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# Teachers Turning to Teachers: Teacherpreneurial Behaviors in Social Media

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There is growing evidence that educators engage in social media and virtual social networks across formal and informal settings to direct the trajectory of their curriculum. Interactions within and across virtual spaces provide opportunities to flatten hierarchical structures as teachers may directly or indirectly engage with educational decision making and reform implementation (e.g., Supovitz et al. 2015). This article examines an educational phenomenon, the emergence of a teacherpreneurial guild—that is, a teacher collective promoting professional practices, norms, and entrepreneurial activity—creating and defining knowledge underlying educational practices and classroom behaviors. Using a sample of Midwestern elementary teachers, this work identifies patterns of online educational resource access over 4 years across 135,000 pins shared within Pinterest, a social media platform. Results indicate teachers most often turn to one another for resources and professional materials. This may have implications for trust developed within teacherpreneurial guilds and teachers' ability to exert agency within their profession.

Over time, education policy has endeavored to connect teachers to one another. Established school communities with collaborative climates, including

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relational trust among teacher colleagues, positively affect schools' stability and students' success (Bryk and Schneider 2002). Furthermore, teachers' opportunities to interact shape what and how they learn (Coburn 2001; Spillane 1999). Education literature has explored various aspects of teacher community and collaboration in and across schools (Bryk and Schneider 2002; Penuel et al. 2009). Nonetheless, the notion of teachers working in isolation, behind closed doors, persists (Lortie 2020). Today, where and how teachers professionally

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engage and collaborate extends beyond the schoolhouse to a world of social media. To date, little effort has been devoted to systematically study teachers' engagement with social media. Although engagement in social media continues to grow, there remains a gap in the literature regarding how information and knowledge diffuse in virtual spaces, contribute to teachers' professional growth, or affect—both directly and indirectly—classroom teaching and students' success.

This work examines a fundamental shift in behaviors as teachers explore professional community and supplemental instructional resources in virtual spaces. Examining trends in teachers' behaviors within social media, we propose an emergent reorientation to resources and professional practices as teachers drive engagement with one another and professional organizations at large.

## Literature Review

Recently, educational reformers have attempted to formalize and distribute improvement in teachers' practices and learning, with some success, through professional learning communities (PLCs; Achinstein 2002). Teachers in PLCs routinely meet to discuss professional practices (Mitchell and Sackney 2000; Toole and Louis 2002), making meaning of their practices and learning from one another (Lave and Wenger 1991). Although the professional teachers' community is a key factor to consider among school organizational conditions (Desimone 2002; Youngs and King 2002), teachers also informally seek advice and instructional support from their peers. These interactions and collaborations, to exchange and gain professional knowledge or improve teaching practices (Baker-Doyle and Yoon 2010; Frank et al. 2004, 2011; Lave and Wenger 1991), may influence their development and social capital over time (Spillane et al. 2012).

### *Teachers and Technology*

Though technology has permeated most facets of daily modern living, it is routinely left on the periphery of schooling (Collins and Halverson 2009). Technology is often used as a physical tool for teaching a particular content or as a distance-learning mechanism (Collins and Halverson 2009). Little research relates to teachers' use of social media for professional purposes in K–12 schooling (Greenhow et al. 2020). Rather, the predominate focus has been on teachers' use of social media for teaching within higher education and the perspectives of students and faculty (Aydin 2012; Forkosh-Baruch and Hershovitz 2012; Greenhow et al. 2020; Manca and Ranieri 2013).

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Recent research indicates that teachers are not a uniform group and that they use technology in various ways depending on context and disposition. Graves and Bowers (2018) analyzed 2,764 teachers from a nationally representative survey on technology use and found four technology type subgroups. Teachers within these subgroups behaved in systematically different ways: one group of teachers was most flexible with technology, one group was most resistant to technology, one group was interested in technology as a tool to support learning through doing (i.e., presentations and lectures), and one group used technology primarily for repeated practice work. Across research on teacher types related to technology use and teachers' integration of social media within higher education learning, there is little work considering the ways teachers use social media to support their own instructional learning and growth.

Increasingly, accessible technology has expanded boundaries of teacher collaboration, shifting some interactions to virtual spaces. For many teachers, social media has become part of their professional and personal life. Social media sites allow individuals to keep in contact with one another easily, maintaining relationships and a presence in one another's life (Hampton 2016). Professionally, relationships with other teachers may inform how a teacher conceptualizes teaching, instruction, or their subject matter (Coburn et al. 2012; Frank et al. 2004; Trust et al. 2016).

This article provides an overall perspective of teachers' engagement in social media situated within a larger ecology of sources on teaching and education professionalism. Examining teachers' behaviors within Pinterest.com (Pinterest), a predominate platform among teachers (Opfer et al. 2016), we illustrate the agents driving professional information and instructional resource sharing and discuss potential impacts for the field at large. In particular, we focus on the teacherpreneur, a phenomenon in the current educational landscape.

### *Educational Phenomena in Social Media*

The teacherpreneur emerges from a larger landscape of societal change happening within twenty-first-century schools. Accountability and data-driven metrics largely dominated definitions of quality education since No Child Left Behind legislation was signed in 2001. What ensued included a battery of assessments and rubrics to assess academic growth and scale academic achievement across all schools. Teachers were identified as a key component to students' learning and success and as an "input" that might be more easily altered than inherent traits of students' individual and local context. As such, they found themselves centered in a struggle for better student outcomes. What resulted

nationwide were a variety of attempts to incentivize teacher quality and remove poor teachers. Approaches to drive a change in teacher quality have largely emerged from neoliberal ideology around market-based mechanisms (e.g., Hirschman 1970) for driving quality, including school choice, teacher accountability through public transparency in the classroom, and school academic growth across years. This has left many teachers disenfranchised as public sentiment has focused on “rotten apples” within the profession (Chilcott et al. 2010; Dunn et al. 2017).

Concurrently, teachers within social spaces online have begun to develop communities in which to share and collaborate with one another. Teacher’s instructional learning is situated in the social context to which they are exposed. Informal network ties among teachers may be developed through interactions across virtual and physical spaces, with one’s physical social network expanding into virtual space (Baker-Doyle and Yoon 2010; Frank et al. 2004; Krutka and Carpenter 2017). In other work, Wellman (2004) finds individuals may meet and connect online seamlessly with others who share similar interests. Teachers, like others, may engage online with those who share professional resources or teaching dispositions (Torphy et al. 2020). The virtual and physical ties teachers maintain facilitate the diffusion of knowledge across their social network (Jimerson 2014; Wellman 2004).

