28 Days Later: Twitter Hashtags as "Just in Time" Teacher Professional Development

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Keywords: affinity spaces, professional development, social learning, teacher learning, Twitter

Abstract

Researchers have argued that Twitter has potential to support high-quality professional development (PD) that can respond to teachers' questions and concerns just in time and "on the spot." Yet, very little attention has been paid to instances where Twitter has made just-in-time learning possible. In this paper, we examine one instance of timely professional development on Twitter, in which 3,597 users used an educational hashtag—#educattentats—to create a temporary affinity space supporting teachers preparing to discuss terrorist attacks in their classes. We describe this just-in-time PD by focusing on participants and modes of participation, the growth and spread of the hashtag and the growth and eventual decline of the hashtag over the course of 28 days. The results of this study suggest that #educattentats served effectively as "just-in-time" professional development for teachers. Implications for research and practice are discussed.

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Changes in the teaching profession (Darling-Hammond & McLaughlin, 1995) and the rapid evolution of educational resources and technologies (Jones & Dexter, 2014) create a need for professional development (PD) that can respond to teachers' questions and concerns just in time and "on the spot" (Plair, 2008, p. 73). In short, effectively supporting teacher learning requires creating flexible environments that allow teachers to connect with colleagues and experts who can help them with their current questions. Some scholars have argued that this "real-time" and "on-demand" support can be provided by Twitter (Carpenter & Krutka, 2015, p. 716).

Researchers have described Twitter-based professional development as taking place within *affinity spaces* (Carpenter & Krutka, 2015) or *learning communities* (Gao & Li, 2016). Previous research on Twitter-based professional development has emphasized its size and scope (Rosenberg, Koehler, Akcaoglu, Greenhalgh, & Hamilton, 2016), its openness and interconnectedness (Carpenter, 2015) and its self-directed but welcoming nature (Visser, Evering, & Barrett, 2014). Very little attention has been paid to instances were Twitter makes just-in-time learning possible (Lock, 2006), and there has been very little examination of what this looks like.

In this paper, we respond to this gap by examining one instance of targeted and timely professional development on Twitter. Following terrorist attacks in Paris in November 2015, Twitter users used the hashtag #educattentats to create a temporary *affinity space* in which they could provide support for teachers preparing to address the incident with their students. We describe this professional development-focused affinity space from its creation to its virtual

disappearance 28 days later and describe how we collected and analyzed data to characterize growth and participation within the affinity space.

Conceptual Framework

In this section, we introduce our conceptual framing of Twitter-based professional development as a kind of social learning that happens through affinity spaces.

Social Nature of Learning

During the early twentieth century, education scholars such as John Dewey (1938/2007) and Lev Vygotsky (1978) began drawing attention to the social processes involved in learning. Greeno, Collins and Resnick (1996) would later describe the increasing recognition of social factors as a "major advance" (p. 15) in the field of educational psychology. One of the most common ways of conceiving of social learning is the *community of practice* (Lave & Wenger, 1991), which purports that people learn in and from communities made up of people sharing the same professional (or other) practices. Gee (2004) suggested the alternative conception of a *social semiotic space*, which is dedicated to particular *content*, characterized by the *interactions* in the space and accessed through a specific *portal*. *Affinity spaces* constitute a subset of social semiotic spaces that are further characterized by features such as diverse forms of participation and dispersed networks of knowledge.

Teacher Professional Development in Social Spaces

Social conceptions of learning can help describe—and better plan—teachers' continued learning. Professional development (PD)—the provision of ongoing training and resources for teachers—is seen as a key resource in advancing education reform (Darling-Hammond & McLaughlin, 1995), and a number of scholars have drawn attention to perceived shortcomings in its conception and execution (Jones & Dexter, 2014; Lawless & Pellegrino, 2007; Lock, 2006;

Visser et al., 2014). Suggestions for improving PD often focus on more fully recognizing the social nature of learning, with some explicitly drawing on the language of communities to frame their assertions (Darling-Hammond & McLaughlin, 1995; Jones & Dexter, 2014).

