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Does a Formal Wiki Event contribute to the Formation of a Network of Practice? A Social Capital Perspective on Informal Learning

Abstract

Informal learning in blended and online settings plays an increasingly important role in the continuous professional development of individuals. Yet, how do individuals engage into these types of activities? We argue that social capital theory can provide valuable insights into how people behave and decide to take part in (in)formal learning. Using social network analysis, we provide empirical evidence on an informal learning activity, where participants collaboratively created knowledge on wiki sites on a predefined set of topics. Our results show that there are three types of active participants in these type of informal learning activities, namely *leaders*, *collaborators* and *lone editors*. These findings provide valuable insights for other, similar activities that aim at enhancing the professional development of individuals.

Keywords

informal learning; network of practice; social capital; wikipedia; professional development

Informal Learning – A Driver for Professional Development

Continuous professional development is essential to the success and performance of organizations (e.g. Hokka & Etelapelto, 2013). Empirical research has evidenced that about 90 percent of learning takes place in informal, rather than formal contexts (e.g. Author C, 2014; Conlon, 2004), and increasingly ICT plays an important role in sharing knowledge and expertise between professionals (e.g. Author C, 2013a; Chen & Chang, 2012; Halimi, Seridi-Bouchelaghem, & Faron-Zucker, 2013; Kim, Hung, Jamaludin, & Lim, 2014; Toikkanen & Lipponen, 2009). Therefore, informal learning plays an important role in the context of professional development (Eraut, 2004). Informal learning offers greater flexibility than (traditional) formal learning scenarios. First, it enables participants to enhance their knowledge and skills more independently. Second, content is generated through each individual's personal (working) environment (e.g. Choi & Jacobs, 2011). As a result, informal learning contributes significantly to participants' professional development (e.g. Author B, 2013; Author C, 2014; Kyndt, Dochy, & Nijs, 2009). Eraut (2004) distinguishes between three different types of informal learning, namely *implicit*, *reactive* and *deliberative learning*. *Implicit learning* takes place always and everywhere in such a way that the individual might not even be aware of his or her learning. In the context of *reactive learning*, the individual is aware of the learning process. Incidences of reactive learning happen spontaneously while carrying out work activities. *Deliberative learning* is distinct from the other two types of informal learning in that the individual explicitly acknowledges the learning process. Scholars such as Za and colleagues (2014) have argued that "*informal learning can be stimulated by formal mechanisms*" (p. 1025). Similarly, using social network analysis, Author C (2014) found that informal learning networks can be encouraged by combining formal academic development with professional networks of academics.

As the number of Web 2.0 tools and services grows, scholars have put forward the concept of *Networks of Practice* (NoP) (e.g. Ranieri, Manca, & Fini, 2012), as a valuable methodological framework to reflect upon online (learning) networks in which professionals exchange and build knowledge to learn. Wasko and Faraj (2005) define NoP as "*a larger, loosely knit, geographically distributed group of individuals engaged in a shared practice*" (p. 37). In this context, Rahimi and colleagues (2015) postulate that Web 2.0 tools and technologies provide "*at-your-fingertips' learning opportunities*" (p. 781) that contribute to individuals' (informal) learning processes. A popular example of Web 2.0 tools for informal learning are wikis (e.g. Chunngam, Chanchalor, & Murphy, 2014). Wikis provide a ready-made environment to share information and acquire new insights, thus promoting informal learning. Yet, how individuals and in particular professionals engage in these types of learning activities, and their underlying learning strategies when engaging with others in this

process is under-researched. In this article we begin by arguing that social capital theory (e.g. Bourdieu, 1986; N. Lin, 1999; Mazzoni & Iannone, 2014) can contribute to our understanding of these issues. The research is guided by the overarching research question of: *Does a formal wiki event contribute to the formation of a (informal) Network of Practice?* Additionally, we formulate two underlying research questions as: *i) Can a formal wiki event initiate informal learning among participants? ii) To what extent does a formal wiki event contribute to the formation of participants' social capital?*