Teachers’ engagement within social media is a prevalent, persistent phenomenon. Social media is frequently used by teachers for the purposes of teaching and procuring standards-aligned resources. Research finds social media is a key part of changes in teaching and learning during and outside of the school day (Krutka and Carpenter 2017; National Council of Supervisors of Mathematics 2015). Amazon Education finds teachers spend up to 12 hours per week seeking out and accessing instructional resources online (Nguyen 2016). In particular, a majority of elementary and secondary teachers consult social media sites, including Pinterest and Teachers Pay Teachers (TPT), when seeking out English language arts and mathematics instructional materials (Opfer et al. 2016).

Teachers may choose to access online resources to meet a specific purpose or need for their instruction (Will 2016). Many of these resources are prepackaged and explicitly illustrate an instructional need. Furthermore, teachers’ virtual collegial social networks allow them to seek out advice and help without the social stigma of turning to their in-school colleagues (Will 2016).

Given both the prevalence and the importance of resources found virtually, those invested in teacher preparation, educational research, and policy making need a better understanding of how teachers seek out and choose instructional resources. Expanding virtual collegial social networks facilitate a grassroots phenomenon of teachers turning to one another, rather than to historically trusted organizations or industry, for help or ideas. This may have implications

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for education policy and curricular coherence as communities of teachers become more connected, permeating physical boundaries.

### *The Case of Pinterest*

Pinterest is a predominate virtual space for teacher interaction, knowledge, and information diffusion (Zhong et al. 2014). The popular social media site allows teachers to scrapbook ideas by pinning lessons, exemplary teaching, and resources in personalized libraries for later reference. Within Pinterest, teachers may customize their newsfeed to follow those people with whom they are connected and the pins and boards they post. Teachers, accessing and sharing resources, build curated archives of instructional resources. Through curation, teachers present the ideas and resources of others as a coherent set situated throughout their boards, representing their professional perspectives on what they find worth knowing and sharing. This situative learning may allow teachers to connect with resources and their colleagues, engaging in both self-directed and incidental learning in social media (Schugurensky 2000).

Pinterest affords the brokerage of information and social collegial networks (Burt 2005), bridging teachers to teachers and to a conglomeration of teaching resources across various virtual resource pools (VRPs). Many classroom teachers, taking initiative to find, share, and sell materials or ideas related to their teaching practice, may be considered entrepreneurs. Given the risk of wasting time, effort, and investment in resources of unknown quality inhering in their district materials and social networks, these teacherpreneurs independently seek supplemental materials and practices. For example, Miss Giraffe, a teacherpreneur and blogger from the website Miss Giraffe's Class at [missgiraffesclass.blogspot.com](http://missgiraffesclass.blogspot.com), writes, "For now, I'll just tell you that this blog is for me to share teaching ideas and snippets from my world. I hope that you can use some of the ideas from this blog in your classroom! I am so excited to be able to connect with teachers around the world and share ideas. Thanks for visiting!" (Miss Giraffe 2016). Jenny, a follower of Miss Giraffe's blog, responds, "You are amazing! I see wonderful ideas on Pinterest and the ideas are almost always from your stuff! Thank you for making amazing products to help first graders!!! I would buy your whole TPT store if I could!" (Miss Giraffe 2016). Teachers develop trust in one another and often seek advice regarding teaching practice, trusting peers more than experts or publishers (Education Week Research Center 2014). This study examines the entrepreneurial behavior of those teachers early in their career and their experienced counterparts. We ask, Who do teachers turn to when seeking out supplemental resources for their instruction? Through an examination of teachers' curation within social media, we seek to resolve from where and from whom teachers' resources originate.

## Theoretical Framing

Educational reform and other top-down approaches are often used in an attempt to change teachers' practices and school quality (Gottfried et al. 2011). However, historically, schools at large are impermeable to change (Lortie 2009; Ravitch 2001). As educational reforms diffuse through federal, state, and district purviews, schools may intentionally or unintentionally loosely couple policy enactment with instructional practices (Bidwell et al. 1997; Coburn and Russel 2008; Weick 1976). The act of loose coupling is the intentionality behind enacting a reform "loosely," or without stringent fidelity to its intended form. Loose coupling generally relates to increased variation in reform enactment (Meyer et al. 1978) and therefore teachers' practices within the classroom (Bidwell et al. 1997; Coburn 2004).

Today, loose coupling of reforms may occur as teachers exercise agency as street-level bureaucrats (Lipsky 2007). There is growing evidence that educators engage in social media and virtual social networks across formal and informal settings. Interactions across virtual spaces offer the potential to flatten hierarchical structures as individuals may directly engage with educational decision makers and educational reform ideology. In some spaces this may manifest in political expressions of activism, across blogs, discussion forums, or social media platforms such as Twitter.com (Baker-Doyle et al. 2018). Yet apart from intentional political or social movement, across VRPs teachers who are focused on developing an archive of professional resources acquire and share instructional tasks. In doing so, they circumvent traditional stakeholders within the field, such as universities, textbook companies, and special interest groups. This autonomous and concurrent action across teachers may create a potential "disruption without signal" in which traditional diffusion of innovation, ideas, and resources competes in a global market (Torphy and Drake 2019). Teachers seek advice and instructional resources from one another within and outside their direct social network to further their professional practices. Thus, social media facilitates teachers' agency and enactment in reforms as they curate instructional resources outside district purview.

The emergence of teachers' virtual collegial social networks may constitute a new form of professional community, a teacherpreneurial guild. Professional guilds have a long-established history extending several hundred years. Krause (1996, 2) defines guilds as "social groups, institutions created by groups of workers around their work, their skill or craft." Professional associations or guilds often emerge organically through an effort to institutionalize a field or practice (Faulconbridge and Muzio 2012). These groups establish norms, share expertise, and create consensus around quality professional practices (Faulconbridge and Muzio 2012; Krause 1996). Furthermore, through combined

membership, guilds allow professionals to directly engage in decision making regarding various factors that may affect their work (Krause 1996). Krause describes a triadic relationship between state or governmental authority, capitalistic market forces, and professions as illustrated in figure 1.

