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Analyzing informal learning patterns in Facebook communities of international conferences

Carlo Giglio* & Roberto Palmieri

Department of Mechanical, Energy and Management Engineering, University of Calabria, Via Pietro Bucci, Building 42/C, 87036, Italy

Abstract

This paper is geared to analyze learning interactions between members of Facebook communities. In particular, this study considers the online dynamics occurring in academic communities associated with international conferences. The data collection process covers 40 days of pre-event activities within the conference-related Facebook community, and aims at elaborating and interpreting such data in order to provide useful information on how to create an online breeding environment for such international events.

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1. Introduction

Nowadays most of socio-economic dynamics of the global community are strongly influenced by knowledge, which is one of the resources playing a leading role on the global scene in terms of orientation of economic actors towards economic growth and societal development paths (Yusuf, 2009, de Castro, Rodrigues, Esteves & da Rosa Pires, 2000; Burton-Jones, 2001; Iammarino, 2005; Palmieri & Giglio, 2014). Knowledge acts as a key resource in the starting phase of many creative and innovative processes by enhancing productivity and fostering competitive advantages (Drucker, 1992; Sawyer, 2006; Macey-Bruges, 2001; Di Pietro & Anoruo, 2006; Takeuchi, 2006; Palmieri & Giglio, 2014). In turn, learning is worth the growing attention of the academic community due to its socio-economic value for both organizations and individuals (Allen & Seaman, 2007). It is defined as the way knowledge is handed

* Carlo Giglio. Tel.: +39-0984-494775; fax: +39-0984-494775.
E-mail address: carlo.giglio@unical.it

over between individuals (Fahey & Prusak, 1998; Tuomi, 1999). It concerns a quota of teachers' knowledge, which is filtered and acquired by learners depending on their needs and cultural background (Alavi & Leidner, 2001). Twigg (1994) includes in the definition of learning also those changes occurred overtime about society's expectations, attendance patterns, institutional structures and teaching/learning approaches.

Despite the growing attention paid to knowledge and learning, a low number of studies focus on informal learning (Aramo-Immonen, Jussila & Huhtamäki, 2014). Moreover, most of the studies concerning OSNs do not involve the analysis of learning dynamics. Therefore, this study hopes to achieve an in-depth understanding of informal learning dynamics between members of Online Social Networks communities. In particular, it is geared to provide a better analysis of such dynamics in conference-related contexts. Hence, the aim of this work is providing field scholars with a more detailed study of informal learning in OSNs as well as bringing to light in advance participants' research lines and identifying those sub-networks of academicians with professional interests in common. This way, conference organizers could trigger activities devoted to ease participants' networking and to improve their satisfaction, since they would start establishing relationships with their peers before the starting of the conference. Finally, a further objective of this work is helping defining in advance conference hot topics by analyzing OSNs activities.

Authors discuss below the main theoretical concepts about informal, non-formal, formal, intentional and accidental learning processes. In Section II, the main objectives of the study are briefly explained. In Section III, the methodological approach is detailed. In Section IV, results are deepened by analyzing explicit online social media activities. Section V concludes about possible limitations, future research efforts and cross-sectorial applications.

1.1. Theory about learning and related research

Informal learning is a non-structured and flexible cognitive effort performed in informal contexts. It includes discussions, talks, presentations, information, advice, guidance, dreams, arts, culture, ideas (Jeffs & Smith, 2005) and is not associated with well-defined goals set in advance. It is a learning-by-experience process generating continuous learning opportunities (OECD, 2010). It has also the highest business value since it ensures the achievement of competitive advantages and productivity growth of firms (Bancheva & Ivanova, 2015). About 75% of overall learning efforts happen in informal contexts and in a flexible way (Bancheva & Ivanova, 2015). Emerging informal learning patterns depends on evolved learners needs (Fahey & Prusak, 1998; Tuomi, 1999), learning environments, supporting technologies and society's expectations (Alavi & Leidner, 2001; Twigg, 1994). Hence, new learning approaches should be defined in order to face today's high-pace development (Mosher, 2004a; Mosher, 2004b). Fahey and Prusak (1998), and Tuomi (1999) emphasize how informal learning may be related to both unconscious/unintentional and non-structured intentional/conscious activities. It may concern "life-wide learning" - i. e. "andragogy" -, "adult learning" (Reischmann, 1986; Reischmann, 2004a; Reischmann, 2004b; Reischmann, 2011), professional, organizational, intentional, unintentional, hidden, small scale and incidental learning (Reischmann, 1986). Most of adult learning activities are incidental - i. e. "en passant", "learning in passing" - (Reischmann, 1986) like in conference-based contexts (Gann & Salter, 2000; Hobday, 2000). In turn, informal learning proves to be a non-ordinary/non-routine/project-like activity (Davies and Brady, 2000). Nonetheless, conference attendees may be interested in realizing comparable researches with similar research methods and interests, thus, retracing periodically the same learning dynamics (Aramo-Immonen, Jussila, & Huhtamäki, 2014). Also organizers tend to re-use patterns, programs and structures of past editions (Aramo-Immonen, Jussila, & Huhtamäki, 2014). In conclusion, conferences are informal learning efforts, despite some routine exceptions (Popper & Lipshitz, 1998; Prencipe & Tell, 2001).