Perspectives and Considerations

Social Capital and Social Media Platforms

According to Lieberman (2000), social media platforms provide a ready-made environment for informal learning processes, since their structure is “*loose, borderless and flexible*” (p. 221). In this context, educational scientists acknowledge that the concept of social capital is not only relevant for analyzing social networking sites in general (e.g. Mazzoni & Iannone, 2014), but that it can also contribute to our understanding of how (informal) learning networks develop and evolve over time (e.g. Moolenaar, Slegers, & Daly, 2012). Authors such as O’Neill (2004) have postulated that social capital is “*an inalienable part of what makes authentic learning communities function sustainably*” (p. 183). According to Tsai and Ghoshal (1998) social capital can be defined as “relational resources, embedded in the cross-cutting personal ties, that are useful for the development of individuals” (p. 464). Ranieri and colleagues (2012) argue that knowledge resources accrue through mutual, online exchange of resources, such as “useful information, personal relationships or the capacity of creating and managing groups” (p. 757). Nahapiet and Ghoshal (1998) distinguish between three dimensions of social capital, namely a structural, a cognitive and a relational dimension. The structural dimension concerns the social interactions between individuals within a particular social media platform; the cognitive dimension deals with the question of whether participating actors share a common understanding and terminology, which improves the potential of exchanging ideas and information; and the relational dimension describes issues such as trust and common values amongst individuals. Yet, while social capital has already been identified and analyzed in a wide range of social media platforms, uncertainty remains about the specific role of social capital in the context of (informal) learning (Boyd & Ellison, 2007).

Wikis – A Portal for (In)formal Learning

A growing number of scholars have argued that wikis provide a valuable platform that allow individuals to collaborate through information and knowledge sharing (e.g. Cress & Kimmerle, 2008; Kosonen & Kianto, 2009). Furthermore, “*the use of wiki applications [...] for developing virtual communities in various areas has become more common in recent years*” (Wang & Wei, 2011, p. 800). Here, we define wikis as “*web-based systems which enable learners to become publishers rather than consumers of knowledge by adding, modifying or deleting content in collaboration with others*” (Jung & Suzuki, 2015, p. 830). Many Web 2.0 tools (e.g. blogs), are curated and distributed by single authors (Judd, Kennedy, & Cropper, 2010). By contrast, wikis are edited by a number of individuals, who track changes and retain a history of all changes that have been made to a singly wiki site entry. As a result, wikis help individual learners to identify and reflect on the changes being made and to experience collaborative information exchange through social interactions with other contributors (e.g. Cole, 2009). Additionally, wikis provide the flexibility “*that is needed particularly in informal and collaborative learning settings, where people with different prior knowledge, learning interests and learning activities learn collaboratively with or from others*” (Halimi et al., 2013, p. 167). Consequently, wikis have been used by various communities within diverse academic disciplines and practical areas to foster information sharing, resource accumulation and knowledge creation (e.g. Black, 2008). However, while acknowledging the great potential of wikis to facilitate the collaborative exchange of information and knowledge (e.g. Chunngam et al., 2014), it is known that “*a wiki in itself will not result in collaboration*” (Jung & Suzuki, 2015, p. 830). Support and moderation mechanisms need to be instigated by the participating wiki authors to foster active and collaborative behaviours (e.g. Judd et al., 2010; Jung & Suzuki, 2015; Kepp & Schorr, 2009). In this

context, Kim and colleagues (2014) suggested that an interplay between formally instigated learning events and informal (collaborative) learning activities can provide a fruitful environment to foster learning within and between different contexts. Indeed, prior research on learning in wikis has tended to focus on technical affordances, paying limited attention to individuals' behaviour in online communities (Hoisl, Aigner, & Miksch, 2007).

Gaps in Prior Research

Although prior research has contributed to our understanding of (in)formal learning in wikis and social capital, these studies are limited in three main ways. First, research on professional development and online (informal) learning is limited (Author B, 2014; Author C, 2013b). Second, although previous research has established that social (networking) platforms “*consist of a larger, loosely knit, geographically distributed group of people who often exchange information [...] without apparent external reward*” (Cho, Chen, & Chung, 2010, p. 1200), little is known about the underlying social network characteristics of these types of platforms. Third, while a growing number of studies are using log-data to determine how wikis and NoPs are bound together, more research is required to gain insight into how individuals develop and maintain online (informal) learning, as well as whether and to what extent this affects the formation of their social capital (e.g. Boyd & Ellison, 2007; Ellison, Steinfield, & Lampe, 2007; Judd et al., 2010). This study addresses these gaps by providing empirical evidence from an informal learning event (an editathon), which used Wikipedia to foster the sharing of information and knowledge on a predefined topic. By implementing social network analyses, we provide valuable insights not only on individuals' online (informal) learning, but also on how their (strategic) behaviours influence their (network) positions in their NoP.

