

A tale of two subreddits: Change and continuity in teaching-related online spaces

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Abstract

Despite social media's ubiquity in modern life, research on some topics related to educators' use of social media for professional purposes remains underdeveloped, such as how use may change over time. This study explores educators' self-directed learning through social media by comparing change and continuity in how users contribute, interact and converse in two teaching-related subreddits, r/Teachers and r/education. More than a million Reddit contributions spanning three-and-a-half years comprise the dataset: 696 660 contributions to r/Teachers from 55 148 users and 339 618 contributions to r/education from 43 711 users. Learning ecology and affinity space concepts frame multiple methods of analysis, including quantitative measures of individual contributions, content interactions and social interactions, as well as qualitative content analysis of top posts and responses. Findings are discussed in light of the literature as change and continuity in Redditors' participation patterns in the two subreddits suggest distinct spaces for distinct purposes. This study offers a starting point for further work to understand the opportunities and challenges of self-directed learning in open and complex social media spaces.

Key words: educators, teachers, self-directed learning, learning ecologies, affinity spaces, social media, online discussion forum, Reddit

Social media tools have assumed important roles in various professions, including education. Many educators use social media to find, exchange and discuss ideas and resources (Macià & García, 2016). The body of research covering educators' uses of social media for professional learning has been growing. However, past work has focused on some platforms (eg, Twitter, Facebook), while paying relatively scant attention to others (eg, Instagram, Reddit) and has included only limited exploration of many relevant topics (Bruguera, Guitert, & Romeu, 2019; Lantz-Andersson, Lundin, & Selwyn, 2018; Veletsianos, Johnson, & Belikov, 2019).

One area in need of further study is how educators' use of social media for self-directed learning (SDL) changes, or remains the same, over time. Social media conversations naturally evolve as participants learn (Gao, Luo, & Zhang, 2012), external circumstances change (Veletsianos *et al.*, 2019) and platforms' popularity shift. Approaching social media use at a single point in time, therefore, risks missing key trends.

Practitioner Notes

What is already known about this topic

- Educators use social media to reach outside their local contexts for self-directed learning.
- Teaching-related subreddits vary in how users contribute and interact.

What this paper adds

- Different online spaces host distinct kinds of discussion.
- Educators' participation in online spaces is not static.
- Social media research methods should account for the possibilities of change and continuity in contributions, interactions and conversations.

Implications for practice and/or policy

- Teaching-related subreddits continue to grow and may offer helpful content and interactions to users; however, self-directed learning through social media also necessitates increased digital literacy.
- r/Teachers appeared to be a conversational space primarily for teachers.
- r/education seemed to be a bulletin board space for posting about broader educational topics.

Several recent studies have called for further investigation of educators' social media activities over time (Veletsianos *et al.*, 2019; Xing & Gao, 2018). We address this call through quantitative and qualitative analyses of three-and-a-half years of activity from two online discussion forums within Reddit: the r/Teachers (<https://www.reddit.com/r/Teachers/>) and r/education (<https://www.reddit.com/r/education/>) subreddits. We seek to understand how two subreddits evolved over time and how they may be distinguished from each other.

We focus on Reddit because it is an understudied social media platform with a large and international base of users. Recently, Reddit was rated the third most popular website in the U.K. and seventh in the United States (Alexa, 2020), with more than 430 million average monthly active users globally and 130 000 active discussion forums, called *subreddits* (Reddit Inc., 2020). Among these many subreddits, several are education-focused, including 16 that comprise the Reddit Education Network. However, Reddit's potential for hosting teaching-related discussions has been the subject of relatively little research (eg, Staudt Willet & Carpenter, 2020) compared to other social media platforms. This study, therefore, adds to the literature on educators' SDL through social media by comparing and contrasting change and continuity in how users contribute, interact and converse in two subreddits.

Review of relevant literature

To contextualize this research, we review the literature on educators' SDL through social media before focusing on studies relevant to Reddit. We also address prior work related to change and continuity in online spaces.

Educators' self-directed learning through social media

Educators acquire valuable knowledge and skills during their initial teacher preparation, but the complexity of education requires continuous learning. Professional development (PD) is, therefore, offered to and sometimes mandated for teachers. Although well-designed PD can have positive effects (Gore *et al.*, 2017), educators frequently lament the quality and quantity of

PD available to them (eg, Hofman & Dijkstra, 2010; Organisation for Economic Co-operation & Development, 2009). Some PD programs have even resulted in negative effects on participating educators (Borman, Gamoran, & Bowdon, 2008). Given such outcomes and criticisms, many educators engage in SDL beyond the required PD. SDL involves individuals assuming responsibility for their learning and managing associated cognitive, contextual and motivational processes (Garrison, 1997). SDL can occur in both formal and informal settings.

Digital technologies have become integral to many SDL activities (Merriam & Baumgartner, 2020), especially in helping educators to self-direct more of their professional learning and connect with colleagues beyond their individual schools (Beach, 2017; Carpenter & Krutka, 2015; Macià & García, 2016). In particular, educators' use of social media platforms such as Twitter (Staudt Willet, 2019), Facebook (Ranieri, Manca, & Fini, 2012), Pinterest (Schroeder, Curcio, & Lundgren, 2019) and Instagram (Carpenter, Morrison, Craft, & Lee, 2020) for SDL has become quite common. Although SDL is often associated with individual pursuits such as independent study, social media can also facilitate learning that features both autonomy and collaborative elements (Kim, Lee, & Park, 2019; Lantz-Andersson *et al.*, 2018). These platforms create opportunities to build relationships, develop networks and communities, and gain vital emotional support, which can reduce feelings of professional isolation (Carpenter & Krutka, 2015; Macià & García, 2016). Unlike PD that is scheduled months in advance and can be quite expensive (eg, conferences), social media can facilitate free and just-in-time learning (Bruguera *et al.*, 2019). The value of such on-demand support has been underscored recently as the COVID-19 pandemic has required educators to navigate dramatic shifts in their work (Trust, Carpenter, Krutka, & Kimmons, 2020).

Social media also create thorny ethical and professional challenges for educators. These platforms can blur personal and professional boundaries (Fox & Bird, 2017), and expose teachers to pressure to communicate with students, families and colleagues outside of work hours (Selwyn, Nemorin, & Johnson, 2017). The lack of traditional information gatekeepers means that social media content may not be vetted or regulated, which has sometimes led to the dissemination of problematic curriculum materials (eg, Sawyer, Dick, Shapiro, & Wismer, 2019). Educators may also experience challenges related to online interactions with other educators (Carpenter & Harvey, 2019). Such obstacles have led some critics to wonder if social media can actually help advance the education profession (Zhang, 2009).

Reddit as a source of self-directed learning

Reddit's numerous discussion forums (ie, subreddits) are organized by volunteers and feature conduct guidelines and moderators to enforce them. Subreddits, therefore, include both user-generated and user-managed content. Like earlier online discussion forums (Kayany, 1998; Nonnecke & Preece, 2003), Reddit's structure creates threaded conversations with *posts* and *responses*. Redditors (ie, registered users of the Reddit platform) can upvote or downvote posts and responses; content within subreddits is ordered based on cumulative voting scores.