Non-formal learning is a somehow structured process with goals set in advance (OECD, 2010; Conner & Clawson, 2004; Conner, 2004; Olaniyi, 2015). It may be related to both intentional or structured accidental activities. It is a mid-way learning combining informal and formal efforts (OECD, 2010) in order to develop socio-economic and political skills in adult learning contexts (Olaniyi, 2015; UNESCO, 1997), where cognitive processes should be nurtured (Cropley, 1979), together with the self-fulfillment of learners (UNESCO, 1997), without any formal and legal compulsions (Okedara, 1980; Radcliffe & Colleta, 1989). Moreover, individual experience influences non-formal learning dynamics and learners are considered as teaching partners (Fahey & Prusak, 1998; Tuomi, 1999; Olaniyi, 2015) in a "cafeteria system" (Nyerere, 1979), where their knowledge needs are satisfied irrespective of their learning purposes. Hence, non-formal learning is different from conference-based learning (Aramo-Immonen, Jussila, & Huhtamäki, 2014; Popper & Lipshitz, 1998; Prencipe & Tell, 2001) and is worth being considered in this work.

Formal learning concerns a hierarchical and highly organized process. It allows individuals to develop new skills, competences and knowledge (OECD, 2010). It is intentional and has clear objectives set in advance. It may include meetings, classes and e-learning in formal contexts whereby organizers and teachers perform planning, steering and controlling tasks (Learning Guide, 2004). Hence, the aforementioned variants of learning are mutually exclusive. Sometimes the need of adopting mixed-learning programs emerges (Learning Guide, 2004). Some empirical studies (EDC, 1998; Skule & Reichborn, 2002) in multinational companies in Norway and in the United States highlight that formal and informal learning often coexist: one hour of formal learning is combined with four hours of informal activities, thus, justifying the “80/20” (Raybould, 1995; Dobbs, 2000; Lloyd, 2000; Vader, 1998) and the “70/20/10” rules (Eichinger & Lombardo, 2010). Formal efforts are compliant with the “spending-outcome paradox” (Cross, 2003a): firms use their financial resources devoted to learning mainly for formal programs. Nonetheless, formal learning has the least effects on knowledge growth, productivity and competitive advantages (Cross, 2003b). Only 25% of skills and knowledge involved in routine tasks can be associated with formal learning (Grebow, 2002; Coomey & Stephenson, 2001; CapitalWorks, 2000). In conclusion, the (predominantly) unstructured process of academic conferences is not compliant with formal learning. Hence, the latter will not be considered in this study.

Intentional and accidental learning are strictly tied by a mutually exclusive relationship. Intentional learning activities are characterized by an explicit learner’s goal (Bancheva & Ivanova, 2015), thus, include different variants of learning processes (Fahey & Prusak, 1998; Tuomi, 1999; Alavi & Leidner, 2001; Twigg, 1994; OECD, 2010; Conner & Clawson, 2004; Conner, 2004; Olaniyi, 2015; Reischmann, 1986; Reischmann, 2004a; Reischmann, 2004b; Reischmann, 2011), provided that the process is intentionally accomplished. In conclusion, intentional learning should be considered in this research since it is a cross genre of learning embracing also the informal one.

Unexpected/Not intentional knowledge acquisition concerns accidental/incidental learning (Bancheva & Ivanova, 2015). Its outcomes may come from any settings, independently of whether the learning context is informal, non-formal or formal. UNESCO (2005) states that it is a “random learning” process, and it is not organized. Knowledge and skills coming from incidental learning are often required in order to perform job tasks (Kerka, 2000; Cahoon, 1995; Baskett, 1993; Rogers, 1997) and may be acquired by means of social interactions (Baskett, 1993; Rogers, 1997; Leroux & Lafleur, 1995; van den Tillaart, van den Berg, & Warmerdam, 1998). Accidental processes may help also deepening existing concepts under a different perspective - e. g. “critical personal experience” - (Reischmann, 1986; Reischmann, 2004a; Reischmann, 2004b; Reischmann, 2011) as it may emerge from teacher-learner or learner-learner interactions (Marsick & Watkins, 2001; Gruber, Mandl, & Oberholzner, 2008). Again, accidental learning emphasizes a partial overlapping with informal learning. Hence, it is worth being considered in this paper.

