How Do US Teachers Align Instructional Resources to The Common Core State Standards: A Case of Pinterest

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ABSTRACT

Social media has become an emergent phenomenon in education. Yet, there is a void in our understanding and research on teachers' professional behavior within virtual spaces. This paper examines a sample of early career teachers' curation of curriculum materials within Pinterest during a time of national education policy reform—the adoption of the Common Core State Standards in the U.S. By aligning the content of the resources that teachers actively seek out online to the Common Core State Standards, we provide an account of the instructional resources accessed and shared as teachers make sense and respond to the policy implementation. Furthermore, by leveraging a novel network approach—Epistemic Network Analysis, we provide a visualization of teachers' conceptualization of varying content and how they relate instruction across standard within their curriculum organization. Finally, by comparing networks of teachers from different states, we find evidence of differences in teachers' behavior patterns as they respond to policy change.

KEYWORDS

Common Core State Standards, Curriculum Curation, Education Policy, Pinterest, Mathematics Teachers

1 INTRODUCTION

With the advent of the Common Core State Standards (CCSS) in the United States, teachers have been facing many new challenges in preparing to teach mathematics aligned with this national reform. Curriculum across different states have undergone significant changes. In early stages of the standard implementation, critics consistently raised concerns about the lagged development of textbooks that are aligned to this curricular reform [1]. Meanwhile, textbook publishers have made great endeavors to revise the existing curriculum according to the standards mapping at each grade level. New curriculum projects (e.g., Eureka, also known as Engaged New York), have been designed to align to the standards in its conceptualization and development process. To date, mainstream curriculum programs for elementary grades claim that they are mostly aligned to the standards. Yet, reports find the degree of alignment varies greatly from program to program (see, EdWeek.org report). For those eight states that initially chose not to participate with the Common Core or withdrew during their transition (e.g., Indiana), school districts may still purchase CCSS-aligned programs on the market while at the same time provide teachers other supplemental materials to cover additional content. Yet, teachers, regardless of their local policy, may need to spend a large amount of individual time and effort to find supplemental materials outside provided textbooks.

Teachers were the first to take action in responding to the lack of curricular materials immediately after CCSS adoption, and their behaviors persist. RAND Corporation [2] reported the results from a nationally representative survey of elementary and secondary teachers, the majority of US elementary teachers and secondary teachers turn to

online resources, in particular, Pinterest and Teachers Pay Teachers for Common Core aligned resources in mathematics and English Language Arts. Despite teachers' active engagement within social media, it is unknown *what* resources teachers acquire in alignment to the standards; more importantly, it is less clear *why* teachers need to acquire those resources in response to the CCSS curricular reform.

2 INTERPRETING AND SENSE MAKING POLICY IN DIFFERENT SPACES

Teachers play a central role in transforming policy to actionable practices directly receivable by students. Research has explored the different ways in which teachers internalize policy and externalize policy into actions, including interpreting policy individually [3, 4] and sense making policy with school-bound social networks [5]. Situated in the social theory of constructing meaning for action, prior research also examined the process of sense making policy as situated in broader social, professional, and organizational contexts by leveraging formal networks and informal communities [6, 7]. The resulted practices are manifest in formal structures such as the grade level meetings or classroom instruction, or informal structure, such as self-imitated conversation with colleagues; both are within the physical spaces of teachers' professional life.