Here professional guilds exercise power and influence directly through interactions within the marketplace and with state authorities regarding oversight and autonomy (Krause 1996). The state may require change through mandate or law while the capitalistic market organizes finance and production (Krause 1996). “A model of guild power . . . should have the following dimensions: power and control over the *association*, the *workplace*, the *market*, and the relation to the *state*” (Krause 1996, 3). Guild association sustains professionalism and the ability to affect state or capitalistic forces (Krause 1996) while preserving professional liberties such as independence, autonomy, discretion, collegiality, partnership, and self-regulation (Faulconbridge and Muzio 2012). The dynamic interaction between market, government, and profession suggest that as state or capitalistic power increases, authority within the profession declines (Krause 1996; Walker 1971).

Over the past 20 years, schools have experienced significant increases in state oversight, including No Child Left Behind accountability requirements, a peremptory Race to the Top focus on teacher evaluation reform, and market-based approaches to educational reform that have directly challenged long-standing association privileges such as teacher tenure, teacher certification, and the traditional public school (Ingersoll 2009). As a result of these changes, professional education associations in many states now have less purview over educational decisions (Ingersoll 2009). Perhaps in response, teachers have

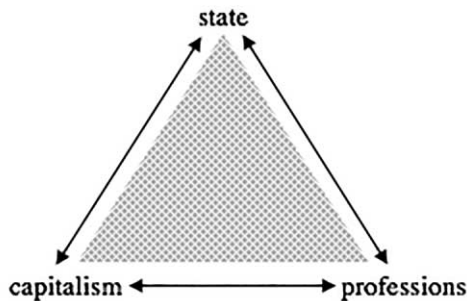


FIG. 1.—Dynamics of professional guilds

increasingly turned to one another within virtual spaces, seeking instructional advice and professional improvement.

Teacherpreneurial behaviors within virtual platforms intersect the space between capitalism and professions. A new form of professional guild, teacherpreneurs circumvent traditional hierarchical diffusion mechanisms and interact directly with peers and educational reformers (Supovitz et al. 2015). Through virtual spaces such as Twitter and Facebook, teacherpreneurs can interact directly with educational authorities and decision makers (Supovitz et al. 2015). As a collective, teacherpreneurial guilds may exercise influence on the educational market through VRPs and the profession as a whole as they self-regulate quality resources through online reviews and collegial social networks. Figure 2 illustrates the dynamics of teacherpreneurial guilds as they are facilitated across virtual spaces.

In figure 2, the teacherpreneurial guild, represented by  $G$ , intersects capitalism and the profession. Leveraging marketplace mechanisms, teachers can freely choose to procure materials from and share them with anyone within or across connected virtual spaces. Teachers engaging with one another across their virtual network may build collegiality, partnership, and discretion leading to an increased sense of belonging (Trust et al. 2016). Within a guild, teachers may collectively use their professional discretion to acquire, share, and recommend resources and to privilege particular sources of information, exercising their professional discretion. As teacherpreneurial membership increases, so does the ability to influence the marketplace, the state, and the profession. For example, within Pinterest, teacherpreneurs choosing to access, purchase, or share materials from trusted educational bloggers may influence the types of instructional resources being distributed and potentially implemented in classrooms

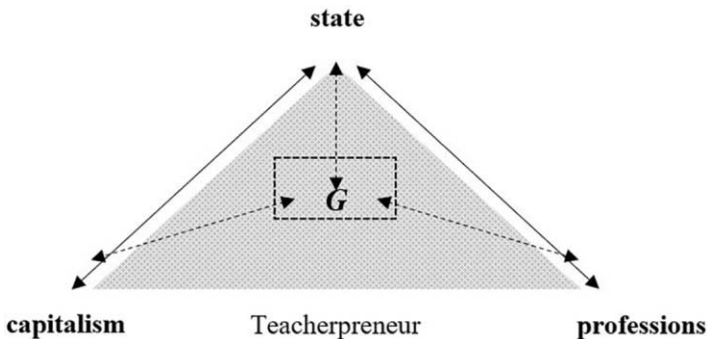


FIG. 2.—Dynamics of teacherpreneurial guilds

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across the country. Rather than accessing state-promoted educational resources, a teacher seeking out materials aligned with the Common Core State Standards (CCSS) may trust those materials created by a fellow teacher in his or her virtual social network.

To capture the monetization of instructional resource creation and sharing within social media, we extended our conceptualization of teacherpreneurial guilds to encompass educational merchants. Many of these individuals are active teachers and engage in teacherpreneurial behavior to direct the trajectory of their classroom, whereas others might not be engaged directly in the education of youth but in the development of teacher resources. Educational merchants—including teachers, homeschooling parents, retired educators, and educational support personnel—selling education resources online are represented within this group. Teacherpreneurs may rely on educational merchants' resources to supplement their instruction. Figure 3 depicts educational merchants as they situate across teacherpreneurial guilds and the larger social structure.

*G* represents the teacherpreneurial guild centering within the ecological structure of education. Educational merchants are those educators invested in promoting, sharing, and diffusing information and resources, for profit, across their network. Rather than predominately acquiring online resources, educational merchants actively engage in for-profit market transactions within Pinterest and beyond. As part of the new gig economy in which individuals may drive for Uber or another ridesharing company in their free time or rent out their apartment through the rental marketplace Airbandb, producing teaching materials for profit may be either a new normal within a twenty-first-century tech era or a response to historically low teaching pay (Ballou and Podgursky 1997).

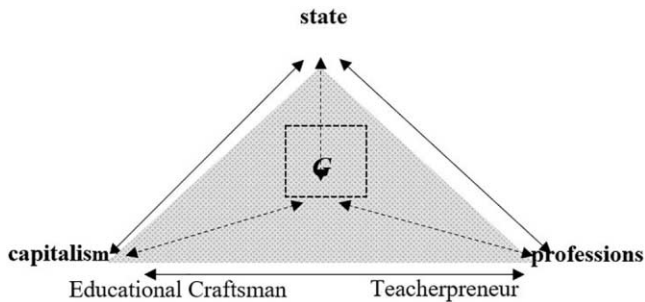


FIG. 3.—Evidence of educational merchants' behavior within a subset of teacherpreneurs.