Because Redditors do not typically disclose their location in their profiles and usernames are nearly always pseudonyms, participants' shared interests supersede distinctions that might dominate their face-to-face interactions. Reddit's norm of anonymity (Haythornthwaite *et al.*, 2018) is quite different from practices on Twitter and Facebook, where educators' participation is often linked to their real identities. Redditors may be unaware of other users' ages or experience levels. For instance, a teacher and a principal could find their discussion on Reddit to be less influenced by the power dynamics that might define their conversation if they worked at the same school. In this way, Reddit's anonymity could paradoxically foster more authenticity and openness than might be found in other social media spaces where there can be more pressure

for teachers to embody idealized identities (Robson, 2018) or promote themselves (Staudt Willet, 2019). Anonymity has, however, sometimes contributed to the development of toxic subcultures in online discussion forums (Kayany, 1998; Massanari, 2017).

As of September 2020, multiple teaching-related subreddits had thousands of subscribers. Despite such subreddits' existence, Reddit has received scant attention from researchers when compared to other online platforms used by teachers for SDL (Bruguera *et al.*, 2019). We identified only four prior studies exploring teaching and learning on Reddit.

Haythornthwaite *et al.* (2018) and Esteve del Valle, Gruz, Kumar, and Gilbert (2020) studied "Ask" subreddits, a particular genre of discussion forums where people can ask questions of experts on particular topics (eg. r/AskScience). These researchers described such subreddits as examples of *learning in the wild*, which we connect to SDL. In this type of learning environment, participants ask questions and others voluntarily respond and argue about answers. Participants in these discussions regularly "make the effort to present information in informed, accessible ways, often with citations to further resources" (Haythornthwaite *et al.*, 2018, p. 219).

Carpenters, McDade, and Childers's (2018) study used qualitative content analysis to investigate 20 days of SDL in the r/Teachers subreddit. Posts were overwhelmingly from individuals who identified as educators and users most frequently sought and gave advice related to technical and emotional aspects of teaching. Top-rated responses often provided advice that aligned with the nature of the advice-seeking post, but on some occasions, Redditors provided support or advice that reframed the original post. Staudt Willet and Carpenter (2020) studied four teaching-related subreddits through comparative quantitative analysis. Findings suggested Reddit's teaching-related subreddits differ in important ways, as defined by unequal levels of individual contributions, content interactions and social interactions. For instance, conversation threads in r/Teachers had on average three-and-a-half times as many responses as those in two of the other subreddits.

None of these prior studies of teaching-related subreddits combined content analysis and quantitative analysis, nor did any address change over time. Thus, despite hosting many teaching-related discussion forums with thousands of monthly posts (Staudt Willet & Carpenter, 2020), Reddit has received limited attention in the literature. Arguably, Reddit's features might create unique affordances and constraints for users and influence the nature of discourse and learning in subreddits. Given these features, educators' Reddit activities may differ in important ways from their uses of other social media for SDL. That is, subreddits may fill particular niches in educators' broader PD landscape.

Change and continuity in online spaces

As educators' professional needs shift with time (Richter, Kunter, Klusmann, Lüdtke, & Baumert, 2011; Veletsianos *et al.*, 2019), their social media use may also evolve (Harvey & Carpenter, 2020; Rehm & Notten, 2016). Additionally, social media platforms themselves regularly change over time (Hogan & Quan-Haase, 2010) and new or altered features can impact users' experiences. The rise and fall of platforms' popularity may result in studies describing social media that become virtually unused a few years later. For example, at one time, Myspace was a setting for informal learning (Greenhow & Robelia, 2009). However, between 2009 and 2011, usage of Myspace dropped off dramatically. This means research that uses a *snapshot* approach to study a single point in time risks missing key trends in social media usage (see Veletsianos *et al.*, 2019; Xing & Gao, 2018).

Framework

We used the learning ecologies and affinity spaces concepts jointly to frame our investigation of educators' SDL on Reddit. Prior studies on educators' voluntary use of social media have also used

learning ecologies (Peters & Romero, 2019; Stevenson, Bower, Falloon, Forbes, & Hatzigianni, 2019; Veletsianos *et al.*, 2019) and affinity spaces framings (Bruguera *et al.*, 2019; Greenhalgh, Rosenberg, Staudt Willet, Koehler, & Akcaoglu, 2020; Staudt Willet & Carpenter, 2020), but this paper uniquely combines the two.

First, learning ecologies are complex systems of interconnected contexts in which learning occurs (Veletsianos *et al.*, 2019), which makes this framework appealing to investigate a platform like Reddit that hosts numerous distinct but potentially connected discussion forums (ie, subreddits). Ecologies are composed of *complementary components*, which means different parts do different things and contribute to learning in distinct ways. An ecological framing considers how disparate pieces fit together. For instance, Stevenson *et al.* (2019) delineated how various elements of professional learning benefitted teachers in particular ways and Peters and Romero (2019) described how engagement patterns and learning strategies in informal contexts helped to support formal academic learning. Ecologies also undergo *transitions*; that is, the systems sometimes change. Veletsianos *et al.* (2019) reported a reciprocal relationship between changes in academics' life circumstances and changes in their social media use. Their results reflect both complementary components and ecological transitions.

Second, affinity spaces are spaces wherein a shared interest or goal draws people together. This shared affinity is expressed through the content of the space and in users' interactions with each other (Gee, 2004). With Reddit, socializing around the common topic of interest has been shown to be a strong motivator of participation (Moore & Chuang, 2017). Affinity spaces are completely *open spaces* where "whoever enters the space ... is in the group and belongs" (Gee & Hayes, 2012, p. 132), and as such, this construct seemed apt for our investigation of an open, largely anonymous platform like Reddit.

Together, learning ecologies and affinity spaces allow us to frame this exploration of educators' SDL through Reddit in terms of both broad contextual considerations and specific, precise measures of activity. We can approach ecological phenomena of complementary components and transitions through affinity space measures of contributions, interactions (both content and social) and conversations (both topics and discourses).

Research question

In this study, we build upon our prior research on teaching-related subreddits (Carpenter *et al.*, 2018; Staudt Willet & Carpenter, 2020) and address the lack of scholarship on educators' social media use over time by exploring a single research question: How have the r/Teachers and r/education subreddits changed, or remained the same, over time? We explore ecological phenomena of change and continuity across three-and-a-half years of subreddit activity by considering five affinity space measures: (a) individual contributions, (b) content interactions, (c) social interactions, (d) topics of conversation and (e) types of discourse.

We selected r/Teachers and r/education for analysis because of various indications that they focused on matters relevant to teachers (Staudt Willet & Carpenter, 2020). Both are part of the Reddit Education Network and as of September 2020, these subreddits had far more subscribers (186 000 and 117 000 subscribers, respectively) than any other teaching-related subreddits.

Method

We collected Reddit data using Google Cloud's BigQuery web service (<https://console.cloud.google.com/bigquery/>). Data were collected retroactively and therefore do not include content deleted by authors or subreddit moderators. We collected 696 660 contributions to r/Teachers from 55 148 contributors dated between January 1, 2016, and June 30, 2019, a total of 54 933 posts

and 641 727 responses to those posts. We also collected 339 618 contributions to r/education from 43 711 contributors, a total of 252 340 posts and 87 278 responses to those posts during the same time span. Altogether, 1 036 278 contributions to r/Teachers and r/education comprised our dataset.