Social Learning and "Just-in-Time" Professional Development

A number of scholars use the phrase "just-in-time" to describe PD that is responsive, timely and effective (e.g., Guskey & Yook, 2009; Lock, 2006; Mouza, 2002). Although just-in-time PD is not a formalized concept built on a foundation of empirical evidence, it is a useful metaphor for a conceptual approach in which PD is organized around flexible structures that emerge when necessary and disappear when no longer needed (Darling-Hammond & McLaughlin, 1995; Jones & Dexter, 2014). Within these structures, learning is driven by teachers—who focus it on their specific needs (Darling-Hammond & McLaughlin, 1995; Easton, 2008)—and supported by "knowledge brokers" (Plair, 2008, p. 70). These structures also draw upon social learning as teachers interact with experts and colleagues who already have the knowledge teachers are trying to obtain.

Twitter as a Social Space

Technology is held to play an important role in social, just-in-time PD (Jones & Dexter, 2014; Lock, 2006), and Twitter has received particular attention. Teachers participate in both synchronous "Twitter chats" and asynchronous activities, which have been described in terms of social learning constructs such as communities of practice and affinity spaces (Carpenter & Krutka, 2015; Gao & Li, 2016; Visser et al., 2014). Carpenter and Krutka (2014; 2015) reported that teachers recognized and appreciated Twitter's potential to provide just-in-time PD, commenting on their ability to obtain PD tailored to their needs and their schedule. However,

although surveys such as this one have established Twitter as a recognized source of just-in-time PD, there remains little research on what this process looks like.

Purpose and Research Questions

In this paper, we examine how Twitter users responded on Twitter to the terrorist attacks carried out in Paris on November 13, 2015. Early in the morning of November 14, the Twitter user Padagogie posted the following tweet on Twitter (Figure 1):

[PLACE FIGURE 1 HERE]

One hashtag that Padagogie used is of particular interest—"educattentats" is a portmanteau of the French words *éducation* (education) and *attentat* (terrorist attack) that was seemingly invented for the purpose of collecting, organizing and disseminating ideas and resources for teachers as they prepared to discuss the November attacks with their students. In this sense, the hashtag became a portal to an affinity space dedicated to interactions around this content. Over the days and weeks that followed, a number of people accessed this affinity space to discuss the relationship between Twitter, teachers and terrorism.

The purpose of this paper is to describe the nature of "just-in-time" professional development by exploring how #educattentats served as a timely but temporary affinity space for teacher learning. As previously stated, although previous research has asserted the existence of just-in-time teacher learning on Twitter, there is little evidence of what this might look like. However, the #educattentats affinity space emerged from a setting where a large group of teachers was seeking the same kind of just-in-time PD, allowing us to target a large-scale but specific instance of this phenomenon for in-depth analysis. Over the course of our description, we respond to the following research questions:

1) Who participated in the #educattentats affinity space and how?

2) How did the #educattentats affinity space spread?

3) How long did the #educattentats affinity space last?

Method

In this section, we describe how we used digital methods—"online and digital technologies to collect and analyze" data (Snee, Hine, Morey, Roberts, & Watson, 2016, p. 1)—to carry out a descriptive study of the #educattentats affinity space.

Data Collection

We collected data composing this space using a Twitter Archiving Google Sheet (TAGS; Hawksey, 2014). The TAGS collected tweets and retweets (i.e., reposts by one person of another person's original tweet) using the #educattentats hashtag along with metadata such as associated Twitter usernames and timestamps. Our initial examination of these data suggested that most of the activity in this affinity space occurred during the first 28 days of its existence. We therefore focused our analysis on data from November 14, 2015 through December 11, 2015. After private Twitter accounts, banned Twitter accounts and accounts whose #educattentats tweets had since been removed were excluded, the final data set for analysis consisted of 1,208 original tweets and 4,333 retweets.

To supplement the data available through TAGS, we collected additional sources of information using *web scraping*, the use of digital methods to automatically collect information from websites (Munzert, Rubba, Meißner, & Nyhuis, 2015). Two additional sources of information were gathered:

1) the profile description and provided geographic location of Twitter users in the original data set, and

2) a list of additional users who had not composed any tweets but had interacted with the #educattentats affinity space by clicking the "like" button for one or more tweets (however, due to the limited amount of information about "likes" displayed on Twitter, we were unable to identify all such users).

Measures

After collecting these data, we took steps to convert them into measures appropriate for our conceptual framework and research questions. Table 1 contains five measures based on tweet-level data, and Table 2 contains eight measures based on user-level data. Some of these are quantitative measures that represent simple transformations of the original data; others represent qualitative coding of original text data.