As educational merchants monetize sharing and collaboration with others, they situate themselves closer to market mechanisms and a capitalistic influence in education (Singer 2017). While teacherpreneurs focusing on instructional resource curation for their local students' needs may more closely relate to traditional conceptions of professional development, they may also engage in the creation and sharing of instructional resources across social media. One may conceptualize this behavior as sliding along a continuum (depicted in fig. 3), more closely resembling a free market approach to educational resource curation. However, educational merchants go further to monetize the education resource market.

As part of a teacherpreneurial guild, educational merchants may gain access to collegial social networks and ideas, information, and resources through virtual collegial ties. This additional social media space affords greater connectivity than TPT, which does not afford visible social networking through public or semipublic social ties (Ellison and Boyd 2013; Greenhow and Askari 2017). Thus, teacherpreneurial relationships and educational merchant resources often extend across virtual platforms, including Pinterest.

At scale, these resources may compete with for-profit producers of educational materials, enact state levied educational reforms, and provide a secondary community for educators. Singularly, teachers may seek one instructional task for a supplemental classroom activity (Hu et al. 2020). En masse, resource seeking and sharing presents a new type of connectivity and information diffusion—from teachers to teachers—and, in many cases, from cloud to class.

Our work seeks to identify patterns of teacher professionalism within social media as they relate to the theoretical framing of teacherpreneurial behavior within twenty-first-century learning. We situate our research in a sociological perspective of professional practices found in guilds and leverage big data within Pinterest to identify and characterize teachers' engagement with one another and curation of instructional resources.

## Method

We examined teachers' curation and sharing of resources across Pinterest. As mentioned, teachers may "pin" pictures or videos (posted by others or found by themselves) of pertinent materials they would like to save for future reference. Teachers can pin "pins" (resources), post them on "boards" (organizational folders), and "follow" other users (stay notified of these users' pins). For example, a Pinterest user may have a board of "Smartboard Technology" or "Addition Strategies." Through exploring teachers' curation of instructional resources and archival material within and across boards we may learn valuable insights into

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what teachers are thinking, how they change their practices, and who they learn from as they do so (Torphy and Drake 2019).

Figure 4 displays an example teacher's Pinterest page. Here, she has curated boards organizing relevant pins across personal and professional interests, including recipes, parenting strategies, and classroom ideas and materials. Her virtual network is indicated by her followers and those whom she follows (190 and 23, respectively). Resources are organized and saved for later reference or to be shared with others across her virtual network.

### *Sample*

This study used a sample of teachers from a National Science Foundation (NSF) funded research grant studying early career teachers' planning and enactment of elementary mathematics across three Midwestern states. Through teacher surveys, sampled early career teachers indicated regular Pinterest use to acquire and share instructional resources.

We combined sampled teacher surveys with the teachers' Pinterest handles to examine trends within Pinterest. We identified Pinterest handles in a multistep approach, as illustrated in figure 5. For those teachers we could not identify, we sent email requests for their Pinterest handles. The final teacher sample for those identified teachers within Pinterest stemming from the initial NSF sample was 197 teachers. We identified and analyzed Pinterest accounts for 197 teachers from the origination of their Pinterest account to November 2016.

In figure 5, we illustrate our approach to teacher identification within Pinterest. Pinterest is a fast-changing social media platform, with affordances being added, revised, and deleted. Therefore, some of the approaches we employed, such as cross-referencing teachers' Pinterest and public Facebook page, can no longer be conducted. Overall, we relied on geographic and demographic information, including grade level taught, district, and photo recognition, to validate teachers' Pinterest accounts.

To build a data set of teachers' curated archives within Pinterest, we began by sampling only educational resources pinned by teachers. We approached this top down from board to pin. First, we created a list of educational keywords (see the appendix, available online) to flag educational boards within Pinterest. These keywords relate to the classroom, instructional topic, and holiday themes within education (as many teachers seek out holiday-related activities). Then, we downloaded teachers' educational pins pertaining to those flagged boards. It is possible teachers pinned educational resources outside a board explicitly labeled in relation to school or academic content. Therefore, this sample represents a conservative estimate of sampled teachers' professional resources within Pinterest.

