A Tale of Two Twitters:
Synchronous and Asynchronous Use of the Same Hashtag

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Abstract: Communication in online settings can occur at the same time (synchronously) or at different times (asynchronously). A new form of online learning in which teachers communicate both at the same time and at different times is through social media platforms such as Twitter. In this descriptive, exploratory study, we set out to explore differences between synchronous and asynchronous interactions through a State Educational Twitter Hashtag (SETH) for educators in Michigan in the United States of America. We collected more than 8,000 tweets and coded for whether the tweet was during either part of a once-per-week synchronous "chat" or all other times of the week. We compared #miched between the two modes and then determined differences in terms of interactions and sentiment. Our analysis is discussed in light of findings from research on synchronous and asynchronous learning.

Introduction

Learning online takes one of two forms in terms of synchronicity, the timing of communication. Synchronous (real-time) learning occurs when learners and teachers are communicating simultaneously, typically by meeting at the same time. Asynchronous (delayed-time) learning occurs when individuals are completing instructional activities on their own time, without depending on immediate interaction. Many online educational spaces use a combination of both synchronous and asynchronous learning.

One form of online learning germane for teacher educators is State Educational Twitter Hashtags, or SETHs. Many teachers use Twitter as a means of self-directed professional development (Carpenter & Krutka, 2014), and SETHs serve as affinity spaces where teachers organize themselves around shared interests (Authors, 2016). Like other online educational spaces, SETHs are characterized by both synchronous interactions (i.e., regularly-scheduled, weekly "chats") and asynchronous interactions (i.e., other times when chats are not occurring.) In this study, we examine how synchronous and asynchronous communication differ in terms of interaction and sentiment across one SETH, #miched. Since, previous research has highlighted the potentially-different impacts of synchronous and asynchronous communication on learning, knowing more about the nature of communication within SETHs may yield insights research and practice. In specific, this study may help us understand how teachers use SETHs as a novel setting to gain new ideas and perspectives on problems of practice and build a professional learning network to align with, support, or provide an alternate space for teacher education.

Literature Review

Asynchronous Learning

Asynchronous online learning (AOL) describes online activities and practices that do not require simultaneous participation (Johnson, 2006). Asynchronous learning has long been one of the main methods through which distance education takes place (Tait, 2003) and is still prominent in online learning (Bourne et al., 1997; Johnson, 2006; Murphy, Rodríguez-Manzanares, & Barbour, 2011). Current applications of AOL include participation in discussion forums, exchanging comments, or giving and receiving feedback.

Although AOL is time-independent—and convenient for learners—it is also associated with drawbacks in terms of engagement and sentiment. In AOL, delays in interactions can lead to feelings of isolation between students and instructors (Huang & Hsiao, 2012; Johnson, 2006; Vonderwell, 2003). Furthermore, in text-only AOL, relationship building takes longer than in richer modes due to lack of nonverbal cues (Walther, 1992). When text-

only asynchronous communication is combined with these delays in feedback, it becomes harder to form impressions of others in AOL, which may negatively affect students' attitudes and learning (Vonderwell, 2003).

Synchronous Learning

Synchronous online learning (SOL) requires simultaneous (real-time) participation of students and instructors (Johnson, 2006) through networked tools. These tools can either be text-based or use richer forms of communication (Bourne et al., 1997). This "at-the-same-time" participation is more similar to traditional classroom instruction than AOL (Murphy et al., 2011); however, in contrast to face-to-face classrooms, they allow for physical remoteness (Murphy et al., 2011).

Synchronicity can impose certain constraints, such as difficulty in scheduling (Bali & Meier, 2014); however, it also has a number of advantages. The primary affordance of SOL is the ability to exchange immediate feedback. This helps learners to advance their understanding in real-time through dynamic interactions with their peers and instructors (Huang & Hsiao, 2012). SOL also lends itself to establishing a community of learners wherein learners may form impressions of their peers and instructors more quickly and easily. The strength of SOL in social aspects has been found to increase student satisfaction with online courses (Cao, Griffin & Bai, 2009).

Purpose and Research Questions

The literature on online learning has identified two distinct modes of communication and identified differences between the two in terms of interaction and sentiment. Asynchronous online learning is generally held to make interaction more difficult and poses obstacles to students' forming impressions of each other. In contrast, synchronous online learning allows for immediate, dynamic exchanges between learners and may also increase students satisfaction.

The purpose of this paper is to examine the presence and effect of each of these modes within one State Educational Twitter Hashtag, #miched. We do so by answering the following research questions:

1. How much activity in the #miched hashtag corresponds to the asynchronous and synchronous modes of learning?
2. How do asynchronous and synchronous activities in the #miched hashtag differ in terms of interaction and sentiment?

Knowing answers to these questions will help us better identify the unique affordances of synchronous and asynchronous activities in a SETHs context as well as better understand how teachers participate in SETHs. This information, in turn, will more clearly illustrate how SETHs might serve as either independent opportunities for teacher professional development or supports for more formal opportunities.

Method

To answer these questions, we analyzed $N = 8,329$ tweets including the #miched hashtag that were composed during the month of January 2016. These tweets were retrieved using a "Twitter Archiving Google Sheet" (TAGS; Hawksey, 2014) as part of a broader collection of SETHs from September 2015 through August 2016.

To measure engagement and sentiment, we automatically identified *mentions*, *replies*, and *likes* for each tweet and calculated the mean number of each during synchronous and asynchronous activities. We also used the Stanford NLP dictionary to code for positive (0-4) and negative (0-4) sentiment, again distinguishing between synchronous and asynchronous activities. To make distinctions between tweets composed during synchronous activities and tweets composed during asynchronous activities, we manually identified all tweets composed any time between the formal beginning of a chat and the moment when the moderator announced its end.