[PLACE TABLE 1 ABOUT HERE]

[PLACE TABLE 2 ABOUT HERE]

Results

In this section, we present and comment on the answers to our three research questions.

RQ1: Who participated in the #educattentats affinity space and how?

We found that this affinity space consisted of 3,597 *unique users* representing a variety of *username roles* (see Table 3). The largest group of participants consists of people and institutions affiliated with primary and secondary education, representing over 22% of the coded sample. Other groups explicitly connected to education (i.e., *research, higher education and libraries*; *administration and government*; and *other education*) represent 24% of the sample, and another 14% of the sample consists of groups whose members were often—but not always—connected with children and schools (i.e., *organizations and associations* and *journalism and media*). However, the remaining codes demonstrate that the #educattentats affinity space was open to a

range of other roles and that it is not always possible to determine with certainty who is participating in an affinity space such as #educattentats.

[PLACE TABLE 3 ABOUT HERE]

Our *participation levels* and *concentration levels* measures demonstrate that Twitter users participated in this affinity space in a variety of different ways. Table 4 shows that nearly three-quarters of participants posted tweets with the #educattentats hashtag. However, less than 11% of participants actually posted original tweets, and nearly a quarter of participants posted no tweets at all, only "liking" others tweets. Moreover, the data presented in Table 5 suggests high levels of concentration: Over 15% of the total activity—and over half of the original tweets—can be traced back to the most active 1% of participants. These data suggest that activity in this affinity space was defined by a core group of people who generated professional development content and a larger periphery who assisted in distributing the content.

[PLACE TABLE 4 ABOUT HERE]

[PLACE TABLE 5 ABOUT HERE]

This variety in participation is also demonstrated by our *tweet purpose* measure. As seen in Table 6, over half of the tweets were dedicated to connecting teachers to resources, including advice for teachers and materials that they could use in the classroom. However, many tweets were dedicated to building and sustaining a teaching community within and beyond the #educattentats affinity space, and participants also engaged in sharing the work that was being done in classrooms.

[PLACE TABLE 6 ABOUT HERE]

RQ2: How did the #educattentats affinity space spread?

We examined the spread of the #educattentats hashtag both in terms of relationships between participants and geographical location. Figure 2 is a network visualization of this affinity space. Each dot represents a participant, and lines between participants represent *user connections*; arrows point from the user making a reference to the user being referenced. Once added to the visualization, dots do not change position and are not removed. In hour one, most of the interaction is clustered in two groups each focused on a single participant, either through others' mentions of them or their mention of others; there is also one user who appears to be using the hashtag independently. By hour two, some new, smaller clusters have appeared, the original clusters have attracted more participants, and there appears to be a connection between the core participants in each cluster. Hours three and four see the addition of new peripheral participants clustering around (and presumably retweeting) the posts composed by a small set of core participants, which is also growing, though not as quickly.

[PLACE FIGURE 2 ABOUT HERE]

Because Twitter is an Internet technology, these networks are not limited by geographical space. Figure 3 demonstrates how #educattentats spread in physical space over the first twelve hours of its existence. Each dot represents the *user location* measure for one participant in the space, and the visualization for each hour includes everyone who has participated up to that point. In the first hour, participants in this affinity space had already spread to several parts of France and Brussels. By hour twelve, people throughout France (including Corsica) and in several other Western European countries had participated in the hashtag. Given the nature of #educattentats, it is not surprising that most of the activity in this affinity space should happen in France and its neighbors; however, this space saw participants from throughout the world. Figure 4 shows on a world map every valid *user location* measure associated with the 28 days we have

examined in this paper, demonstrating that people from every inhabited continent participated in the space.

[PLACE FIGURE 3 ABOUT HERE]

[PLACE FIGURE 4 ABOUT HERE]

RQ3: How long did the #educattentats affinity space last?

This affinity space was characterized by a rapid growth early in its existence and by a steady decline thereafter. Figure 5 shows how the *tweets per day*, *retweets per day*, *users per day* and *new users per day* measures increased steadily over the first three days (with the exception of *tweets per day*, which saw a small dip on day two). However, after peaking on day three, all of these measures decrease abruptly through days four and five and then begin steadily decreasing. There is little activity after day ten and virtually none by day 28.