We used the statistical computing software R (R Core Team, 2020) to stratify the data into six-month periods (eg, January to June 2016) and conduct analyses addressing the first three dimensions of our research question: individual contributions, content interactions and social interactions. We performed these calculations similarly to our previous work (Staudt Willet & Carpenter, 2020). We used the R package igraph (Csárdi, 2020) to conduct social network analysis and ggraph (Pedersen, 2020) to create network visualizations.

To address the fourth and fifth dimensions of our research question, for each of the seven time periods, we conducted the qualitative content analysis of the top-ten posts (defined by highest voting scores) in each subreddit and up to the top-ten responses to each of these. We analyzed top posts and responses because they reflect content that is most visible and valued in the subreddits. Thus, we hand-coded 140 Reddit posts and 1460 responses to understand common topics of conversation and types of discourse.

We initially applied a set of a priori codes from Haythornthwaite *et al.*'s (2018) research on "Ask" subreddits, but we did not find those codes to be suitable for these teaching-related subreddits. We, therefore, engaged in three rounds of *open coding* (Saldaña, 2016) to develop an emergent coding scheme to categorize posts and a second emergent coding scheme for responses (see supplementary online materials for codebooks). Individual posts and responses could receive multiple codes. In each round, both authors independently coded subsets of data and then met to discuss initial interpretations, resolve discrepancies and refine the codebooks. In total, both authors coded all 140 posts; both authors also coded 279 responses to establish reliability. After the third round of coding, we finalized code definitions and calculated inter-rater reliability scores. Percent agreement for individual codes ranged 84–99% and Cohen's kappa ranged .58–.98, representing substantial to the almost perfect agreement (Landis & Koch, 1977). With reliability established through dual coding, the second author then coded the remaining 1181 responses.

Results

Individual contributions

We analyzed how the r/Teachers and r/education subreddits changed over time in terms of daily contributions and the number of contributors. First, we looked at the number of posts and responses each day from January 1, 2016, to June 30, 2019 (Figure 1). Note that the *y*-axis is on a log10 scale, which compresses larger *y*-values. This allows posts and responses from both subreddits to be represented on a single plot, despite the differences in the order of magnitude. Both post and response numbers in r/Teachers have been trending upward since 2016, while daily post numbers in r/education have been trending downward, with an especially rapid drop in 2019. In both subreddits, there appear to be small June-July and December-January dips each year, which may reflect a school-year-related pattern.

The log transformation of the *y*-axis means that these trends should not be compared visually. Instead, we calculated the slopes of linear regression lines. The slope of the r/Teachers posts linear regression line is 0.03 ($p < .001$) and the slope of the responses linear regression line is 0.49 ($p < .001$). With each passing month, we would expect one additional daily post and 15 additional daily responses; concomitantly, response threads are becoming longer over time. In r/education, the slope of the posts linear regression line is -0.08 ($p < .001$) and the slope of the responses linear regression is 0.00 ($p = .680$). For each month that passes, we would expect between two and

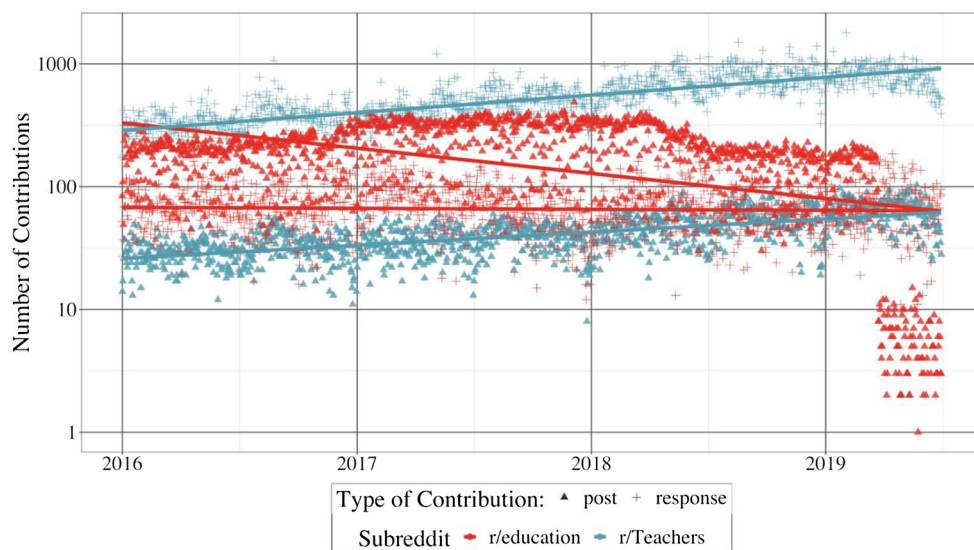


Figure 1: Daily contributions to r/Teachers and r/education
[Colour figure can be viewed at wileyonlinelibrary.com]

three fewer daily posts and a similar number of daily responses. The decrease in daily posts was even more rapid during the first half of 2019.

We also calculated the number of contributors during each time period (Figure 2). In r/Teachers, the number of posters and responders increased over time, with more new responders than new posters. In r/education, the number of responders was consistent, but the number of posters decreased steadily from 2017 onward. The drop-off in r/education posts in 2019 does not seem to be explained entirely by this longer trend of decreasing posters. Also, in contrast to r/Teachers, r/education typically had more posters than responders, until the first half of 2019.

Content interactions

We analyzed how content interactions in the two subreddits changed over time in terms of response rate and thread length. First, we calculated the response rate as the percentage of posts receiving at least one response (Figure 3). Both subreddits' response rates were consistent over time. However, in each period, 80–90% of r/Teachers posts received responses, whereas the r/education response rate was 5–10%.

We also calculated the average thread length; that is, the mean number of responses per post (Figure 4). r/Teachers posts that received responses averaged a steady range of 12–15 responses across the time. For the 5–10% of posts in r/education that received responses, thread length increased over time, from approximately three responses per post on average to nearly 10.

Social interactions

We analyzed how social interactions in the r/Teachers and r/education subreddits changed over time in terms of *node degree* (ie, how connected users were; Figure 5), *transitivity* (ie, how clustered conversations were; Figure 6) and *reciprocity* (ie, the likelihood of mutual responses; Figure 7). We also created social network visualizations of the subreddits during the first, fourth and seventh time periods (Figure 8) to depict the overall connections between contributors through responses.