Results

To answer our first research question, we present the number of synchronous and asynchronous tweets over time. As seen in Figure 1, chats happened in a one-hour window on a regular, weekly basis, with the tweets from any one chat accounting for a substantial portion of #miched tweets for that day. Of the 8,274 tweets examined in this study, 74.64% ($n = 6,176$) resulted from asynchronous activities, with the other 25.35% ($n = 2,098$) resulting from synchronous chats. It is worth noting that although—as previously noted—tweets from chats only account for

just over a quarter of the #miched tweets in January 2016, these chats only account for approximately one-half of one percent of the time.
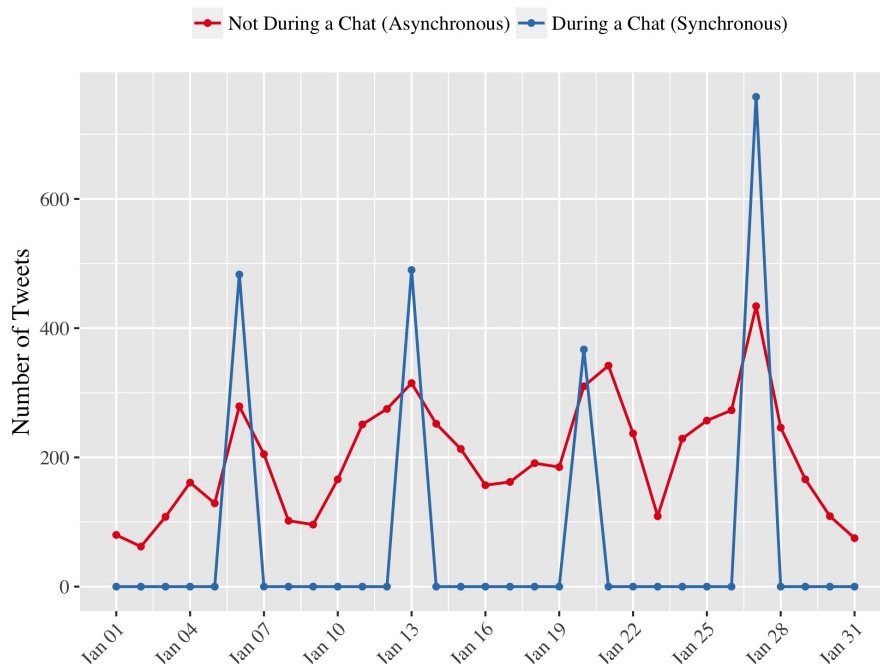
Figure 1. Comparison of Number of Tweets During and Not During a Chat for #miched for January 2016.

To answer our second research question, we calculated differences between asynchronous and synchronous activities in #miched in terms of interaction and sentiment. As seen in Table 1 below, and as predicted in past research, there were noteworthy differences in terms of interaction and sentiment between tweets during modes. Replies were more than four times greater during synchronous time ($t = 15.69$, $p < .001$, $d = .39$) and likes were around twice as frequent ($t = 10.68$, $p < .001$, $d = .27$), while retweets were slightly less frequent ($t = 4.26$, $p < .001$, $d = .11$). Positive sentiment was greater ($t = 11.72$, $p < .001$, $d = .29$) and negative sentiment slightly less frequent, though with a small effect size, during synchronous tweets ($t = 2.79$, $p = .005$, $d = .07$).

	Mean Interactions / Sentiment Not During a Chat (Asynchronous; $n = 6{,}176$)	Mean Interactions / Sentiment During a Chat (Synchronous; $n = 2{,}009$)	Difference
Replies	0.15	0.68	$t = 15.69$, $p < .001$, $d = .39$
Likes	0.63	1.16	$t = 10.68$, $p < .001$, $d = .27$
Retweets	0.59	0.42	$t = 4.26$, $p < .001$, $d = .11$
Positive Sentiment (0-4)	0.81	1.11	$t = 11.72$, $p < .001$, $d = .29$
Negative Sentiment (0-4)	0.28	0.24	$t = 2.79$, $p = .005$, $d = .07$

Table 1. Differences in characteristics of tweets during synchronous and asynchronous periods.

Discussion and Conclusion

In this descriptive, exploratory study, we examined synchronous and asynchronous modes of communication in one new site for teacher education, a State Educational Twitter Hashtag. We coded 8,329 tweets from one month of #miched and examined the balance between asynchronous and synchronous tweets as well as differences in interaction (replies, likes, and retweets) and sentiment across these two modes. We found that during

synchronous activities, replies and likes are much more common, in line with past research that highlights the benefits of SOL for immediate communication. Positive sentiment was also higher and negative sentiment lower during chats, which may reflect findings in previous research that synchronous learning has benefits for building community. Unlike replies and likes, retweets were higher during asynchronous communication. This may reflect that #miched participants use retweeting not to interact with the original tweeter but rather to spread information more broadly.

Based on these results and the findings of previous research, we suggest that SETHs and other Twitter-based learning spaces are places where important professional development interactions are occurring. Given the number of tweets taking place during the month examined in this study, and knowing that over 50% of SETHs participants are teachers or other educational professionals (Authors, 2016), we suggest that this is an activity that may have an impact on classrooms around the United States. Building on these findings, we may be able to speak to how teachers use SETHs in different ways for different professional learning purposes, namely to gain different perspectives around key problems of practice, communicate and build a professional learning network, and in ways we might not yet understand or even anticipate.

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