[PLACE FIGURE 5 ABOUT HERE]

Given the context of this affinity space, this pattern is not surprising. #educattentats was first used on the Saturday following the Paris attacks in order to help teachers prepare to return to class on the following Monday. That Monday is represented by day three in Figure 5—precisely the day that all of the measures associated with this research question peaked. Indeed, the figure suggests that the affinity space continued to see regular activity throughout the rest of the school week but that by the following Monday (i.e., day ten), teachers were largely returning to their regular routines, minimizing the need for participation in this affinity space.

Discussion

The results to our study paint the #educattentats hashtag as an affinity space that delivered "just-in-time" professional development to teachers. As previously described in this paper, just-in-time PD is organized around flexible structures in which learning is driven by teachers and

supported by "knowledge brokers." In this section, we highlight how each of these three elements can be seen in these data.

Perhaps the most distinctive feature of the #educattentats affinity space was its flexibility in emerging when needed and disappearing after it had served its purpose. Many hashtag-based affinity spaces dedicated to teacher PD are known—and valued—for their longevity; for example, #edchat has existed for over five years (Gao & Li, 2016). In contrast, #educattentats saw peak activity within three days and virtually disappeared in less than a month. However, Darling-Hammond and McLaughlin (1995) suggest that—so long as they have served their purpose—the disappearance of professional development communities and spaces should not be seen as failure but rather as a natural part of the process. Indeed, as previously mentioned in this paper, the peak of the #educattentats affinity space coincided with the day that teachers and students returned to school after the terrorist attacks, the purpose referenced in the very first tweet using this hashtag. The decline in activity after this day therefore represents the decreasing importance and utility of the professional development being provided within the space and—therefore—the flexibility of this Twitter-based affinity space in responding to teachers' time-sensitive needs.

The flexibility of just-in-time professional development allows teachers to drive their own learning by pursuing the knowledge and resources they need to meet their own needs. Our analysis did not observe any explicit expressions of teacher needs and (for the most part) could not determine whether teachers' needs were being met by the #educattentats affinity space. Nonetheless, our analysis shows that this space was largely driven by education stakeholders: *Username roles* with direct or indirect connections to education constituted the majority of the sample of Twitter profiles that we analyzed, and many of the tweets we coded were dedicated to

either reflecting on or paying homage to the role of the teaching profession in times of crisis. Furthermore, many of the other coded tweets had the purpose of providing support and resources to teachers. That is, although the extent to which these resources met teachers' needs cannot be determined from our analysis, it seems clear that this affinity space was dedicated to supporting teachers in their continued learning.

Teacher-driven learning in a just-in-time PD setting is made possible by the presence of knowledge brokers who can respond to teachers' needs in a timely fashion. As before, it is uncertain from our analysis what the exact needs of teachers participating in the #educattentats affinity space were. However, many of those who participated played the role of knowledge broker, presumably with the intention of supporting those needs. According to Plair (2008), the *knowledge broker* is an individual who helps *knowledge integrators* (those putting knowledge into practice) connect with *knowledge creators,* who are creating or providing knowledge. The high ratio of retweets to original tweets suggests that most #educattentats participants played the role of *knowledge brokers* by retweeting information from a small number of *knowledge creators* (i.e., those posting original tweets). This relationship can be further seen in network visualizations of this space, which show a periphery of participants clustered around a small core, presumably retweeting their original posts.

Limitations and Future Research

Although the data suggest that the #educattentats affinity space was successful in delivering "just in time" professional development, there remain a number of issues that are worthy of further consideration. These issues are predominantly related to the nature of Twitter data and the digital methods that we used. For example, our examination of this space is complicated by our inability to study some of its participants in detail. As previously stated, the

limited availability of certain data from Twitter makes it difficult to determine who has participated by "liking" tweets and impossible to identify all such participants. Furthermore, it is entirely possible that other people accessed the #educattentats affinity space without leaving any digital traces (Carpenter, 2015); that is, we have no way of knowing how many teachers read these tweets but elected not to "like," retweet, or compose any.

Furthermore, the data that we did collect were largely insufficient for determining what teachers' needs are and what they learned from participation in this space. Our coding did not reveal any patterns related to these subjects, and the metadata of a tweet has nothing to contribute to these questions. Similarly, although the high concentration of activity in a small number of participants may be typical of hashtag-based affinity spaces (e.g., Gao & Li, 2016), it also raises questions about whether all participants are learning the same amount from the space. The participants themselves are also worthy of further examination: Although the large number of "other" participants indicates an open space that spread information far and wide, it also invites questions as to how many of the participants actually benefited professionally—or even personally—from the information being shared.