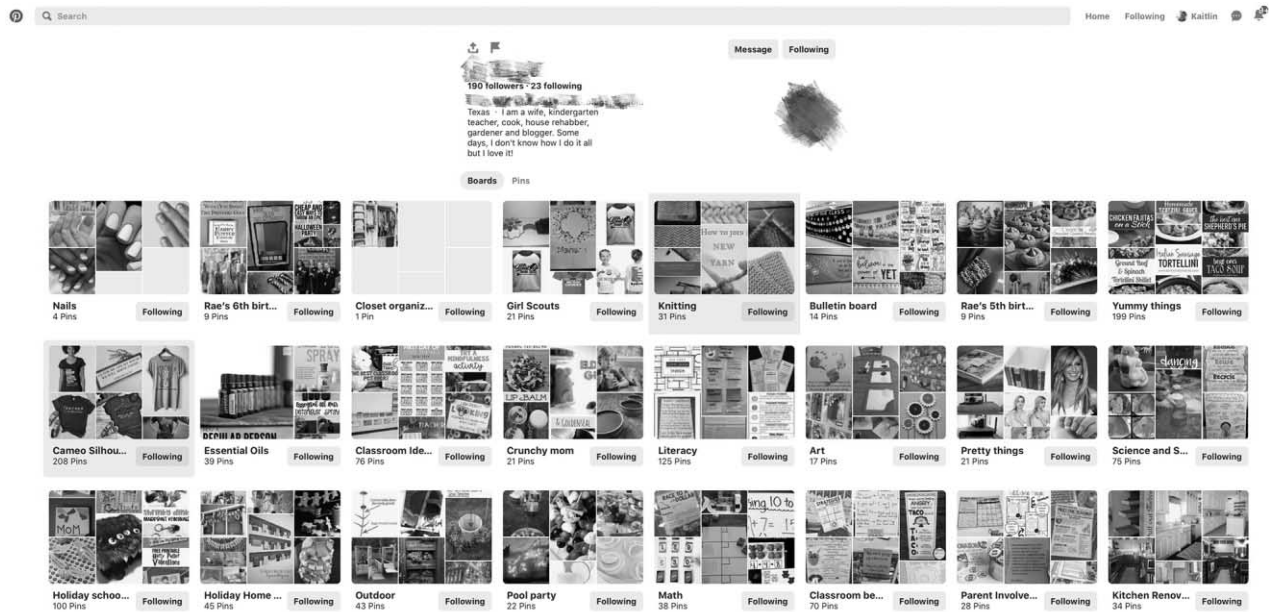


FIG. 4.—An example of a teacher's Pinterest page

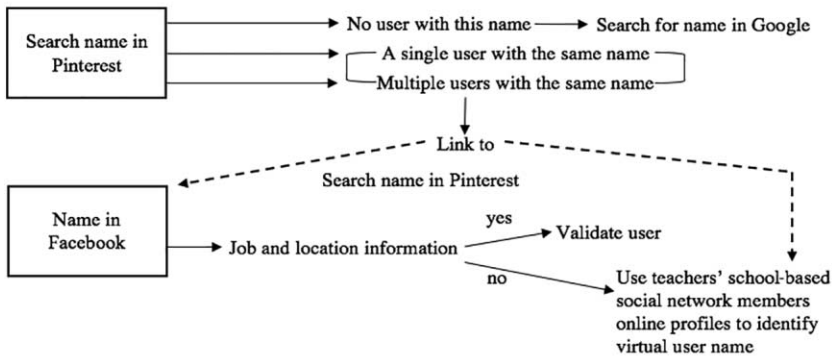


FIG. 5.—Validating teachers' Pinterest accounts

We sought to identify from whom—that is, where in the virtual world—teachers were curating instructional resources. To characterize the source of information pins linked through to, we used click-through technology to identify the secondary online source from which each pin originated. We assumed that teachers who were interested in the resources being curated would choose to follow links back to the primary source, considering the type of resource being acquired and shared (Torphy and Drake 2019). Figure 6 depicts the information flow across virtual space.

In figure 6, Cara Godfrey<sup>1</sup> pins a mathematics resource from the website Miss Giraffe's Class and archives it in her "Math" board within a larger archive of "First Grade" on her personal Pinterest page. The pin, Building Number Sense in First Grade, links to [www.bloglovin.com](http://www.bloglovin.com). The author listed is Miss Giraffe's Class. Importantly, this is not the only virtual space she has to promote her work; her primary website is listed in table 1, [missgiraffesclass.blogspot.com](http://missgiraffesclass.blogspot.com). In both cases, we considered the source an educator blog because the identified producer for the blog is an educator.

Table 1 enumerates the overall pins downloaded across 197 teachers over a maximum 5-year time frame (June 2011–November 2016).

Table 1 shows teachers within our sampled total pins and secondary online sites of origin over time. Totals for teachers and sites do not sum across years, as sampled teachers and secondary sites may be reflected across years or drop out of particular time points, depending on pinning behavior. Overall, our sample included 140,287 pins from across 16,082 unique secondary online sites. Because of dropped URLs, or changes in domain, 3% of pins (3,816) could not be opened and therefore were restricted from analysis. Our remaining sample contained 136,471 pins.

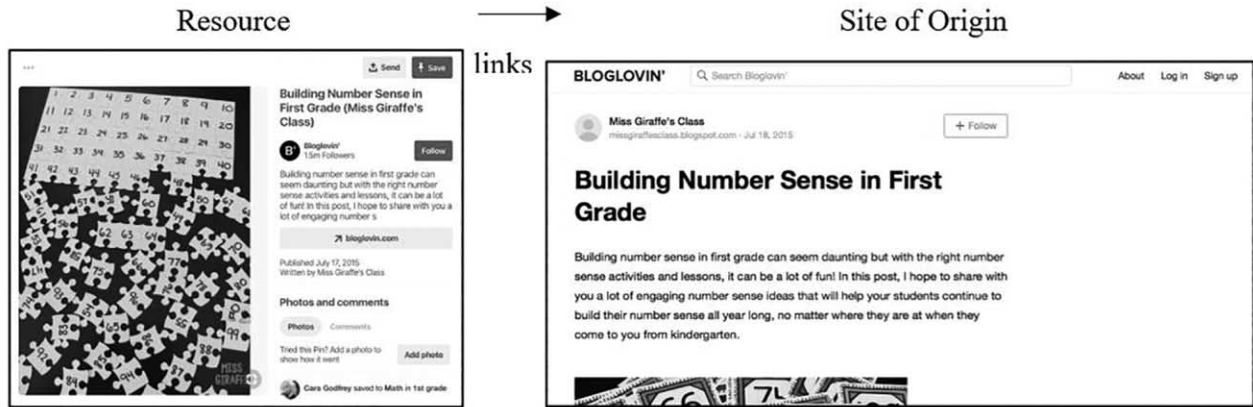


FIG. 6.—Instructional resource connections from Pinterest to the virtual universe

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TABLE 1

*Pins and Secondary Source Origins across Teachers over Time (n = 197)*

	YEAR						Total
	2011	2012	2013	2014	2015	2016	
Teachers	48	161	179	180	173	166	197
Unique secondary online sites	1,315	5,888	6,832	5,712	5,226	3,871	16,082
Pins	2,650	32,704	34,560	28,364	25,074	16,935	140,287

We used large-scale data-mining techniques and retroductive (Ragin 1994) analysis to develop a set of categories to describe the different sources of the resources that teachers curated. Through this approach, we engaged in “empirically driven theorizing” (Salganik 2017, 61–62) to build a system of classification that would enable us to identify patterns across teachers’ curation within social media. We began by hand labeling (Salganik 2017) a sample of 3,528 unique secondary online sites. Through this process, we used retroductive analysis to define mutually exclusive teacherpreneurial sources of information that encompassed the full sample of instructional resources curated. Merged, hand-classified sites matched to 67,435 of 140,287 sampled pins. To label the remaining pins, we used keywords indexing the domain name and suffix to characterize an additional 5,115 online sources (31,410 pins; see the appendix for keyword lists). Finally, we hand labeled the remaining 7,439 unique secondary sources accounting for the remainder of pins that had been left unclassified. This coding provides full coverage of teachers’ pins over time.