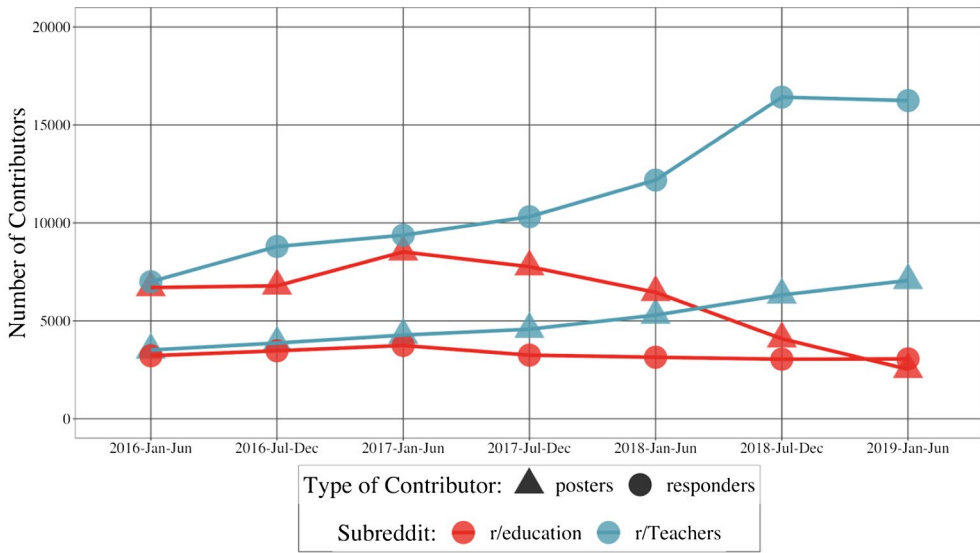


Figure 2: Contributors to r/Teachers and r/education
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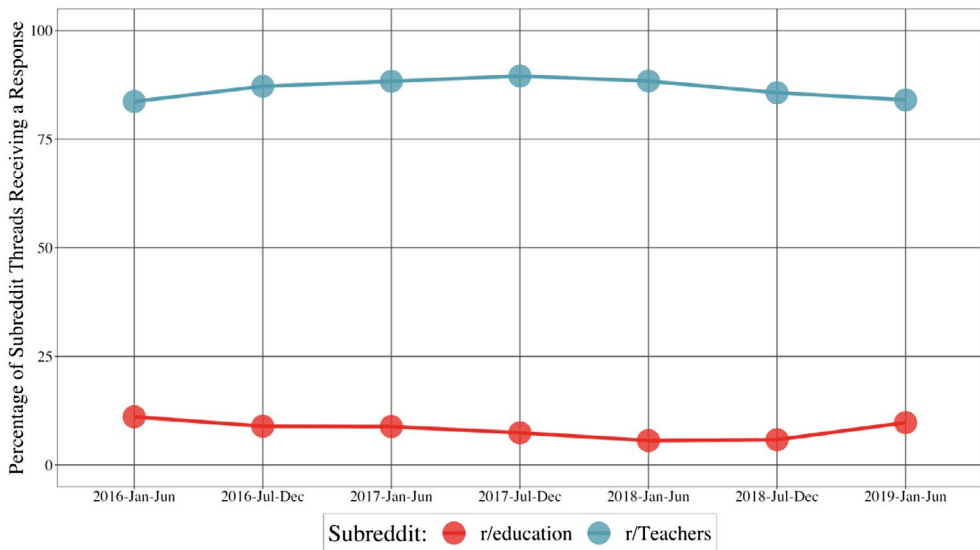


Figure 3: Response rate in r/Teachers and r/education
[Colour figure can be viewed at wileyonlinelibrary.com]

The mean *node degree* during each time period can be understood as the average number of connections someone has with other subreddit users through sending or receiving responses. We found node degree in both subreddits remained relatively consistent. On average, r/Teachers contributors were connected to approximately seven other users, whereas r/education contributors were only connected to two. Node degree for r/education did appear to increase slightly from mid-2017 onward, up to approximately three in the first half of 2019.

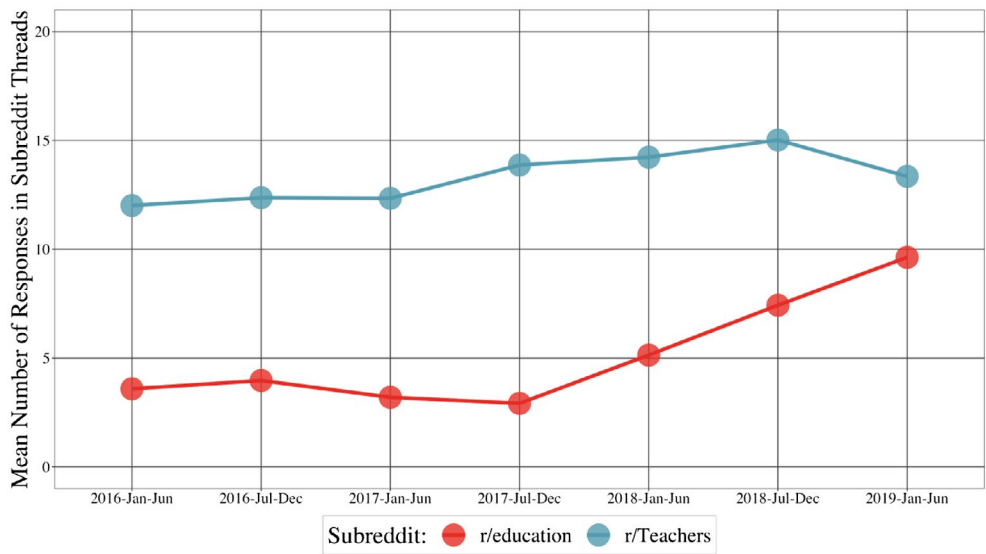


Figure 4: Mean thread length in r/Teachers and r/education
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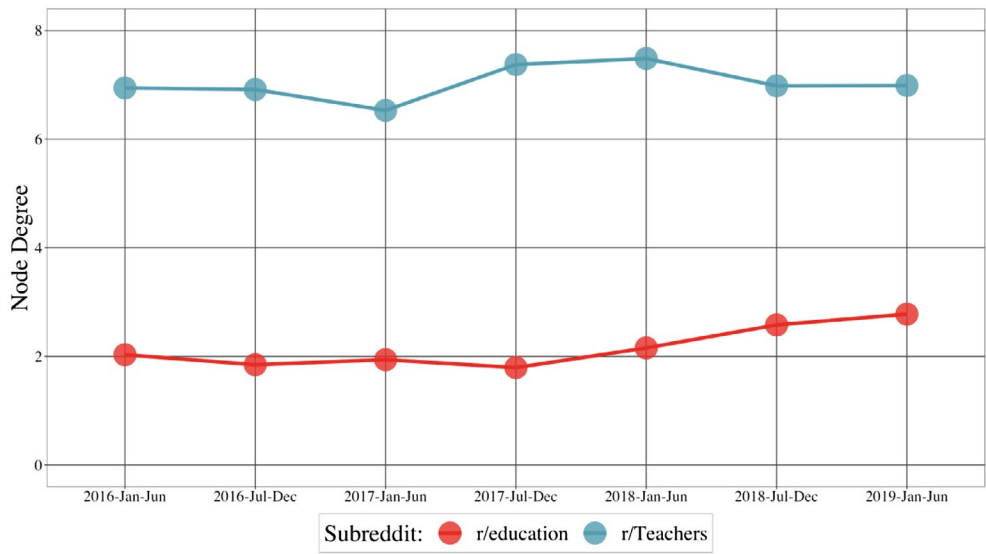


Figure 5: Node degree in r/Teachers and r/education
[Colour figure can be viewed at wileyonlinelibrary.com]

In both subreddits, transitivity decreased over time, meaning that conversations in r/Teachers and r/education became less clustered among all participants (Hogan, 2017). Reciprocity in r/Teachers increased over time, until a drop-off in the first half of 2019. Increased reciprocity can be interpreted to mean that there are fewer hierarchical relationships where users do *not* respond back to someone who responded to them (Hogan, 2017). In r/Teachers, mutuality increased and