In the context of a national curriculum reform, the response to the policy may also happen in other forms of teacher practices and in the extended spaces beyond the school walls. In the #CommonCore project [8], we see how educators across geographical boundaries play various roles in a broader social network, and shape the discourse around the CCSS. Conversations around the policy incorporate teachers' individual and collective sense making process through a national lens. This article seeks to examine teachers' instructional planning in response to a national curriculum initiative within Pinterest, a central virtual resource pools where teachers turn to for standard aligned resources [2]. We argue that national policy such as the CCSS, permeates teachers' local and global communities as teachers individually and collectively make sense of policy in a social continuum of physical and virtual interactions. Those sense-making behaviors may take many forms, some more observable than others. Teachers' behaviors within social media provide a window into otherwise hard-to-capture sense making processes as it provides a record of teachers' behavior that contributes to a collection of rich data on their online engagement. In this paper, we focus on teachers' engagement in terms of curation of curriculum that address the needs facing them after CCSS enactment. Our conceptual framework is shown in Fig. 1.
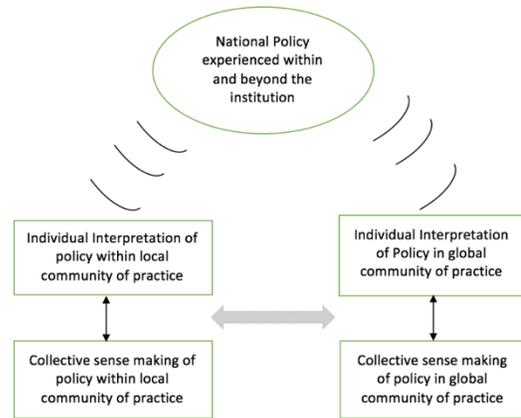

Figure 1: The permeation of national policy into physical and virtual spaces of teachers.

3. METHOD

In this paper, we characterized teachers' curation of mathematical resources in terms of what domain (e.g., Numbers & Operations, Measurement & Data) and what cluster (a set of related content standards) are they aligned to the Common Core State Standards. Additionally, we used Epistemic Network Analysis (ENA) to examine how teachers are sense making and organizing their curation of curriculum within Pinterest by mathematical content.

3.1 Sample

Using a subsample of early career teachers from a National Science Foundation funded research grant studying their planning and enactment of elementary mathematics, we identified and analyzed Pinterest accounts of 29 teachers from four Midwestern states. We confirmed their Pinterest accounts through cross referencing demographic information found in our data, on Pinterest, and other social media websites. The information includes, grade level taught, teaching district, and photo recognition. Coding of content were applied to these teachers' mathematical resources pinned between the origin of their accounts to November 2016. In total, we coded 1,924 total pins coded for instructional content. Future work will expand analysis to a larger sample of both early career teachers and their experienced colleagues, characterizing their curated curriculum within Pinterest.

3.2 Content Coding

For each pin, the rater team first discerned whether the mathematical content in the image is primarily related to one well-defined task and content. Some mathematical pins feature a conglomerate set of resources in the format of a packet, which we referred to as Content Resource [9]. This type of resource addresses multiple domains and clusters. Hence, we assigned a particular code to distinguish mixed

resources from others. Similarly, resources that feature organizational tools for teaching (Physical Resources) and teaching moves (Pedagogical Processes) [9] are also excluded from further analysis beyond descriptive statistics as they concern the structure of the classroom and teaching practice rather than content. For the rest of mathematical pins, we coded for the primary and secondary mathematical domain and cluster to which a pin belongs. Given that only 11.3% of the pins have a secondary content code, we focus on the primary categorization of instructional tasks.

3.3 Epistemic Network Analysis

After we applied the Common Core content coding to all sampled teachers' pins, we used Epistemic Network Analysis (ENA) to map out how are content is grouped together in teachers' board. Through examining patterns in teachers' curation of instructional content within boards, we expect to observe both how teachers organize their thinking and draw connections across instructional content. ENA is a type of network analysis that models how people connect elements within their discourse in the temporal context in order to demonstrate their cognitive network structure [10]. Often teachers organize their pins thematically, for example, a board may be titled "math center" and represent a space in which a teacher collects and houses resources on mathematical activities for centers in his or her classroom. In this case, discourse is teachers' curation of pins related to math center resources and the temporal context is the board, math center. By examining how teachers make connections among tasks with different content, we may provide a rich description of how teachers curate mathematical resources in response to their local context, the curriculum, and necessary content to meet curriculum demands for mathematics instruction.