Conclusion

Teachers can play a key civic role in teaching students about important current affairs, and the November 2015 Paris attacks were no exception. However, the importance of this role is matched by its difficulty: Typically, teachers do not expect to—and are not trained to—adjust their planning and curriculum to include lessons about national tragedies. The concept of "just in time" professional development explains the importance of providing targeted and timely support to teachers in contexts such as these, and the #educattentats affinity space demonstrates how people were able to use Twitter to provide PD that was flexible, driven by education

stakeholders and characterized by knowledge brokers. Fortunately, the utility of Twitter in providing this kind of support is not limited to situations where large numbers of teachers need a "just-in-time" response to a major event in their community, country, or world. Indeed, while #educattentats provides an in-depth, large-scale look at how Twitter supports teacher learning in the moment it needs to happen, it is likely that this is happening constantly on a smaller scale and in different spaces throughout the Web.

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Tables

Table 1

Tweet-level Measures

Measure	**Definition and Description**
Tweet purpose	the purpose that a tweet appears to serve based upon qualitative coding of its content; codes describing purposes (Table 6) were developed by two coders who reached *substantial* levels of reliability ($\kappa = .78$; Landis & Koch, 1977)
Tweet day	the calendar day on which a tweet was composed; this measure ranges from 1 (representing 14 November 2015 UTC) to 28 (representing 11 December 2015 UTC)
Tweet hour	the relative hour in which a tweet was composed; this measure ranges from 1 (representing the first hour after the #educattentats hashtag was first used) to 650 (representing the 650th hour after the #educattentats hashtag was first used)
Tweets per day	the number of original tweets composed in a particular *tweet day*
Retweets per day	the number of retweets composed in a particular *tweet day*

Table 2

User-level Measures

Measure	Definition and Description
User role	the role a participant played in the educational or broader community based upon a qualitative coding of their Twitter profile; two raters developed mutually-exclusive codes describing those profiles (see Table 3) and reached *substantial* inter-rater reliability ($\kappa = .65$; Landis & Koch, 1977)
User location	an *estimate* of the geographical location of a participant who tweeted or retweeted using the #educattentats hashtag; developed by retrieving the location listed in their profile and using the Google Maps API to convert that location into latitude and longitude coordinates
Unique users	the total number of unique usernames who had tweeted, retweeted, or "liked" posts using the #educattentats hashtag
Participation levels	the percentage of *unique users* who participated in any of the following forms of participation: posting to Twitter (in any form), composing original posts, retweeting original posts and "liking" posts
Concentration levels	a measure of how much of one kind of participation (i.e., original posts, retweets, or "likes") is concentrated within just a few unique users
User connections	a list of network connections between users created by capturing every mention or retweet of one participant by another
Users per day	the number of *unique users* who tweeted (or retweeted) on a particular *tweet day*
New users per day	the number of *users per day* that had not tweeted prior to that *tweet day*

Table 3

Description and Distribution of Codes for Username Roles

Code	Description	Percentage
Primary and secondary education	accounts associated with teachers, institutions and students in primary and secondary education systems	22.67% (68)
Administration and government	accounts associated with officials and institutions connected with the French education ministry, school administrators and politicians	7.00% (21)
Research, higher education and libraries	accounts associated with professors, institutions, students and employees of research, higher education, or library institutions	10.33% (31)
Other education	accounts associated with people who expressed interest in education but whose exact role was either unclear or did not fit into any of the above categories	6.67% (20)
Organizations and associations	accounts associated with private or non-profit organizations, many of which had educational interests, including parents' organizations, advocacy groups and teachers' unions	8.33% (25)
Journalism and media	accounts associated with media outlets and their employees; many were focused specifically on educational or children's issues	5.67% (17)
Other	accounts associated with people expressing a clear identity that did not fit any of the above categories	18.00% (54)
Unclear	accounts with profiles that did not clearly state a role or identity for the associated user	7.00% (21)
Blank	accounts that contained no information in the profile	14.33% (43)

Note. $N = 300$

Table 4

Participation Levels in the #educattentats Affinity Space

Type of Participation	Percentage of Users Engaging
Posting to Twitter	77.24% (2,779)
Composing original posts	11.09% (399)
Retweeting original posts	70.54% (2,538)
"Liking" posts	39.55% (1,423)