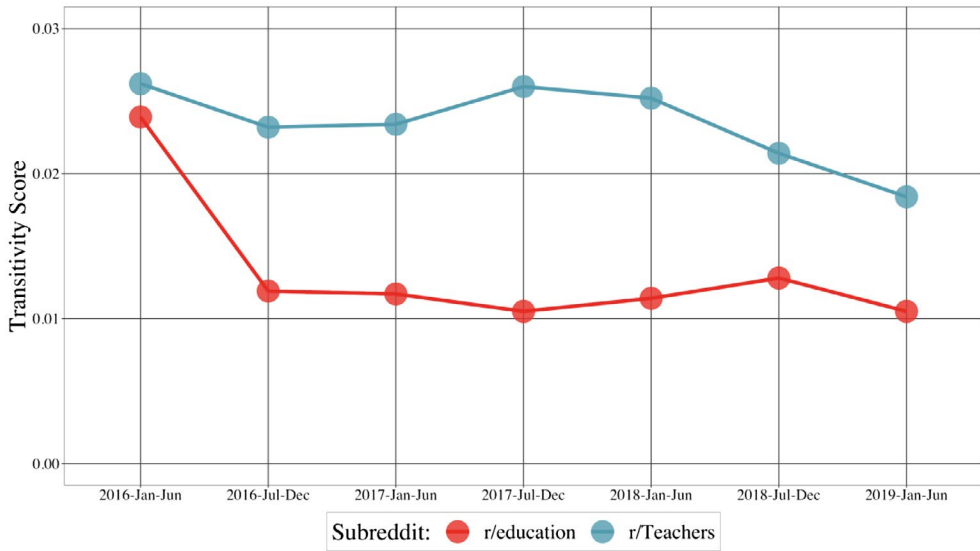


Figure 6: Transitivity in r/Teachers and r/education
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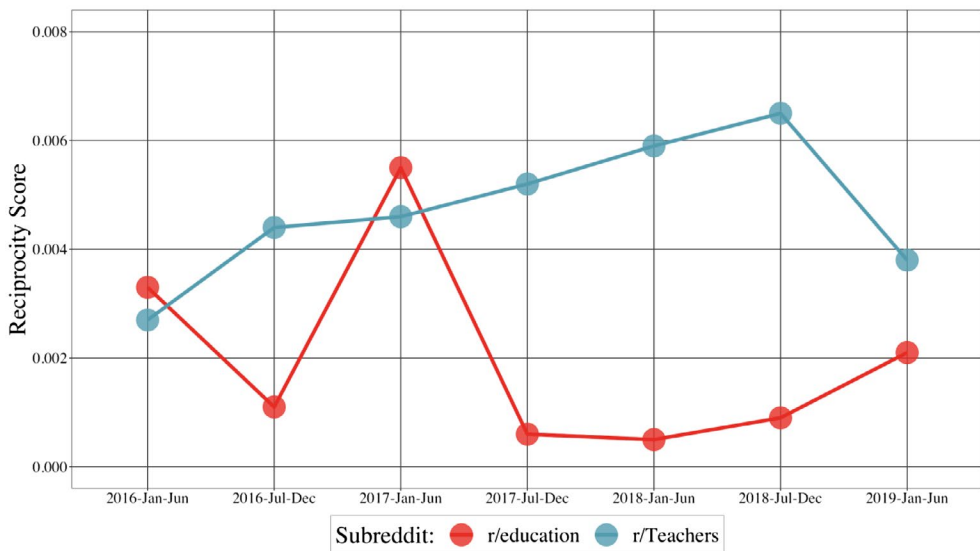


Figure 7: Reciprocity in r/Teachers and r/education
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hierarchical relationships decreased, until a reversal in 2019. Reciprocity in r/education rose and fell from 2016 to 2017, but since the second half of 2017 has gradually increased. This means mutuality in r/education has increased and hierarchical relationships decreased since 2017.

Social network visualizations (Figure 8) depict subreddit contributors with a dot and the connecting lines between them represent responses. The centrality of dots is determined by the number of other users interacted with and the nodes around the periphery of these plots were minimally

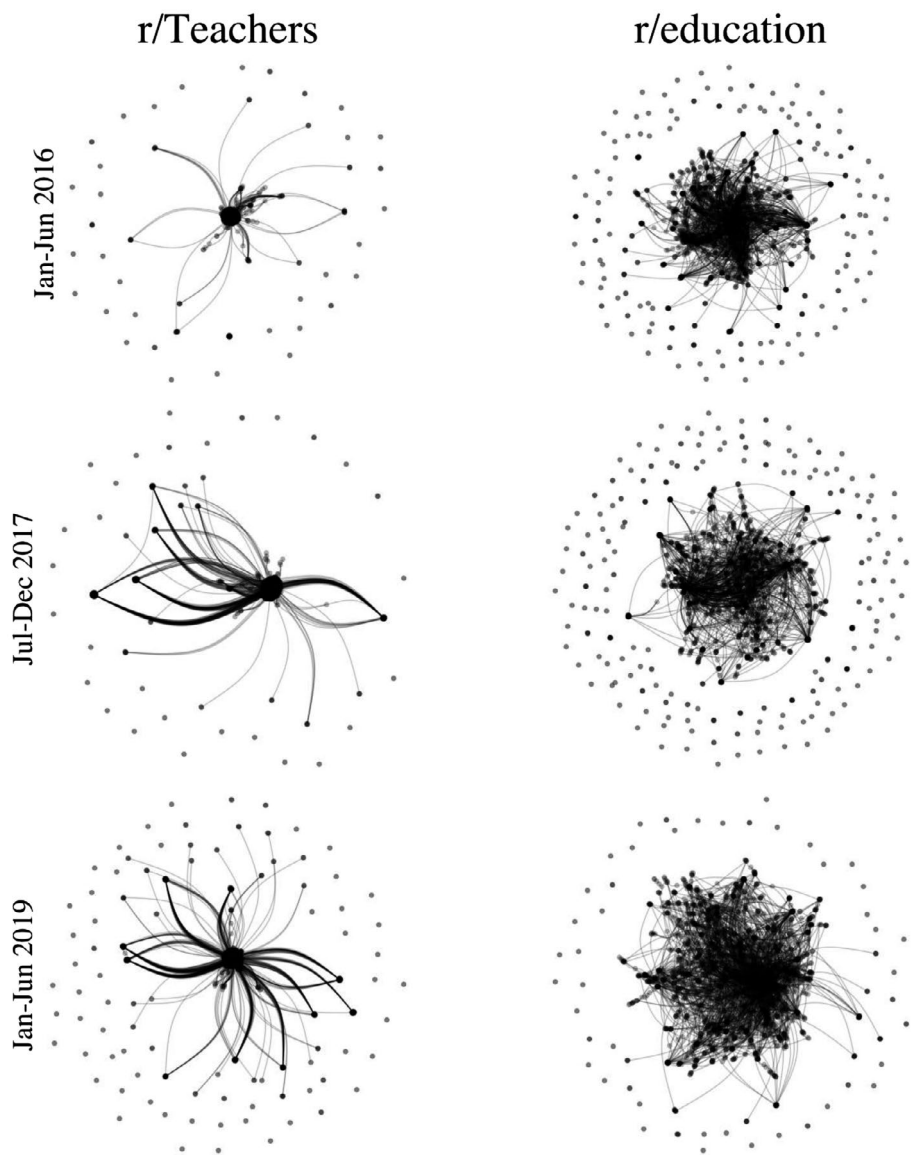


Figure 8: Network visualizations of r/Teachers and r/education

connected to others. r/Teachers had a very dense core of users and responses, with few *peripheral participants*. Over time, the number of peripheral participants seemed to increase. Additionally, conversations between peripheral participants and those in the core appeared to increase over time, as suggested by more spokes radiating out from the dense central mass of users.