Methods

Data

The data was collected in the context of the “Innovative Learning Week” in a large, research-intensive University in the United Kingdom. Participants took part in a dedicated (informal) learning event, called editathon, aiming to create and modify wiki sites about the origin of medical education for women within University X. The activity was based on a blended learning scenario, where participants could meet face-to-face during a series of afternoon sessions to work collaboratively on the creation of the wiki sites. Participants represented a wide range of disciplines and were located in different departments including IT services, library and information work, educational science and departments whose content focus directly relates to the content of the editathon in question. Based on anecdotal evidence, the driving motivations to participate in the editathon were a general interest in using wiki-technology, expanding their professional network by collaborating with colleagues, as well as to reflect on their work routine and role within their organization. A ‘wikimedian in residence’ (an editor who has a placement within the university) supported the creation of the wiki sites. University archivists assisted with access to the university archives on medical education, and media specialists helped to record media clips of the relevant locations around the university. The editathon was open to all and targeted towards students, staff and members of the public who had an interest in the topic. For the purpose of this study, we focus on the online activities of the editathon. While we acknowledge that social capital might have also developed during face-to-face activities, we wanted to focus on the online aspect of the event, as uncertainty remains about the specific role of social capital within the context of (online) informal learning (e.g. Boyd & Ellison, 2007). The data was collected via the wikimedia site (<https://wikimedia.org.uk/>), on which the event was hosted. The data collection took place during (five days) and after the editathon event (for a duration of 7 months), and was based on the downloadable log data from all applicable wikimedia sites that have been covered during the editathon. However, it has to be noted that the majority of these sites (83.33 %) were already created prior to the event, sometimes dating back as far as 2003. Consequently, the data not only captured the activities of participants in the event, but also from a larger group of individuals, who were also interested in the applicable topics and collaboratively exchanged information and knowledge. Yet, for the current study, we focussed on the group of participants from the event. The SNA metrics were then computed using the software package Pajek. Based on the collected data, the

2-Mode network structure was comprised of i) users, who contributed and edited to wiki sites and ii) wiki sites that were part of the editathon. In order to guarantee privacy of participants and meet our Ethical guidelines, all users and wikis are presented in an anonymous manner.

Social Network Analysis

The data was analysed using social network analysis (SNA). According to Dawson (2010), SNA “provides a valuable methodology for examining the patterns of interaction that occur within a group of actors” (p. 738). SNA is well-suited for analysing large amounts of data effectively and is, therefore, useful for researching social learning platforms, such as wikis (e.g. Cela, Sicilia, & Sánchez-Alonso, 2015). Furthermore, SNA has been widely acknowledged as a valuable tool to assess learning networks (e.g. Chen & Chang, 2012; Škerlavaj, Dimovski, Mrvar, & Pahor, 2010), as well as the *structural* dimension of social capital (e.g. Author C, 2013b; Moolenaar et al., 2012). Wiki sites constitute 2-Mode networks in which there are (generally) two types of data: i) individuals and ii) characteristics (Wasserman & Faust, 1994). Thus, documents (e.g. contributions to wiki sites) form the basis for this type network (Latapy, Magnien, & Vecchio, 2008). Analysing this type of network allows us to identify relationships amongst individuals (e.g. Halpin, Robu, & Shepherd, 2007). Moreover, this method has been widely used to assess the relevance and level of social capital, particularly the *structural* (e.g. Grabowicz, Ramasco, Goncalves, & Eguiluz, 2014) and *cognitive* dimension (e.g. Borgatti & Everett, 1997; Opsahl, 2013) in social media sites. More specifically, we determine the *structural* dimension of social capital by determining individuals’ degree centrality (e.g. J.-W. Lin, Huang, & Chuang, 2015), which has been identified as a useful metric to describe learning in networks (e.g. Toikkanen & Lipponen, 2009). In the context of a 2-Mode network, this metric determines how often an individual has edited a certain wiki site. An alternative interpretation would be that it captures by how many individuals edited a particular wiki site.