Note. *N* = 3598

Table 5

Concentration Levels of Activity in the #educattentats Affinity Space

Percentage of Users	Original Tweets	Retweets	Likes	Total Activity
1%	51.97%	13.46%	16.45%	15.74%
2%	64.88%	19.86%	24.15%	21.56%
2.5%	69.16%	22.27%	27.32%	23.92%
5%	81.00%	31.34%	38.63%	32.46%
10%	95.81%	43.05%	53.23%	43.49%

Table 6

Description and Distribution of Codes for Purposes of Tweets

Code		Percentage
Invite collaboration and build community	tweets that publicized the affinity space, invited others to collaborate on projects, reflected on the civic role of teachers, or expressed appreciation for the broad teaching community	18.00% (54)
Provide pedagogical support	tweets that included or linked to information or resources that helped teachers prepare themselves emotionally to teach about the November attacks or provided advice for how to teach sensitive subjects related to the attacks; many tweets also referenced resources for learners but in the overall context of providing support for teachers	38.67% (116)
Share resources for learners	tweets that linked to resources meant to support students and children's understanding of the November attacks; these included lesson plans, slideshows, drawings and images and articles from children's media	26.33% (79)
Describe classroom experiences	tweets that included or linked to reported experiences talking in class about the November attacks; these included pictures of student work, links to student videos and teacher testimonies	13.33% (40)
Other / unclear	tweets whose purpose did not fall into one of the above categories or could not be determined	3.67% (11)

Note. $N = 300$

Figures

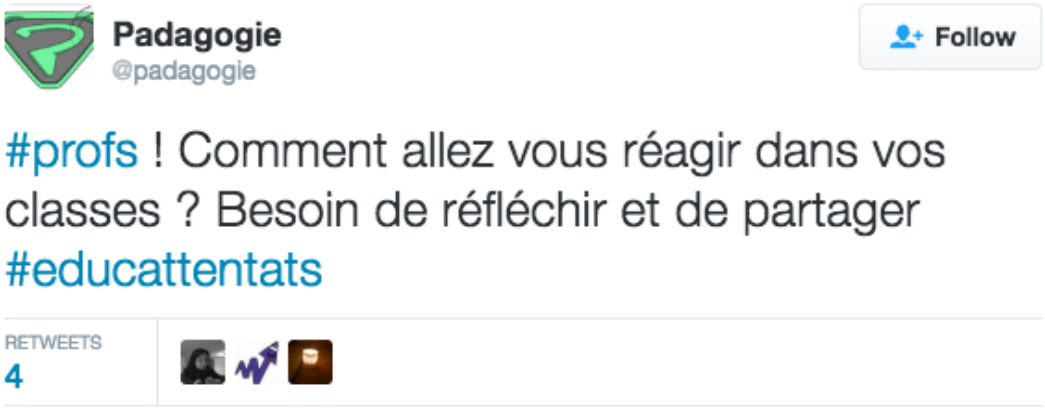

Figure 1. Screenshot of the first tweet using the #educattentats hashtag. The text translates to "#profs ! How will you respond in your classes? Need to reflect and share #educattentats"

