

An Investment Decision for Teachers?! The Role of Social Capital in Twitter Conversations among Teachers

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Introduction

The continuous professional development of teachers has been identified as a pivotal element in the provision of high quality education (e.g. Hokka & Etelapelto, 2013). Additionally, Paavola and colleagues (2004) stipulated that this development is fostered while collaborating in social networks composed of diverse groups of people. In this context, Wasko and Faraj (2005) have suggested to consider virtual *Networks of Practice* (NoP), which consist of “self-organizing, open activity system focused on a shared practice that exists primarily through computer-mediated communication” (p. 37). Generally, these type of frameworks have also been referred to as *Communities of Practice* (CoP). Conceptualized by Lave and Wenger (1991), CoP constitute “groups of people, who share a concern, set of problems or passion about a topic and who deepen their knowledge and expertise in this area by interacting on an ongoing basis” (Wenger, McDermott, & Snyder, 2002, p. 4). However, CoP do not appropriately capture the nature of networks that are increasingly emerging within the realm of online social networking sites (SNS). More specifically, while CoP account for face-to-face information exchange and engaged communication among participants, who typically know each other in person (Wasko & Faraj, 2005). In contrast, NoP acknowledge that complete strangers might collaboratively discuss a shared practice, while possibly never meeting each other offline.

In this context, Twitter constitutes a SNS wherein the development of NoP can be fostered (e.g. Bruns & Stieglitz, 2013). Twitter is a light-weight tool for easy communication that enables individuals to share information about any topic, in so-called “tweets” that are limited to 140 characters. Twitter also allows to communicate with other users, e.g. via direct messages, mentions (e.g. @user), retweets (e.g. RT @user), or hashtags (e.g. #topic). This type of communication has greatly contributed to the ease and flexibility with which information can be shared among large groups of people and irrespective of time and place (Ye, Fang, He, & Hsieh, 2012).

Yet, Hew and Hara (2007) have highlighted that “people typically value and protect what they know” (p. 1). Similarly, researchers have stipulated that individuals’ worry about jeopardizing their position within NoP (Wasko & Faraj, 2005). By sharing information via Twitter, the information becomes freely available to everyone and is no longer particular to an individual person. Consequently, users might refrain from actively contributing information to the NoP. Furthermore, and particularly focusing on the framework of teachers, Hou Sung and Chang (2009) have found that “most teachers do not interact in a culture in which teaching-related knowledge is exchanged [...]; [and] they are accustomed to designing teaching activities in isolation [...], which, in turn, prevents knowledge externalization and sharing.” (p. 101). Hence, the question arises of whether Twitter really has the potential to contribute to the formation and development of NoP for teachers. Yet, while previous research has already greatly contributed to our understanding of how individuals communicate via Twitter (e.g. Hofer & Aubert, 2013), NoP for teachers have been largely neglected. The present study addresses this shortcoming by investigating whether teachers engage into hashtag conversations, which would contribute to the creation of a NoP amongst them.

Social Capital

In the discussion about social networking sites (SNS), e.g. Twitter, the concept of *social capital* has been repeatedly mentioned as a possible perspective to analyze their potential and usage (e.g. Tong, Van Der Heide, Langwell, & Walther, 2008). Moreover, scholars like Lin (1999) have concluded that “we are witnessing a revolutionary rise of social capital, as represented by cyber-networks. In fact, we are witnessing a new era where social capital will soon supercede personal capital in significance and effect” (p. 45). Based on the work of Tsai and Ghoshal (1998), we define social capital as “relational resources embedded in the cross-cutting personal ties that are useful for the personal development of individuals” (p. 464). Furthermore, we consider social capital to be composed of three separate dimensions, as first stipulated by Nahapiet and Ghoshal (1998). More specifically, social capital comprises a structural, a cognitive and a relational dimension. The *structural dimension* is generally concerned with the social interactions among individuals within a certain network, as they play a crucial role predicting the type and level of