In order to then draw more concrete conclusions from the data on the *structural* social capital of individuals, we also compute 1-Mode projections (e.g. Halpin et al., 2007), which focus on one type of network data. Here, we determined a 1-Mode projection based on individuals, factoring in their connection with wiki sites. Hence, if two individuals were editing the same wiki site, the projection identified a link between them. This in turn would positively affect their degree centrality. Consequently, the higher the degree centrality of any given individual, the higher their (potential) *structural* social capital. Considering the *cognitive* dimension of social capital, our point of departure was again the 2-Mode network. If two individuals edit the same wiki site, this can be interpreted as an active process of trying to establish a common understanding and a shared terminology about a certain topic. Consequently, this would contribute to the potential of exchanging further ideas and information about the same topic. Hence, if two individuals would connect to the same wiki site, this suggests that *cognitive* social capital is formed. Similarly, the 1-Mode projection would also reveal between this process is taking place, as only connected individuals have been editing and contributing to the same topic.

Additionally, the multi-relational nature of the data, allowing for a classification into “minor” (e.g. typographical corrections, spelling and formatting) and “major” changes (e.g. editing and changing the meaning of large pieces of text), provides another methodological approach to assess the *cognitive* dimension of social capital. More specifically, we argue that “minor” changes can be interpreted as preliminary evidence that the majority of individuals agree with the generally used terminology to describe the content of a particular wiki site. As a result, this would suggest that higher levels of *cognitive* social capital have been formed, compared to sites where the majority of changes can be classified as “major”. Finally, we use the timestamp of wikis edits, in order to determine any possible differences in editing behaviour over time.

Results

47 individuals participated in the editathon event. The editathon included 66 wiki sites related to the content domain (women's medical education). The 2-Mode network analysis revealed that 20 individuals (42.55%) actively contributed to a subset of 31 wiki sites (46.96 %) and created 11 wiki sites (16.67%), which were not present prior to the event. Taking into the multi-level nature of our

data, Figure 1 provides a graphical representation of the 2-mode network, taking into consideration “major changes” to the wiki pages. As can be seen from Figure 1, only a few wiki pages were edited by several individuals (e.g. Wikisite_17). The analysis also revealed that some users appeared to be working alone in this online part of the event (e.g. User_40, User_8, User_11), focusing on topics that were not covered by other editathon participants. However, with the exception of these types of users, participants in the event appear to be well-connected via their editing and contributing activities. This is also highlighted by the 1-Mode projection of the network as displayed in Figure 2, which illustrates who has edited the same wiki sites. A visual impression of the “minor changes” network is provided in Figure 3, which shows that the minority of contributions and edits to the wiki sites in question could be classified accordingly.

Figure 1 about here

Figure 2 about here

Based on the findings, we identified a number of different types of online behaviours in the network. More specifically, we were able to identify three types of active online participants: *leaders*, *collaborators* and *lone editors*. *Leaders* were central to the online exchange of information and contributed to a broad variety of topics. For example, User_3 (Figure 1) contributed considerably to Wikisite_27 and Wikisite_38 (Figure 1), adding a total of 18.973 and 5.843 letters, respectively. However, this participant also made changes to four other wiki sites, editing on average of 229 letters. *Collaborators* joined in the general exchange of information, contributing mainly minor changes to wiki sites. For example, User_37 (Figure 3 below) edited three wiki sites, contributing and editing an average of 65 letters. *Lone editors* also shared information, but focussed on topics that were not covered by others (e.g. User_40, Figure 1). This particular participant made sizeable contributions to Wikisite_25 and Wikisite_41 (Figure 1), adding a total of 8913 and 2554 **letters**, respectively.

Figure 3 about here

As a final step in our analysis, we further unpacked the data from a longitudinal perspective, whereby we subdivided the data into two timeframes: “during” and “after” the event. From this we determined the centrality degrees of users (Figure 4 below) and wiki sites (Figure 5 below). Figure 4 illustrates that a few participants were very active online and a larger group were less active. Participants who were most active online tended to continue active, online engagement after the editathon event. Four active participants increased their online activity after the editathon, compared to during the event. A small subset of the wiki sites received most attention by the participants, whereas a larger subset of wiki pages underwent a limited degree of editing. A further three wiki sites had most of the editing applied after the event (Figure 5).

Figure 4 about here

Figure 5 about here

Discussion

This study investigated the extent to which a formal wiki event – or editathon – can contribute to the formation of a Network of Practice (NoP). This work addresses a gap identified in prior research, which tends not to consider professional learning in online (informal) learning networks or focus on technical opportunities and constraints of Web 2.0 technologies (e.g. Cho et al., 2010; Hoisl et al., 2007; Judd et al., 2010; C.-W. Tsai, Shen, & Fan, 2013). Focusing on the social aspect of informal learning, we used social capital theory to improve our understanding of informal, deliberative learning within an online setting. To examine the editathon, hosted by a large, research-intensive University in the United Kingdom, we used a longitudinal, multilevel 2-mode social network analysis to analyse the wiki data. Furthermore, we focused on the *structural* (Grabowicz et al., 2014) and *cognitive* (Borgatti & Everett, 1997; Opsahl, 2013) dimensions of social capital.