In contrast, r/education had many peripheral participants, whose number increased from the first half of 2016 to the second half of 2017, but then decreased dramatically for the first half of 2019. Correspondingly, the size of the core network of conversations seemed to grow. Across all three time periods, there appeared to be relatively few conversations between peripheral

participants and those in the core of the network. Although r/education's core visually appears to be larger than that of r/Teachers, its *density* of connections is sparser, as the network visualizations for r/Teachers contain nearly three-and-a-half times as many dots (ie, contributors) and more than seven times as many lines (ie, responses).

Topics and discourse

We looked at how topics of conversation and types of discourse changed over time through qualitative content analysis of top-voted posts (Figure 9) and responses (Figure 10). The most common

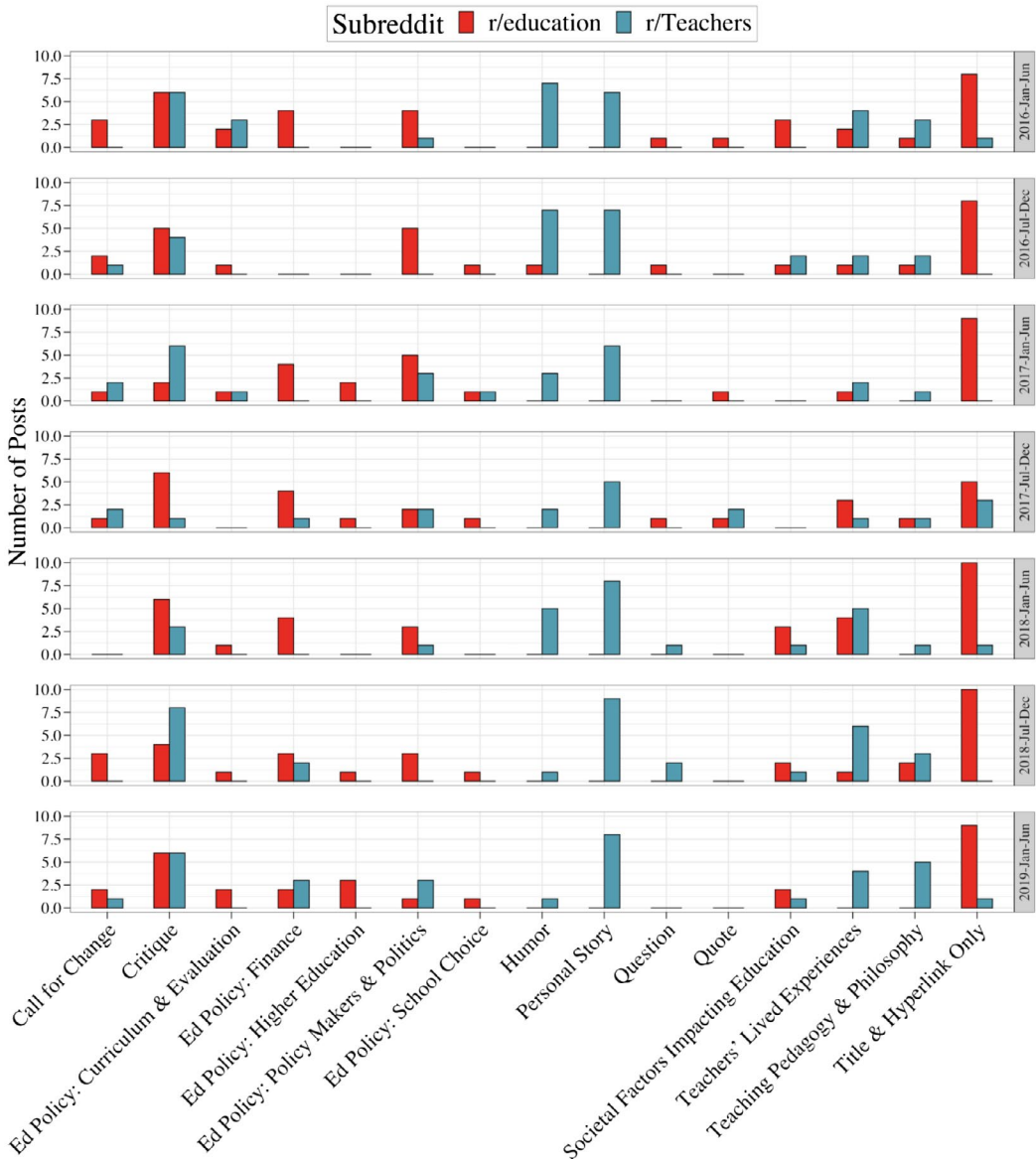


Figure 9: Post topics and discourse in r/Teachers and r/education
[Colour figure can be viewed at wileyonlinelibrary.com]