2. Objectives

The main objective of this work is deepening the informal learning dynamics occurring between conference participants by analyzing pre-event interactions in OSNs communities. In this paper, authors have focused on an international academic community, whose activities represent the end result of the process triggered by event organizers. A further goal of this study is nurturing a favorable setting around the conference in order to stimulate participants to get acquainted in advance with each other and to foreordain sub-groups of researchers sharing the same interests. Moreover, this research work is geared to fill the gap existing in literature about informal learning and its dynamics occurring in OSN communities. Finally, this work aims at providing conference organizers with target information, which can be used in order to achieve a higher success rate and to improve their events.

3. Methodology

The research method focuses on one of the main peculiarities of conference settings that is the emergence of knowledge as the end result of cognitive conflicts among learners (Engeström, 2000). Such knowledge generation, upgrading and sharing processes arising within conferences are fostered by means of deliberate stimuli coming from event organizers. Despite such efforts are carefully planned and performed by conference organizers, participants may reject the importance of taking part in such processes or may even miss the need of developing or deepening hot knowledge topics well before the starting of the event. Hence, such efforts may be nullified and learners may be jointly responsible for their behavior (Aramo-Immonen, Jussila, & Huhtamäki, 2014). However, both planned triggers and

learning settings have an influence on behavioral patterns of attendees. Emerging technologies may provide a significant contribution in order to entangle participants and make them take on an intelligent behavior. As a matter of fact, OSNs communities facilitate attendees to give their ideas and concepts even more clearly than in non-virtual contexts (Aramo-Immonen, Jussila, & Huhtamäki, 2014). Hence, conference managers started adopting such technologies in order to foster informal learning processes in academic events (Jussila, Huhtamäki, Kärkkäinen, & Still, 2013). Recent studies (Palmieri & Giglio, 2015a; Palmieri & Giglio, 2015b; Palmieri & Giglio, 2015c) show how the analysis of OSNs activities contributes to steer organizers towards the definition of specific hot topics, which will be likely developed during the event, thus, planning in advance most of learning dynamics of the conference.

The research method adopted in order to perform an empirical analysis is based on a dataset extracted from a conference-related Facebook community (Card, Mackinlay, & Shneiderman, 1999; Benbasat, Goldstein, & Mead, 1987). Afterwards, such data have been visualized and analyzed by means of ad hoc tools (Ware, 2004) during a period of 40 days. The aforementioned research methodologies are coherent with the data science research approach (Hey, Tansley, & Tolle, 2009) and the data gathering and elaboration techniques (Davenport, 2014). The case study analyzed in this paper takes into account the RSA Conference 2016 (hereinafter RSAC) to be held at the Marina Bay Sands in Singapore, 20-22 July 2016. Organizers plan and perform online activities before the starting of the conference on the Facebook community “RSA Conference” (Facebook ID 70343649637). The event is annually held in a different location, thus, involving partially different sets of international researchers, practitioners, experts and companies. Such an international setting brings different cultural views and thoughts about the main conference topic and aims at developing collaborations and professional networks endowed with a transcultural value. From a methodological perspective, “RSA Conference” members are more than 20,000 and represent a highly connected quota of people interested in the conference topic. Moreover, they are characterized by a widespread inclination toward informal learning. Again, data gathering and elaboration processes are applied on a representative sample of data, coherently with other empirical studies (Palmieri & Giglio, 2015a; Palmieri & Giglio, 2015b; Palmieri & Giglio, 2015c). The data collection process is performed through NetVizz v1.3. In particular, three modules are utilized: “page data”, “page like network” and “search” (Rieder, 2013). NetVizz allows to collect data for research purposes and is a very reliable data extraction tool. The “page data” module is utilized in order to extract data about “posts by page and users” for 40 days (April 17th-May 26th, 2016), while the crawl depth of the “page like network” module is set equal to 1. Collected data can be elaborated by most network analysis software (Rieder, 2013) like Gephi (Bastian, Heymann & Jacomy, 2009), which was utilized in this study because of its suitability for research activities, high-quality and wide range in terms of algorithmic solutions and filters, customization options, flexibility, scalability, WYSIWYG and user-friendly software (Palmieri & Giglio, 2015a; Palmieri & Giglio, 2015b; Palmieri & Giglio, 2015c). The aforementioned data about the queries ensure transparency and reproducibility of this study.