Based on our findings, we tentatively confirm our overarching research question that the editathon contributed to the formation of a NoP. The physical environment of the editathon effectively introduced participants to a larger network of people, who also edited and added information to the sites. The online environment of the event provided an infrastructure for participant to contribute to the applicable wiki sites, thereby creating a network of individuals “*engaged in a shared practice*” (Wasko & Faraj, 2005, p. 37). In combination with anecdotal evidence from the event, the editathon has therefore met the expectations and goals of the participants, who wanted to collaborate with colleagues on a joint topic of interest. Moreover, the longitudinal data provided evidence for our first underlying research question, indicating that the editathon contributed to the initiation of an informal learning process. Participants’ engagement with the wiki site did not stop when the editathon ended. Instead, participants continued to edit and add information for several months after the event. Hence, we can conclude that a) the editathon event contributed to the formation of a NoP around a specific theme of the event and b) the online wiki environment provided a framework that stimulated a more prolonged engagement with the topic and with other network participants. Furthermore, and again drawing on anecdotal evidence from the event, participants specifically considered the editathon as part of their individual professional development plan. Interestingly, the main focus was not such much on gaining content-specific knowledge of the event’s underlying topical domain. Instead, participants rather seemed to join and engage into event, in order to acquire more knowledge and skills in using wiki-technology, expand their professional network by collaborating with colleagues, as well as to reflect on their work routine and role within their organization.

The online log-data of the event also revealed that the event contributed to the formation of participants' social capital. More specifically, considering the *structural* dimension, we identified three types of social capital formation among participants: *leaders*, *collaborators* and *lone editors*. *Leaders* held central, online positions in the evolving NoP, actively sharing and editing a variety of different wiki sites. *Collaborators* joined in the general, online exchange of information, but contributed mainly minor changes to wiki sites. *Lone editors* also shared information, choosing topics that were not covered by others. Hence, while we argue that each type of participant acquired different types and levels of social capital, they all could benefit from contributing useful resources and information to the wiki sites of the editathon (Ranieri et al., 2012).

When considering the *cognitive* dimension, we argued that if two individuals edit the same wiki site, this can be interpreted as an active process of trying to establish a common understanding and a shared terminology about a certain topic. Consequently, this would contribute to the potential of exchanging further ideas and information about the same topic. Hence, if two individuals would connect to the same wiki site, this suggests that *cognitive* social capital is formed. Based on the results of this study, we postulate that participants within the NoP have attained higher levels of social capital. The predetermined wiki sites provided the foundation for the discussion and constituted the base level for the editing process. Moreover, participants engaged into a continuous process of editing wiki sites within the context of the editathon and even after the event had officially ended.

Additionally, “minor changes” to the wiki sites have been the exception, which suggests that once the sites have either been created or the most sizeable changes had been made, participants agreed with the provided information and did not perceive the need to further adjust the content. This

in turn provides a first indication that participants engaged into a process of agreeing on a common understanding and terminology with respect to the applicable topics of the wiki sites, thereby contributing to the *cognitive* dimension of their social capital. Consequently, these findings provide valuable insights for organizers of future editathon events. By acknowledging the different types of participants, organizers can design and implement targeted scaffolding activities to foster a more evenly distributed level of activity (e.g. Jung & Suzuki, 2015). Finally, we conclude that a formal mechanism, such as an organized editathon, can contribute to the formation of a NoP and trigger a continuous informal learning process.