collective action (e.g. Burt, 1992). Consequently, they can be considered as the underlying fabric that enables individuals to access and accumulate the other dimensions of social capital. The *cognitive dimension* touches upon the content of the information being exchanged among individuals. In order to engage into a meaningful exchange of ideas on a shared practice, all participating actors need to have a certain level of shared understanding, common code and vocabulary (Nahapiet & Ghoshal, 1998). Otherwise, the full potential of exchanging of ideas and thoughts can be substantially reduced. Finally, the *relational dimension* is concerned with issues such as trust and common values shared among individuals. Unless individuals have a feeling of identification with a groups (e.g. NoP), or recognize a certain degree of reciprocity, they will reconsider their actions and possibly invest their time and resources elsewhere.

Yet, while previous research has identified these dimensions and agreed upon the general value of social capital theory for analyzing SNS (e.g. Riedl, Köbler, Goswami, & Krcmar, 2013), more insights are required as to whether and to what extent the indicated dimensions can be traced within SNS. Additionally, according to Bourdieu (1986), the mere potential of attaining social capital also acts as an incentive to actively engage into SNS. As a result, scholars have suggested that some individuals might try to dominate communication within SNS and impose a certain direction onto discussions within SNS (Lin, 1999). However, it is yet to be convincingly shown that this type of behavior is applicable for SNS communication among teachers.

Research Questions

Building upon on the aforementioned considerations and perceived gaps in prior research, we formulate our three main research questions as:

- RQ 1) Do Twitter conversations among teachers contribute to a Network of Practice?
- RQ 2) To what extent can the dimensions of social capital be traced within Twitter conversations?
- RQ 3) Is it possible for individuals to attain central positions within Twitter conversations that will possibly allow them to dominate communication flows and the general direction of a Twitter conversation?

#edchat & #edchatDE – Twitter Conversations about Innovation in Education

Including hashtags in tweets has become common practise on Twitter and allows individuals to include their contributions in a larger conversation about a certain topic, which enhances their possibility to access networks and further develop their already existing ones (Letierce, Passant, Breslin, & Decker, 2010). Consequently, they can be regarded as a possibility for individuals to get connected to a NoP. Moreover, by providing individuals with the possibility to connect, they thereby also constitute a ready-made environment to investigate the importance of social capital within SNS. In the context of this paper, we will focus on the hashtags #edchat and edchatDE. Both conversations started out as weekly live-chats, lasting for one to two hours, which covered the latest trends and developments in education, as well as the integration of (new) media into the lesson plans and broader curricula. While #edchat mainly focusses on the geographical region of North America, #edchatDE can be considered as a spin-off that has been established for German speaking countries.

Method

The core contribution of this study revolves around answering the question on whether social networking sites (SNS), such as Twitter, are able to connect professional workers thereby furthering the linking up of knowledge transfer and social capital. Using Twitter data on the hashtag #edchat and #edchatDE conversations between teaching professionals we apply a multi-method approach focusing on the structural and cognitive dimension¹ within the theoretical framework of social capital formation (Nahapiet & Ghoshal, 1998), as explained previously.

First, over a period of two months, we collected data on the Twitter users that have contributed to both hashtag related discussions (e.g. Bruns & Stieglitz, 2013), subsequently building directed unweighted 1-mode networks based on tweet (including Mentions and Replies) and directed unweighted 2-mode networks based on user and hashtag matrices. Then, secondly, we conducted a social networks analysis (SNA), to identify and compare whether #edchat and #edchatDE have contributed to the creation of a core NoP (e.g. Himelboim, McCreery, & Smith, 2013). SNA has been widely acknowledged as a valuable tool to assess the structural dimension of social capital (e.g. Tsai & Ghoshal, 1998). Within SNA there are a number of metrics which have been developed that can be computed and which present the structural characteristics in social networks (Grabowicz, Ramasco, Moro, Pujol, & Eguiluz, 2012). The internal links and the links between groups within the network are initially the most

