed according to recommendations and comments show high levels of superposition with the offline reality, which strengthens the social mirror effect.

This effect proves that online connectedness is a faithful reflexion of socialization in the offline reality (Dunbar et al., 2015). In the case studied in this research, it is possible to assert that socialization that occurs based on professional activities in the offline reality affects how social workers interact on LinkedIn.

The online structure analysed appears governed by implicit communities with dense groups that are connected, which have high cohesion levels and in which all members know each other. These groups tend to closure and give rise to bonding social capital. In these groups, the trust generated between professionals who share domain and practice favours a sense of belonging and commitment. They share and develop practices, sharing the same views and meanings, learning together from their own interactions, and accessing opportunities for professional development. In fact, a correlation between connectedness and interaction was proved, particularly through recommendations and comments. However, this type of capital, which is reflected in interaction networks, provides monolithic knowledge (Burt, 2005).

Professionals better positioned for greater spread of information were identified based on their intermediation positions. These professionals establish bridges between communities (Burt, 2005), thus contributing to the creation of communities that are more liable to include members willing to cooperate and accept and spread new ideas. Communities that incorporate this type of members would be more heterogeneous and, as noted by Sennet (2008), change of domain would be likely to happen, that is, connections that are unlikely to happen a priori. However, despite having better positions to access information and spread it on social networking sites, these bridging nodes do not necessarily always make the most of such potential. In order to do so, information must be not only accessed but mobilised strategically (Lin, 2001), activating latent ties based on the knowledge about each professional's connectedness and interaction and the tendency to closure of certain communities.

Limitations of the Study

In this case study there is only a subset of social workers who are more active on LinkedIn than the rest. Perhaps, it would be convenient in future research to broaden the range of the sample in order to develop other statistical proof that would strengthen the results. However, a balance should be guaranteed in this sense, since broadening the sample might make the netnographic analysis difficult.

Furthermore, because the nature of LinkedIn involves a specific type of behaviour where active display and observation prevail compared to direct interaction, the possibility of analysing this object in other online networking site such as Facebook or Twitter is considered because direct interaction is often higher in these networking sites.

Conclusion

Implicit learning communities are created on social networking sites based on connectedness and interaction patterns. These patterns are influenced by similarities and common interests on professional domains and practices that users share with other professionals. Digital platforms like LinkedIn are trying to be less self-promotion showcases and become tools for professionals to share resources and apply them to specific domains and practices.

Today, only being able to access information is not enough, individuals must know how to differentiate between reliable and unreliable information. For this purpose, it is particularly important for social workers to be aware of the need to work together to increase their abilities to heal and create social capital on social

networking sites. Using these tools strategically is a challenge for both organizations and professionals. The commitment shown by the core of professionals of the study sample is remarkable. Their efforts to share and cooperate regarding domains and work practices extend to the other users, mainly thanks to LinkedIn's "recommend" algorithm. This spontaneous commitment, which probably grew in these professionals responding to an interest in presenting themselves as dynamic persons, must be mobilised strategically for it to have a greater impact. Being more and better connected can contribute to social workers' higher involvement and learning through communities of practice.

This challenge must be addressed as it is questioning social work organizations' strategic planning abilities as well as social workers' commitment. Social networking sites can be used to share information between professionals, but we must not forget they also allow social work professionals to communicate and share information with their users. Many of these sites' functions can be used to improve users' relations and communities and improve their abilities to exchange information.

Conflict of Interest

The authors of this article declare no conflict of interest.

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