## Results

Our results illustrated from whom teachers receive instructional resources and professional information. Teachers’ behavior within social media presents a window into the state of the field (Choi and Varian 2012) as it relates to teachers’ engagement with curricular planning and exists within teaching and social media.

Analysis included an iterative coding process to identify teachers’ acquired resources as represented in pinning behavior. We found that secondary online sources patterned across three large clusters of operational type, including teacher-to-teacher markets (TTMs), teacher blogs, and educational organizations. Within these three clusters, we further defined unique attributes of online sources. Table 2 defines teacherpreneurial online source categories and characteristics.

TABLE 2

*Defining and Describing Teacherpreneurial Online Sources*

Secondary Online Source Category	
<b>Teacher-to-Teacher Consumption Markets (TTM)</b>	
Teachers Pay Teachers (TPT)	The teacher-to-teacher consumption markets are online platforms where teachers share and sell classroom resources, comparing products directly across vendors. This category defines content from the TPT website (teacherspayteachers.com).
Other teacher market website	Websites that are not TPT but are TTM websites, such as teachersnotebook.com
<b>Educator Blogs</b>	
Educator blogs	Educator blogs include independent websites created by individuals or groups of teachers who openly reflect and share their professional values.
<b>Educational Organizations</b>	
For-profit educational organization	Education companies that sell products to teachers or schools, for example, scholastic.com
Not-for-profit educational organization	Educational associations and state/school education agencies, for example, National Council of Teachers of Mathematics
<b>Periphery Online Secondary Sites</b>	
Noneducational sites	Though there may be an educational section, the primary purpose of these sites is not educational. These sites represent individuals or organizations that generally employ contracted writers and do not allow individuals to upload resources outside of a discussion board format, for example, the Huffington Post.
Teachers' original created pins	Uploaded by the pinner him- or herself
Other original uploads	This category includes other educators' uploads on Google.com/docs, Flickr.com, YouTube.com, Tumblr.com, Twitter.com, Facebook.com, or sites that resemble Pinterest, for example, TeachHUB.com. These sites are all for individuals to share information or resources with one another.

Within curated resources, we found teachers turning to other teachers for professional content and instructional tasks. TTMs, similar to an education eBay, provided a space for teachers to create and sell instructional resources directly to one another. Education resources sold ranged in prices, from free to

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more than \$100 per download. The most highly pinned TTM was TPT. To date, TPT reports 4 million active members and over \$330 million earned by teachers alone. TTMs also linked to other online spaces, such as Pinterest and educator blogs. Educator bloggers often linked content for sale directly to their TTM site, driving traffic and potential for resource purchase. Some teachers favorited vendors and followed their TPT stores as new materials were added for purchase. As referenced in the exchange between Miss Giraffe and Jenny, both teacherpreneurs and TPT represented prominent resources from which to curate instruction tailored by teachers, for teachers.

We examined teachers' pinning behavior as reflected across the different sources of resources that teachers curated as defined in table 2. Figure 7 depicts pinning behavior across teacherpreneurial categories.

We found that TTMs and educator blogs accounted for 74%, or 101,679, of all teachers' pins. When combined with other teacher-to-teacher resource seeking, such as at YouTube.com or other teacher original uploads (e.g., Google.com/docs), the proportion of pins described by teacherpreneurial online sites increased to 79%. Therefore, across 197 teachers seeking instructional resources, the majority of the time, teachers were turning to one another for help and support.

Few resources reflected teachers curating information from organizational sources. Only 7% of 136,471 pins reflected resources that originated from

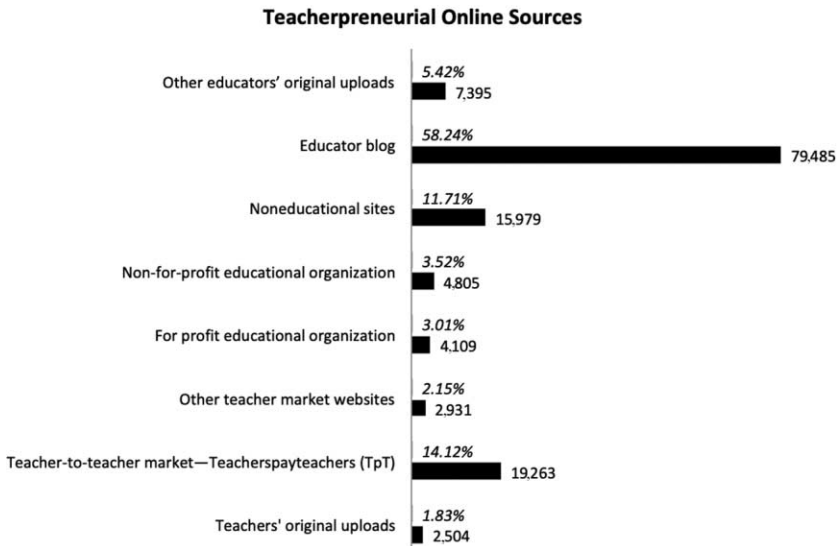


FIG. 7.—Teacherpreneurial information seeking across Pinterest virtual resource pools

educational organizations, such as the National Council of Teachers of Mathematics, state departments of education, or for-profit organizations such as IXL. Although these organizations have historically preponderated instructional resources available to teachers in schools, they represent a small minority of the resources exchanged in Pinterest.

To identify the proportion of resources monetized through educational merchant activities, we examined two-thirds of instructional resources pinned within Pinterest (66,988 pins). Educator blogs and TTMs provided the platform for educational merchant enterprises. We followed each pin’s link to its site of origin and analyzed if it provided teachers an opportunity to purchase resources. We considered these pins evidence of an educational merchant marketplace in which resources may be bought and sold. Figure 8 provides results on the proportion of resources monetized across online spaces.