¹ Due to the nature of the collected data, we were not able to assess the role of the relational dimension of social capital within the context of the current study. However, we are planning to add this dimension to our analysis by conducting qualitative studies (participatory observation and semi-structured interviews) in the future.

interesting to explore, to get an idea of reciprocity and the intensity of the knowledge exchanged through the hashtag discussions. We have therefore computed the in- and out-degree centrality metrics of all users taking part in both hashtag discussions, as well as their betweenness centrality. While in- and out-degree centrality provides us with an indication of how often an individual has been contacted or has contacted others, respectively, betweenness centrality allowed us to draw conclusions about individuals' relative network position and their ability to dominate the conversation. Third, we ran a cluster analysis with the aim of identifying possible subgroups of users (e.g. Java, Song, Finin, & Tseng, 2007) within the #edchat and #edchatDE networks. Taking into account the directed nature of Twitter conversations, we have used the Louvain-Method to cluster our data and to identify subgroups (Blondel, Guillaume, Lambiotte, and Lefebvre, 2008). The Louvain method is a greedy optimization method which looks at the optimal modularity to partition the network into (sub-) clusters. Finally, based on the top 100 hashtag pairs that could be attained from the collected tweets that were posted as part of the chosen hashtag conversation, we computed a 2-Mode Network to identify possible commonalities in the contributions of the twitter users to both the hash-tag conversations. Based on the results, we were able to draw a number of conclusions about the cognitive dimension of the hashtag conversations and determine whether individuals shared a common terminology and as such a common knowledge base (Cowan, 2004). The data was collected from the 22nd of May through to the 28th of July, 2014. NodeXL was used to collect the data and to determine the top 100 hashtag pairs. Pajek was used to conduct the SNA.

Results

Overall, 61.000 Tweets (#edchat: 56.194; #edchatde: 5.215) from about 25.000 Twitter-Users (#edchat: 20.012; #edchatde: 406) were collected. Tables 1 summarize the main descriptive statistics.

Table 1: Overall User Statistics (#edchat and #edchatDE)

	#edchat		#edchatDE	
	M	SD	M	SD
Mentions	2.30	6.95	8.62	58.09
Replies to	0.06	0.67	3.29	25.40
Mentioned	2.30	32.59	8.62	49.72
Replied to	0.06	0.62	3.29	17.03
Tweets in #	0.15	0.36	2.72	19.16
Followers	20,144.81	492,978.81	31,689.15	428,331.35
Following	1,132.49	11,692.10	1,600.51	7,303.31
All Tweets	5,631.39	20,508.70	9,237.91	17,852.90

As can be seen from the Table 1, the two target groups exhibit similarities in their background characteristics (e.g. Followers and Following), as well as communication behaviour (e.g. All Tweets). However, it seems that individuals within #edchatDE engage more into reciprocal communication, as compared to their counterparts in the #edchat conversations. More specifically, particularly the activities „ Replies to“ and „ Replied to“ are more pronounced in #edchatDE. Figure 1 provides a longitudinal representation of our data.

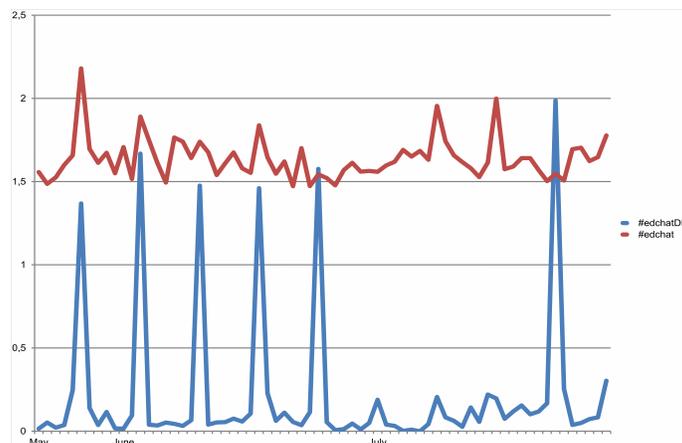


Figure 1: Longitudinal Data on #edchat and #edchatDE

While the contributions for #edchatDE peak on every Tuesday (the scheduled day of the week for the live-chat), #edchat exhibits a more continuous flow of information that is being shared. The results of our social network analysis are provided in Table 2 below.