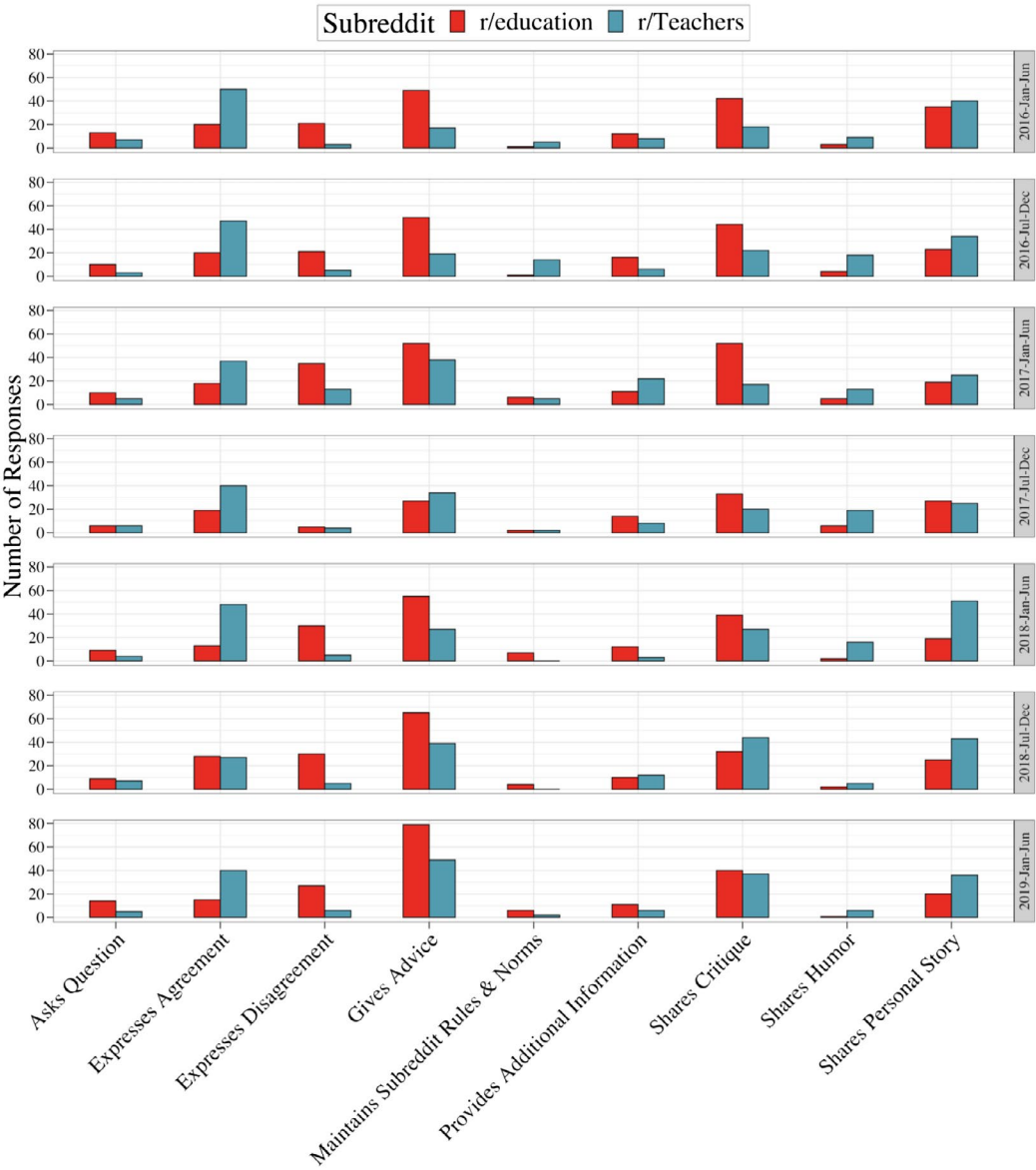


Figure 10: Response topics and discourse in r/Teachers and r/education
[Colour figure can be viewed at wileyonlinelibrary.com]

topics of r/Teachers posts (see supplementary online materials for codebooks) included teachers' lived experiences (eg, teacher pay and work conditions) and pedagogy. The most frequent type of discourse in r/Teachers posts was telling personal stories related to education. In r/education, common post topics included various education policy matters (eg, politics, finances, higher education) and societal factors impacting education. The predominant discourse in r/education was sharing the title of and hyperlink to an online article, without comment or explanation. r/education discourse also often included calls for change. Critique was common in both subreddits, albeit more prevalent in r/education.

Although there were many aspects of continuity in post topics and discourse in the two subreddits, there were also elements of change. For instance, in *r/Teachers*, there was a recent decrease in posts that shared humor and in 2017, there was a period of increased posting about education policy that coincided with U.S. Senate confirmation hearings for Secretary of Education Betsy DeVos.

The most common discourses in *r/Teachers*' responses (see supplementary online materials for codebooks) included expressing agreement with posts or subsequent responses, sharing personal stories, giving advice and sharing critiques. Agreement and personal stories stayed at relatively consistent levels over time, while critiques and advice both became more common. *r/education* responses also gave advice and shared critiques, but even more often than in *r/Teachers*. Responses in *r/education* often included personal stories, but less frequently than in *r/Teachers*. Finally, expressing disagreement with the original post or subsequent responses was common in *r/education*. Although there was some ebb and flow over time, on the whole, there appeared to be a high degree of continuity in the kinds of responses posted to *r/education*.

Discussion

These findings suggest that *r/Teachers* and *r/education* have featured both change and continuity over time. During 42 months from 2016 to 2019, both subreddits remained relatively stable in some regards but also experienced varying degrees of change. We discuss our findings on five affinity space measures in light of ecological themes of transition (ie, change and continuity) and complementary components (ie, distinct spaces for distinct purposes).

Change and continuity

r/Teachers saw all forms of individual contributions increase steadily, while content interactions remained consistent. In terms of social interactions, node degree was consistent, transitivity (ie, clustering) decreased and reciprocity (ie, mutuality) increased until a reversal in 2019. There were few peripheral participants, but these increased over time, as did the conversations between those on the periphery and those in the core. Topics of conversation were generally consistent, largely pertaining to teachers' lived experiences and pedagogy. Discourse was consistently marked by personal stories related to education and expressing agreement, while sharing critiques of education and giving advice increased.

In *r/education*, contributions such as the number of responses and responders remained consistent even while posts and posters declined. With content interactions, response rate remained consistent—albeit much lower than that in *r/Teachers*—and thread length increased. In terms of social interactions, node degree increased slightly, transitivity decreased and reciprocity has increased. There were many peripheral participants, whose number initially increased, but then decreased dramatically in 2019; meanwhile, the core network grew. Topics of conversation were generally consistent, largely pertaining to education policy and societal factors impacting education. Discourse was dominated by posts that simply shared the title of and hyperlink to an online article. Advice, critique, disagreement and calls for change were more common than in *r/Teachers*. Personal stories and agreement were present too, but less frequently than in *r/Teachers*.

Our findings offer insights into various aspects of continuity and change in the studied subreddits. However, one aspect of how subreddits develop over time that remains unclear is the extent to which knowledge accumulates, builds and is advanced within these spaces. Teaching-related subreddits could, for example, feature some degrees of the periodic rehashing of the same content

or ideas, or a flood of popular or trendy content that lacks coherence. Zhang (2009) critiqued Web 2.0 platforms for being “generally weak in commitment to the sustained progress of ideas” (p. 275) and it is still unknown how much subreddits may contribute to such progress. Although the individual autonomy associated with SDL can in many regards be beneficial, it may also come at the cost of relatively less attention being paid to collective endeavors. Our content analysis did not uncover any examples of posts that explicitly built upon or referenced ideas from prior posts. Instead, some posts seemed to be products of frustration with a particular moment in politics. Highly rated posts in both subreddits contained criticisms of U.S. political figures such as Donald Trump and Betsy DeVos, but no apparent efforts across posts to build a sustained, coherent critique of or activism regarding candidates or the U.S. federal government’s role in education.

Distinct spaces for distinct purposes

In addition to the differing affinities suggested by their names (ie, teacher-focused vs. education more broadly), these two subreddits may be differentiated by what users *do* in the spaces in terms of contributions, interactions and changes over time. Even at points of thematic intersection between the two subreddits, such as critiques of education, what participants did with this content differed greatly. This finding aligns with our prior quantitative research that indicated distinctions between teaching-related subreddits (Staudt Willet & Carpenter, 2020) and other studies that have demonstrated how one online platform can play host to diverse spaces (Carpenter, Tani, Morrison, & Keane, 2020; Greenhalgh *et al.*, 2020) that may reflect different affinities or fill distinct ecological niches. Some spaces can host regular and robust discussions (eg, Lantz-Andersson, Peterson, Hillman, Lundin, & Rensfeldt, 2017), while others appear to be less interactive and conversational (eg, Staudt Willet, 2019).

We characterize r/Teachers as a *conversational* space for educators. r/Teachers threads were often quite convivial in nature (Varis & Blommaert, 2015). Consistently, the most popular topics were teachers’ lived experiences and pedagogy, and posts frequently took the form of telling personal stories. Most posts attracted responses and conversation threads were lengthy. This is noteworthy given findings from van Bommel, Randahl, Liljekvist, and Ruthven (2020) that there are more signs of deeper teacher learning in longer discussion threads.

In contrast, r/education appears to be more of a *bulletin board* space. Users frequently posted on topics related to education policy and societal factors impacting education. In contrast to r/Teachers, many r/education posts did not attract any responses. When posts did receive responses, response threads were shorter than in r/Teachers. Affinity spaces can often have a primary focus on the content of interest and r/education appeared to be relatively more content-focused. However, r/Teachers appeared to attract more socializing around the common topic of interest (Moore & Chuang, 2017). The two studied subreddits appear to offer distinct contexts for SDL that can potentially function as different and even complementary components of educators’ professional learning ecologies.