We found that 82.19% (55,060 pins) allowed teachers to access an educational merchant (i.e., for-profit) marketplace. Within these monetized pins, we identified their site origin and found the majority of pins originated from educator blogs that provided teachers an opportunity to buy resources (51%). The second-largest space pins linked to was TPT, the largest VRP within our

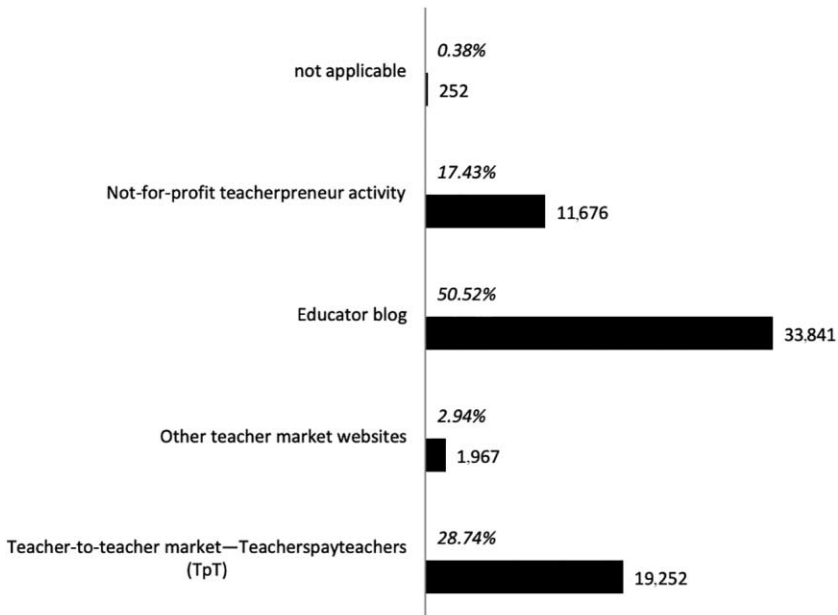


FIG. 8.—Educational craftsmen resource selling across Pinterest virtual resource pools

data (29%). Finally, only 17% of pins subsampled did not originate from teacherpreneurs that monetized resources.

The prominence of educational merchant resources observed within teacher-to-teacher networks and knowledge curation may reflect a movement of educational merchants—those teachers financially motivated to promote, share, and diffuse information and resources across their network. Given the relatively recent advent of teacherpreneurial behavior within virtual spaces, we examined online resource seeking over time. Figure 9 illustrates changes in online pinning behavior.

Descriptive results indicated educator blogs continue to be a predominate resource from which teachers procure instructional help and materials. Overall and across 5 years of teachers' pins, findings suggested sampled teachers pin more resources from other educators, through teacher blogs and TTMs.

Teachers' resource seeking was significantly different across different online sources over years  $F(7,24) = 39.43, p < .001$ . A post-hoc Tukey test showed that the amount of resources teachers curated from educator blogs was significantly higher than from other categories. Although teachers' resource seeking did not grow linearly over years, there was a significant nonlinear relationship between years and teachers' resource seeking, with the 2012–13 span reaching peak curation over the span of 2011–16,  $F(1,24) = 22.07, p < .001$ . This nonlinear relationship is consistent across all categories of online sources, with the exception of a slightly exaggerated increase and decrease at the beginning and end of sampled years for educator blogs  $F(7,24) = 6.27, p < .001$ .

To understand what teachers are pinning and how these resources may shape students' learning experiences, in other work (Hu et al. 2018) we examined the quality of instructional content using the revised Bloom's taxonomy framework (Anderson and Bloom 2001). Hu et al. (2018) used a sample of 1,303 mathematical pins from 26 early career teachers' Pinterest accounts to identify the potential for cognitive demand required of students when completing a particular mathematics task. By examining potential cognitive demand inherent within a mathematical task, researchers were able to understand the types of resources being curated and their relevance to students' learning across a scaffolded cognitive domain. Using the rubric, we characterized each task within teachers' pinned resources. Table 3 provides the number of mathematical tasks pinned in each cognitive demand level.

We found pins to predominantly reflect potential for cognitive demand in the lower two categories—remembering and understanding—of the revised Bloom's taxonomy. This suggested that the potential of instructional tasks sampled from the early career teachers largely require students to engage in lower-thinking-order activities. This may relate to following early career teachers who may be less practiced at identifying high-quality instructional

## Teacherpreneurial Online Resource Seeking Over Time

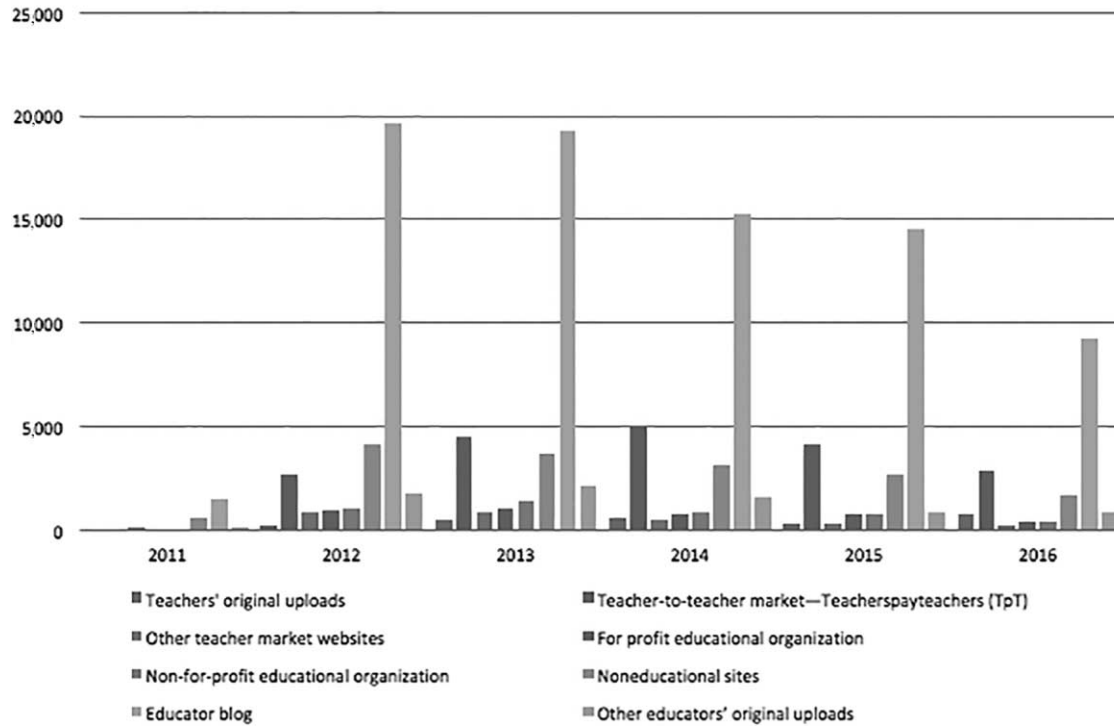


FIG. 9.—Change in teacherpreneurial information seeking across Pinterest virtual resource pools: 2011–16