Table 2: Social Network Statistics (#edchat and #edchatDE)

	#edchat		#edchatDE	
	M	SD	M	SD
In-Degree	2.37	32.82	4.38	13.91
Out-Degree	2.37	7.14	4.38	16.15
Centrality				
<i>Betweenness</i>	0.00	0.00	0.00	0.01
<i>Closeness</i>	0.21	0.07	0.33	0.09
Structural Hole	0.68	0.34	0.64	0.31

While the data is subject to considerable standard deviations, the overall trend from Table 1 is again visible. More specifically, participants in #edchatDE were, on average, more active in contributing to the discussion (Out-Degree), and attracted more communication from others (In-Degree). Finally, when considering the attained centrality measures, it seems that neither #edchat, nor #edchatDE have provided individuals with a platform to attain central positions in the overall network and possibly dominate the discussion. Similarly, considering the values for our structural hole measure, individuals in both hashtag conversations can benefit from potentially acting as bridges between otherwise disconnected users.

However, this perception needs to be qualified to some extent when considering the sociogram presented in Figure 2. From the figure it is apparent that while individuals might not have been able to attain centrality within their overall networks, some have been able to attain central positions within their subclusters. When taking a closer look at the characteristics of these subclusters, we discovered that the larger clusters were driven by either a dominant individual, who was able to gather a group around her, an online (commercial) portal covering the main topic of discussion. The latter is particularly pronounced within #edchat.

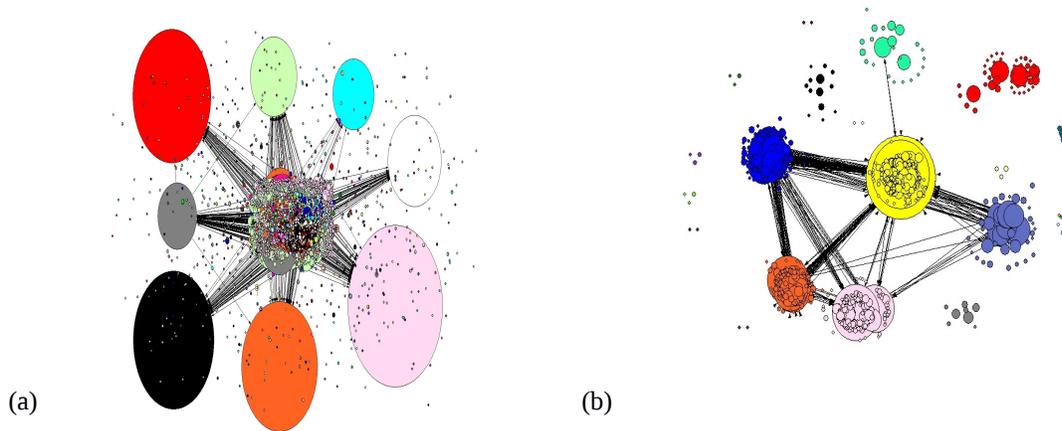


Figure 2: Sociogram of (a) #edchat and (b) #edchatDE
 Note: Clustering Algorithm = Louvain Method (Single Refinement); Layout: Kamada-Kawai (Optimize Inside Clusters); Node Size = Degree

The results of our semantic network analysis are presented in Figure 3. As expected, #edchat and #edchatDE were at the core of their respective discussions. However, the two networks differ quite considerably with their observed orientation. While #edchat was mainly combined with similar hashtags that also aim at fostering general information exchange on education among English speaking Twitter users (e.g. #ukedchat, #edtech and #commoncore), #edchatDE covered more specific discussion topics (e.g. #storify, #oerkoeln14, #etherpad). Moreover, #edchat constitutes a component part of the #edchatDE discussion and has been included in the exchange of information within the applicable conversation.

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