Significance

This study’s exploration of educators’ use of an under-researched but popular social media platform, Reddit, offers important findings pertaining to two subreddits during the time period under study. In many ways, these findings are necessarily tied to these contexts, as is acknowledged by a learning ecologies frame. However, these particulars nevertheless advance the general knowledge base on SDL in a digital era. Educators’ SDL is not an activity devoid of context but should be understood as possessing a temporal dimension likely connected to broader world events. Our findings are consistent with prior research that suggests that although online spaces are rarely

static, some behaviors tend to remain consistent across time and platforms (Hogan & Quan-Haase, 2010). This study's findings illustrate how looking at only a snapshot of data from social media spaces can be problematic. If we had gathered data only from the middle time period in our data collection window (July–December 2017), we might have told a different story about the subreddits' similarities and differences. Analysis of posts during this period in isolation (see the middle row of Figure 9) would have suggested that there was dramatically more critique in r/education than in r/Teachers, more about teachers' lived experiences in r/education than in r/Teachers and only small differences between rates of sharing hyperlinks without comments. Similarly, a snapshot study from the middle time period would suggest more advice-giving in r/Teachers than r/education and more sharing of personal stories in r/education responses than r/Teachers (see the middle row of Figure 10). Such “findings” would thus have produced conclusions opposite to those from the longitudinal analysis of our full data set.

Our findings also have implications for teacher education and self-directed professional learning. Teacher educators who are aware of the changing nature of online spaces and the multiple, complementary contexts that comprise learning ecologies may be able to help teachers navigate the evolving challenges and opportunities of these spaces. They may also be able to advise aspiring educators on how best to combine different spaces for maximum effect. By hosting spaces where many thousands of educators convene and discuss professional matters, teaching-related subreddits may allow preservice teachers to tap additional sources of practitioner expertise and mentoring.

Teaching-related subreddits could be appealing sites for ongoing professional discussions for multiple reasons. There is no guarantee that many or most teachers at a particular school share concerns or goals (Huberman, 1995), so teachers may access affinity spaces to find colleagues with common priorities and interests. Furthermore, teachers likely access numerous affinity spaces for complementary purposes as part of a broader learning ecology (Stevenson *et al.*, 2019; Veletsianos *et al.*, 2019). Educators may sometimes prefer to address topics such as internal school politics (Carpenter *et al.*, 2018) or national politics in anonymous or outside-of-school contexts. Because of how teachers are often excluded from education policy conversations, social media such as Reddit can offer spaces in which teachers' voices can be heard (Brickner, 2016). Furthermore, although Fox and Bird (2017) found that social media tools can lead to context collapse and complicate boundaries between personal and professional contexts, Reddit may offer opportunities for educators to more safely share and discuss personal views on educational topics in ways that do not risk being perceived as unprofessional. For instance, the stress that COVID-19-related changes to teaching and learning has caused teachers may also increase the value of anonymous spaces where educators can vent their frustrations or unburden themselves of the emotions they are experiencing (Trust *et al.*, 2020).

Future research

This study offers a starting point for future work to understand the opportunities and challenges of SDL in open and complex social media spaces. The framework, which links learning ecology and affinity space concepts, suggests research questions, measures and methods that can be applied to the future study of SDL in additional subreddits or other social media contexts. Our specific methodological approach here can be used to explore new spaces in educators' learning ecologies, or new measures and methods may be considered. Regardless, researchers must account for ecological transitions that may, in turn, result in a change in affinity space characteristics such as contributions, interactions and topics of conversation. In addition, transitions may likely be linked to learning ecologies' complementary components (Veletsianos *et al.*, 2019). That is, changes in one space for professional learning can lead to the transformation of other spaces. Much more work is needed to understand how educators create holistic systems of SDL (ie, learning ecologies) composed of

distinct spaces on various social media platforms (Stevenson *et al.*, 2019). Another fruitful avenue of future research would be to continue studying how SDL in informal settings like Reddit can influence formal academic learning, extending Peters and Romero's (2019) findings.

In addition, future self-report research would advance understanding of SDL in teaching-related subreddits. Our previous investigation of teaching-related subreddits compared four different subreddits in a snapshot study of one year of posts and responses (Staudt Willet & Carpenter, 2020), and provided breadth at the cost of depth. There, we recommended that further research should study the substance of subreddit content, collect self-reported data and take a longitudinal approach to address temporal aspects of participation. Here, we address two of those areas, but further investigation is required. Surveys, interviews, or focus groups could explore questions related to contextual factors such as offline locations and events, as well as Redditors' personal factors, including patterns of engagement (Peters & Romero, 2019), anticipated outcomes or benefits from posting and responding, and SDL strategies (Beach, 2017; Keay, Carse, & Jess, 2019; Kim *et al.*, 2019; Peters & Romero, 2019; Pirkkalainen, Pawlowski, & Pappa, 2017). In particular, interviews of subreddit moderators may provide insights into the cultures and histories of these online spaces (see Esteve del Valle *et al.*, 2020; Gilbert, 2020) and potentially help explain elements of change and continuity like the dramatic drop off in posts to r/education that occurred in the first half of 2019. A future self-report study could also provide insight into phenomena that cannot be studied through data mining methods. For instance, because Redditors do not list their location in their profiles, we could not comment here on which countries contribute most often to teaching-related subreddits. A self-report study could also target educators who read subreddit content but never contribute, the *lurkers* who are a common, but little understood, social media phenomenon (Bozkurt, Koutropoulos, Singh, & Honeychurch, 2020; Nonnecke & Preece, 2003).

We must acknowledge limitations in our approach even when accounting for a temporal dimension. For instance, our results may have been different if we had chosen one-year or one-month periods, instead of six-month periods. In addition, findings may have been different had we studied data from a year earlier or a year later. For instance, Reddit data from 2020 would be interesting given the COVID-19 pandemic's disruption of education. This study underscores the need for additional research, as there remains more to understand related to change and continuity in online spaces.

Conclusion

Educators should be aware that self-directed learning on Reddit is different than visiting a library and navigating affinity spaces requires additional skills and digital literacies. Educators must work to become critical consumers of ideas and materials encountered in online spaces (Lankshear & Knobel, 2008). Although we did not uncover evidence that trolling, flaming and other forms of cyberviolence were common in r/Teachers or r/education, this may be related to our decision to focus on popular (ie, highest voted) posts and responses. Teaching-related subreddits may be experienced as distinct and even isolated online learning spaces, but they are still on Reddit's platform where users are only one click away from toxic affinity spaces that may be antithetical to teachers' values (see Gilbert, 2020; Massanari, 2017). It is essential that educators who use open and complex social media spaces and scholars who study these environments, continue to reflect upon and analyze the opportunities and challenges of SDL in such contexts.

Statements on open data, ethics and conflict of interest

Our code for analysis is shared openly on GitHub (<https://github.com/bretsw/subreddits-over-time/>) and our data are publicly available through Open Science Framework (<https://osf.io/tm74g/>).

This study was reviewed and approved by the Human Research Protection Program at Michigan State University.

The authors report no conflict of interest; this work does not deal with commercial products.

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Supporting Information

Additional Supporting Information may be found online in the Supporting Information section at the end of the article.