*Teachers Turning to Teachers*

TABLE 3

*Counts of Pins at Each Cognitive Process Level from 26 Early Career Teachers*

<u>LEVEL 1</u>	<u>LEVEL 2</u>	<u>LEVEL 3</u>	<u>LEVEL 4</u>	<u>LEVEL 5</u>	<u>LEVEL 6</u>	
Remember	Understand	Apply	Analyze	Evaluate	Create	Not Applicable <sup>a</sup>
493	471	207	85	4	16	651

<sup>a</sup> Other math pins include content resources (a conglomerate of tasks, worksheets, or assessment items), pedagogical tips, and classroom organization/decoration ideas. Content resources make up the majority of this column.

resources. Furthermore, it could also be the case that early career teachers are seeking easily enacted resources to supplement their curriculum.

*Limitations*

This article uses a sample of early career teachers and follows their online social media behavior within Pinterest. Results reflect both the sample and the platform within which behavior occurs and therefore cannot necessarily be generalized to all teachers or all social media. For example, there may be differences in teachers' curation given their level of teaching experience (Hu et al. 2018; Torphy et al. 2020). Furthermore, results reported are descriptive in nature and cannot causally identify trends in teachers' pinning over time. Finally, the work contends that teachers' pinning reflects their conceptualization of instruction. However, we do not observe teachers' enactment of curated resources within the classroom. Therefore, future work should be done to identify the diffusion and enactment of online resources from cloud to class.

Discussion

For many teachers, the twenty-first century ushered in a new world of professional engagement across online and social media platforms. Who teachers are and how they engage relate to how information and educational reform diffuse within and across schools (Zhao and Frank 2003). Teachers who are more open to innovation or are provided with professional support may be more likely to change their classroom practices (Rogers 2010). Their conceptualizations of instruction or good practice vary across subject and topic, over time. Observation and survey may inform understandings but are limited to snapshots or retrospective considerations of one's instruction. This work examines teachers' conceptualization of instruction as evidenced, in real time, by social media engagement. Teachers' curation of instructional resources within social media provides a window into their consideration of instruction and planning.

Through an examination of teachers' pinning of resources, we consider the potential impacts of teacherpreneurs taking initiative to curate instructional resources and direct the trajectory of their classroom curriculum as it relates to state, market, and professional forces. In other work, we examine an archive of curated resources and find teachers pin a majority of low-quality mathematics tasks. Taken en masse, lower-quality resources implemented within classrooms may decrease teachers' professional learning and development within the profession and may negatively affect state attempts to increase teaching quality and student achievement. Grassroots teacherpreneurial behavior at scale suggests a mass of resource curation by teachers to teachers that could shift market share of curriculum resources within schools. As teacherpreneurs continue to turn to one another for professional resources and instructional tasks, curriculum may shift from that developed by publishers toward educational craftsmen and teacher-driven products.

Another movement of educator-generated instructional resources and curriculum runs parallel to teacherpreneurial guilds. #GoOpen, an open educational resource (OER) movement, is a federally backed initiative that seeks to develop high-quality, open, commonly licensed educational resources nationwide (Open Education 2019). Often led by participating states and districts, OER may be conceptualized as representing a more state-based influence over instructional resource curation. Similar to autonomous teacherpreneurial behavior, teachers within OER districts are encouraged to be share the same tenets of a teacherpreneurial guild, curating instructional resources and adapting it to their own local student needs (Open Education 2019). However, diverging with grassroots teacherpreneurial engagement, OER requires that teachers use only open resources and encourages teachers to share openly with others any high-quality instructional resources they create (Open Education 2019).

Social norms differ within teacherpreneurial guilds and monetized TTMs. Educational merchants, those teachers who choose to seek profit in sharing professional advice, information, and instructional resources, surface within Pinterest and other VRPs. Although teachers may find a great deal of resources across virtual space, we find them explicitly investing in one another's professional wisdom and instructional materials through purchased resources. This reflects a vote of confidence in the producer of materials and overall suggests teachers prefer to turn to one another for professional support. This phenomenon may be a manifestation of teacher-to-teacher trust and the formation of a teacherpreneurial guild. This professional guild of teachers may extend across geography, school demographics, and other professional affiliation.

Observing educators' online discourse and exchange of information and resources, we contribute to conceptions of current teaching, learning, and educational practices occurring within and around educational reform. In other work, we examine impacts of the CCSS on teachers' curation within Pinterest,

and the influence of teachers' social networks on their likelihood to access resources within Pinterest and to share resources from the same producer within the virtual universe (Liu et al. 2020; Torphy et al. 2019). To identify and characterize resources curated within the teacherpreneurial guild, we examine mathematical tasks within Pinterest and their quality and alignment to CCSS standards (Hu et al. 2018). Finally, we seek to understand the impact of teacherpreneurial behaviors within the classroom. Through both qualitative and quantitative analysis, we examine teachers' sense-making as they curate instructional resources for their students (Hu et al. 2020; Torphy and Drake 2019).

To identify relationships between the quality of curated resources and teachers' enactment of ambitious mathematics, we connect sampled teachers' classroom observations to their Pinterest curation. In future work, we will explore in more detail entrepreneurial behaviors of teacherpreneurs and those educational merchants invested in promoting, sharing, and diffusing information and resources across their network.

As teachers enter the profession with a priori understandings of VRPs and instructional resource curation, we expect greater shifts in the educational landscape. Although the notion of teacherpreneur is novel, the principle—that is, a teacher independently directing his or her own classroom initiatives—is not (Kennedy and Kennedy 2005; Lortie 2020). Social media provides greater affordance for teachers to connect and engage with one another (Torphy and Drake 2019). Through increased understandings of this phenomenon, we may better understand approaches to broach research to practice boundaries, provide quality educational resources, and support stronger teaching quality—across geography, over time.

## Notes

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1. This pin was chosen randomly and does not represent a pin or teacher in our sampled data.

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