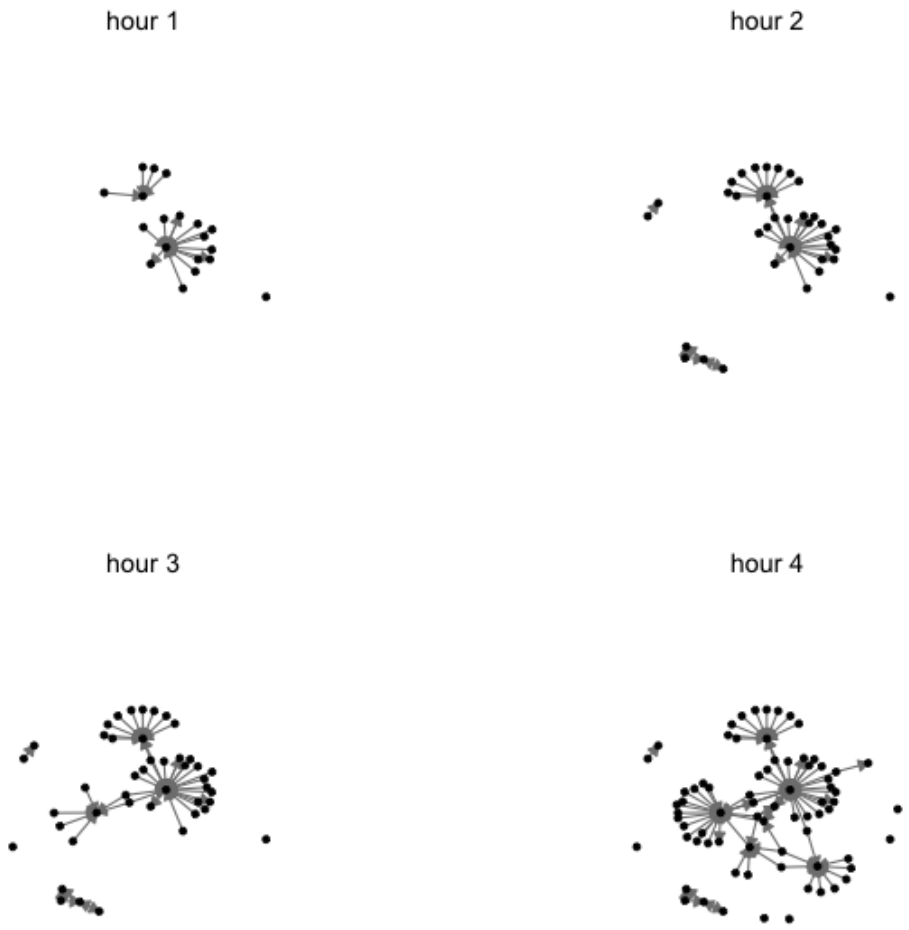

Figure 2. *User connections* between #educattentats participants from *tweet hour* 1 through *tweet hour* 4.

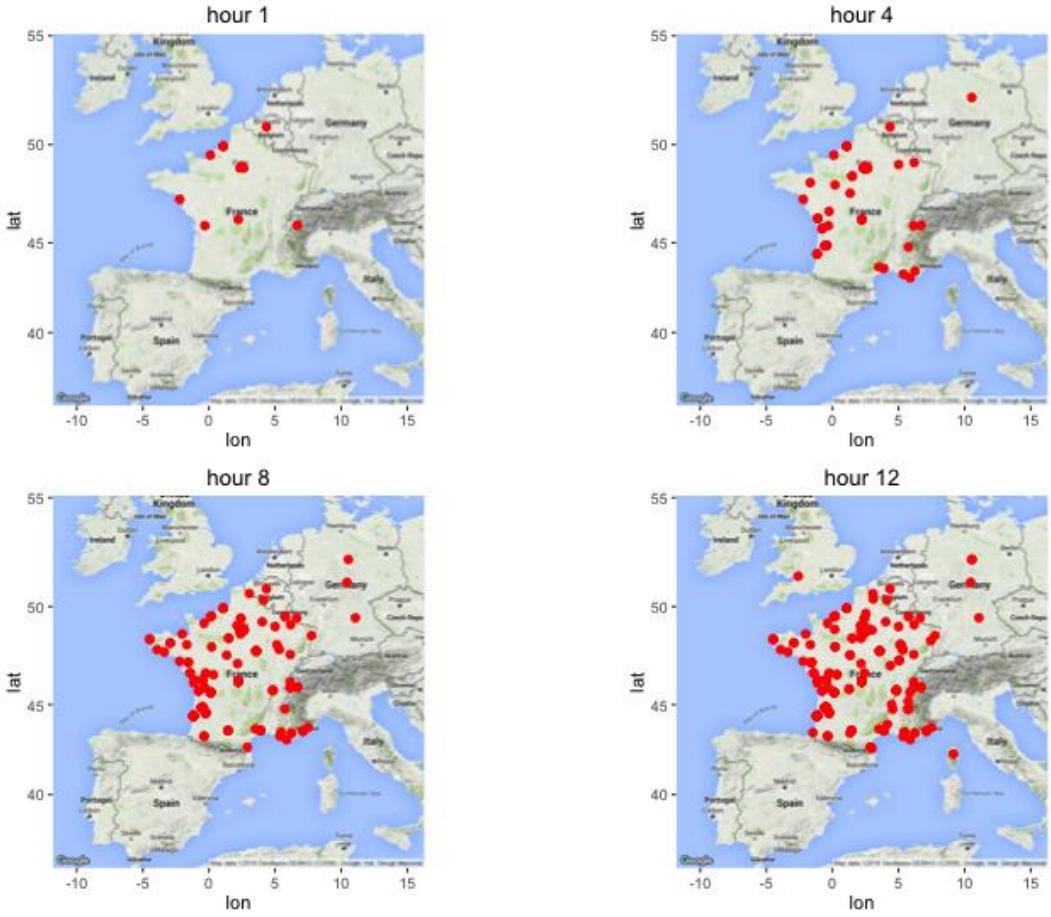

Figure 3. *User location* of #educattentats participants in France and neighboring countries from *tweet hour* 1 through *tweet hour* 12.