Future Research

While this study has contributed to the growing scholarly discussion about informal learning on social media sites, it also exhibits three main limitations that should be considered for future research. First, the study focused on the online part of the informal learning event. Yet, the event also hosted a range of face-to-face activities. If an individual contributed mainly minor changes to wiki sites, or appeared as an online *lone editor*, this might have been pre-planned or agreed upon with other participants during the face-to-face part of the event. We therefore might observe discrepancies between observed online behaviour and participants' actual behaviour during the event. Consequently, this circumstance has to be taken into account when interpreting the results. Second, the current analysis has focused on the participants of a formally organized learning event. However, the overall amount of active individuals on the applicable wiki sites is considerably larger, considering that the majority of these sites (83.33 %) were already created prior to the event. In that sense, they also constituted part of the larger NoP that continues to edit and add information. Consequently, future research should also consider this larger network, in order to possibly identify generally underlying trends and behaviours. Third, and closely related to the latter, this study has focused on assessing online log-data. Future research should extend this type of analyses by also incorporating mixed method approaches, such as questionnaires and semi-structured interviews. For example, instruments to measure actual social capital acquisition (e.g. Lee, Yen, & Hsiao, 2014) could be used as a valuable starting point. Furthermore, semi-structured interviews could provide crucial insights into the formal and informal mechanisms how professionals learn individually and together (Author C, 2015).

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Figures

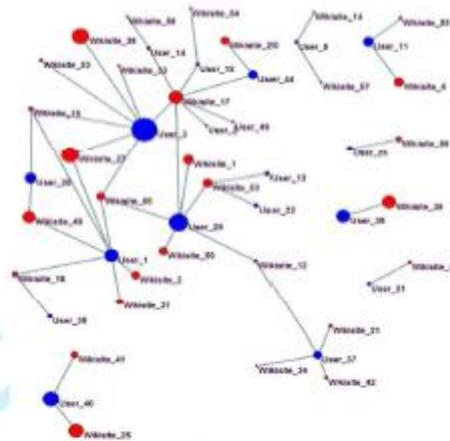


Figure 1. 2-Mode network diagram of users and wiki sites (only major changes)
Note: Users = Red, Topics = Blue; Size of Nodes = Degree Centrality; Layout = Pivot Multidimensional Scaling

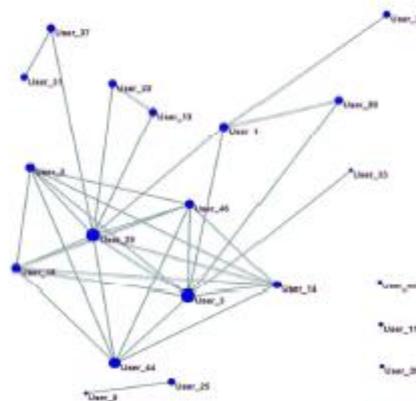


Figure 2. 1-Mode projection network diagram of users
Note: Size of Nodes = Degree Centrality; Layout = Pivot Multidimensional Scaling

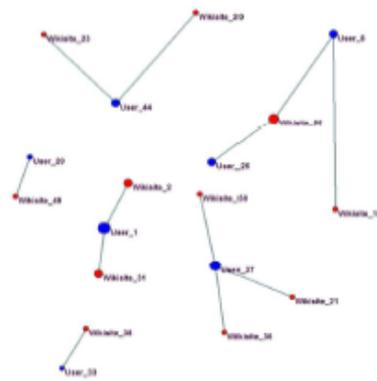


Figure 3. 2-Mode network diagram of users and wiki sites (only minor changes)
 Note: Users = Red, Topics = Blue; Size of Nodes = Degree Centrality; Layout = Pivot
 Multidimensional Scaling

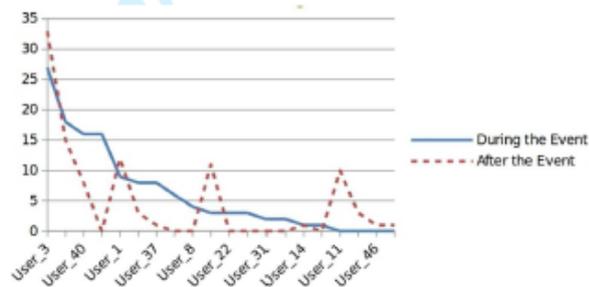


Figure 4. Comparison of contributions (degree) per user during and after the event

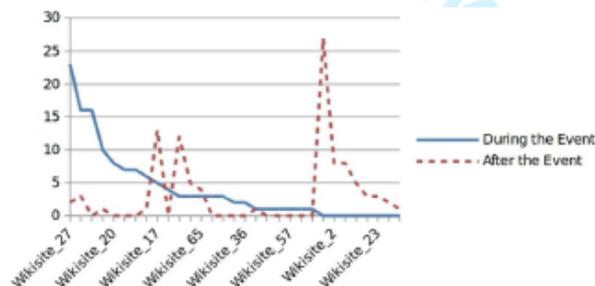


Figure 5. Comparison of contributions (degree) to wiki sites during and after the event