4. Results

Gephi identifies 34,733 nodes and 53,487 edges. The graph is directed. Density within online social networks is a key factor in order to determine how close the graph is to being complete. Graph density measure provides a value equal to 0.000. Such a measure shows a lack of connection among the more than 20,000 likers of the Facebook page at hand. This may reveal how planned triggering activities did not lead to improve the user engagement before the starting of the event. However, further data elaboration and interpretation processes are required in order to draw conclusions. In fact, quality of user interactions is worthy of attention in the case study at hand.

The study deepens further such issues by analysing also strongly and weakly connected components (Tarjan, 1972), hereinafter SCC and WCC, respectively. WCC are 9, SCC are 34,733. The integrated analysis of graph density and connected components measures emphasizes the existence of a number of sub-groups standing alone. Moreover, such an evidence is even more clear if compared to the analysis of the previous year, since in 2015 WCC were 20 and SCC were 900 (Palmieri & Giglio, 2015a; Palmieri & Giglio, 2015b; Palmieri & Giglio, 2015c). Hence, organizers were not able to involve newcomers and to integrate old and new sub-networks. The other side of the coin shows strong intra-component connections. Finally, organizers are not able to involve all users at the same time and with the same triggering activities. This means that they are ineffective and inefficient since they are obliged to perform different social media activities, each of them having a specific target audience restricted to one (or a limited number of) sub-groups. An additional question is the possible overlapping between online sub-groups and real sub-networks of

participants. However, data extracted from OSNs should be integrated with data coming from real-world analysis in order to prove the possible existence of such an overlapping.

Modularity may provide additional information about the existence of sub-networks since its measure relies on specific detection algorithms, standard parameters and standard resolution values (Blondel, Guillaume, Lambiotte, & Lefebvre, 2008; Lambiotte, Delvenne, & Barahona, 2009). Also betweenness centrality, harmonic closeness centrality, eccentricity and PageRank distributions are taken into account (Brandes, 2001; Kleinberg, 1999; Brin & Page, 1998), together with network diameter, which is equal to 1, and average path length, which is equal to 1.0. The most relevant data is about modularity and modularity with resolution values, which are equal to 0.492 in both cases. The substantial overlapping between sub-network detection and WCC analysis is highlighted by the identification of 16 communities. In addition, the slightly increasing modularity values - if compared to the same measures in 2015 – (Palmieri & Giglio, 2015a; Palmieri & Giglio, 2015b; Palmieri & Giglio, 2015c) tend to confirm the aforementioned failure of triggering activities since the much higher number of users has no significant repercussions on the level of integration of newcomers. Finally, the overall study of the graph at hand proves how a number of sub-groups emerge already in the pre-event phase, but there is also a strong intra-component connection within each sub-network.

5. Conclusions

However, this study helps filling the gap in literature about informal learning analysis in OSNs communities, which has been mentioned in the introductory section of this paper. In fact, it helps overcoming the lack of studies in this field about informal learning and pre-conference social media activities in OSNs communities. It provides a useful guidance in order to deepen informal learning processes occurring within academic events and to analyze user engagement and responsiveness to planned triggering activities. This way, the study contributes to the definition of tools and techniques aimed at monitoring in advance the emergence of possible hot topics and the corresponding sub-networks sharing the same research interests. Event organizers may also identify those working triggering activities, which help achieving higher user engagement levels, to improve the inefficient ones and to discard the ineffective ones. Ultimately, this study provides event organizers with a valuable approach in order to nurture a favorable setting during the pre-conference phase, thus, improving also conference success rate and brand.

As already discussed in the previous section, this case study shows how connected components, centrality, density and modularity measures depict the existence of many separated sub-communities. Moreover, the trend compared to the same measures in 2015 does not reveal any improvements. In conclusion, this is mainly due to the lack of adoption of monitoring approaches, techniques and tools like those proposed in this research work, and also to their resistance to change those previously implemented and consolidated triggering processes with more effective and efficient ones.

Despite some limitations - mainly about user data extraction and elaboration - related to the recent restrictions carried out by Facebook, still the collected datasets have been visualized and analyzed through NetVizz and Gephi. Such software solutions are helpful in order to identify also non topic-related social media streams, but they are not endowed with a semantic engine layer, yet. Such a layer could provide a further significant improvement to future research efforts, if developed and implemented as an additional module. However, such limitations are not attributable to the research work and methodology, but only to privacy restrictions and available tools on the software market.

From the methodological standpoint, a new exploratory approach is proposed. In fact, informal learning patterns are analyzed through visualization tools and techniques, which rely on the elaboration of small data collected from online sources. Therefore, such an exploratory methodology provides field scholars with an original approach in order to deepen informal learning processes. In addition, it can be considered also as a guidance for field research related to case studies on informal learning in OSNs communities. Finally, this work encourages academicians to deepen and build up more advanced tools and techniques for event hot topics prediction and pre-event sub-groups detection.

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