Figure 4. *User location of* #educattentats participants through *tweet day* 28.

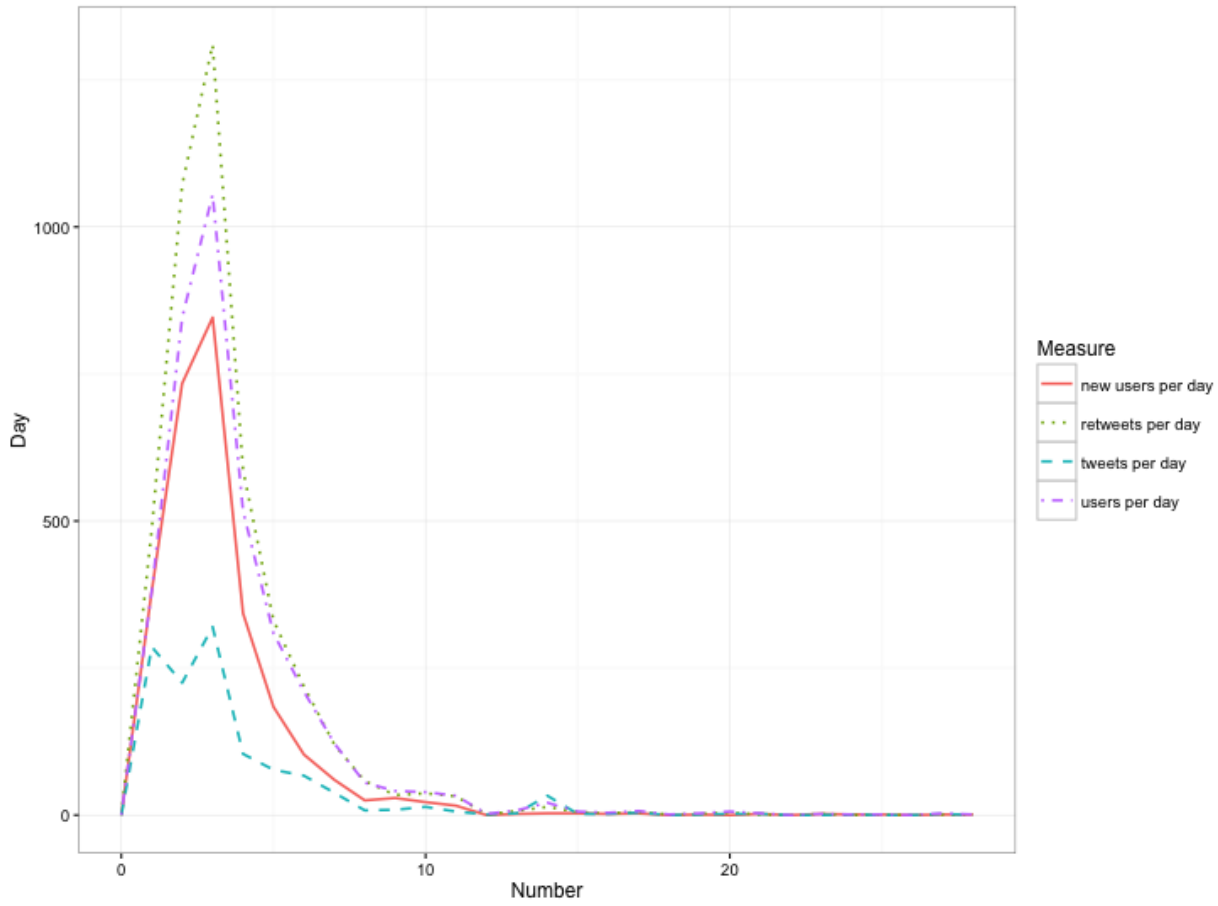

Figure 5. *New users per day*, *retweets per day*, *tweets per day*, from *tweet day 1* through *tweet day* 28.