4 PRELIMINARY RESULTS AND DISCUSSION

4.1 Instructional Resources Acquired Across Mathematics Domains

Fig 2. displays the frequency of each domain in sampled teachers' curation of instructional resources within Pinterest. Most of the pins that teachers curate are Content Resources, which are aligned to multiple Common Core content domains. Moreover, teachers tend to seek out instructional resources in the domain of Operations & Algebraic Thinking (21.1%), followed by Measurement & Data (14.1%) and Numbers and Operations in Base 10 (13.8%).
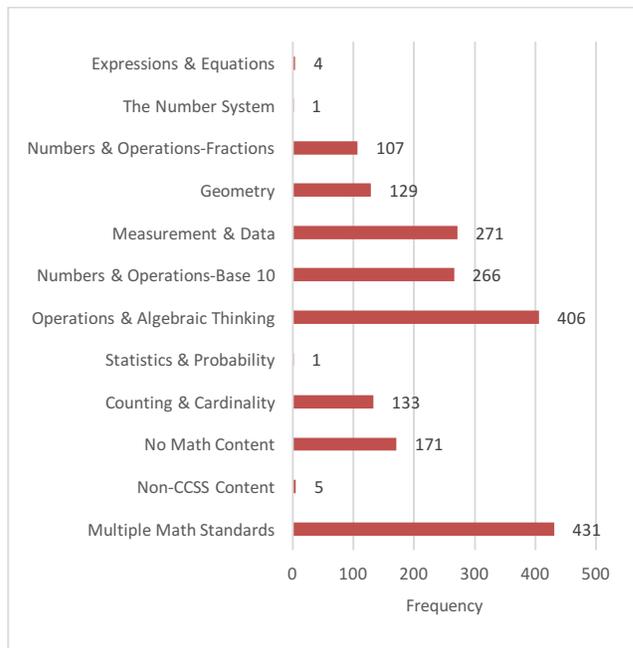

Figure 2: Frequency of Each Domain in Teachers' Curation of Instructional Resources within Pinterest.

The predominance of Content Resources as found in teachers' collection of instructional resources suggests teachers may need a variety of supplemental curriculum materials. Moreover, certain domains are more salient than others, particularly domains related to number sense, including numbers and operations. This may point to potential area of work for curriculum developers and textbook publishers, as teachers have demonstrated their need of instructional resources in these subject areas within mathematics.

4.2 Instructional Resources Acquired Across Concept Mastery as Defined by Mathematics Cluster

Table 1 shows the top most frequent clusters as shown in sampled teachers' collection of curriculum materials in mathematics (with threshold set at 50 pins). Developing the conceptualization of addition and subtraction through "putting together" and "taking away" is the most popular content sought after by sampled teachers, followed by activities on the time and money. Additionally, the large number of Non-CCSS content acquired within Pinterest is also worth noting. Examples of content that is not specified in the Common Core State Standards include reading calendar months and dates by week and asking an appropriate statistical question before conducting surveys. Despite this national policy of curriculum varies in its timeline for implementation across states, many teachers still feel the need to access and curate certain topics that

they regard as worthwhile mathematics curriculum for their students.

Table 1: Frequency of Top Clusters in Teachers' Curation of Instructional Resources within Pinterest.

Comparison	Frequency	Percentage
Understand addition as putting together and adding to, and understand subtraction as taking apart and taking from	112	5.77%
Work with time and money	83	4.32%
Non-CCSS Content	78	4.06%
Develop understanding of fractions as numbers	75	3.90%
Understand place value (2 places)	71	3.69%
Use place value understanding and properties of operations to add and subtract	68	3.54%
Understand place value (3 places)	65	3.38%
Know number names and the count sequence	57	2.96%
Count to tell the number of objects	53	2.76%
Identify and describe shapes	51	2.65%
Add and subtract within 20	50	2.60%

4.3 Are There Any Salient Differences In Terms of Teachers' Curated Resources Across States?

Sampled teachers are from four different states. One of the states—Indiana, repealed the CCSS after one year's implementation and replaced it with their own state standards, though they largely overlapped with the national curriculum. As the organization of content and connections emphasized by the standards have shifted, teachers in Indiana have demonstrated different behavior patterns in their curriculum curation within Pinterest. Fig. 3 shows two groups of teachers' subtracted network in terms of how they make connections among content differently on their

boards. The red lines represent more connections among certain domains made by Indiana teachers when they seek out and curate instructional resources, while the purple line represents more connections made among another set of domains amongst those teachers in Common Core states. We set the threshold at 0.1 for tie strength loading to highlight those salient differences between the two networks.
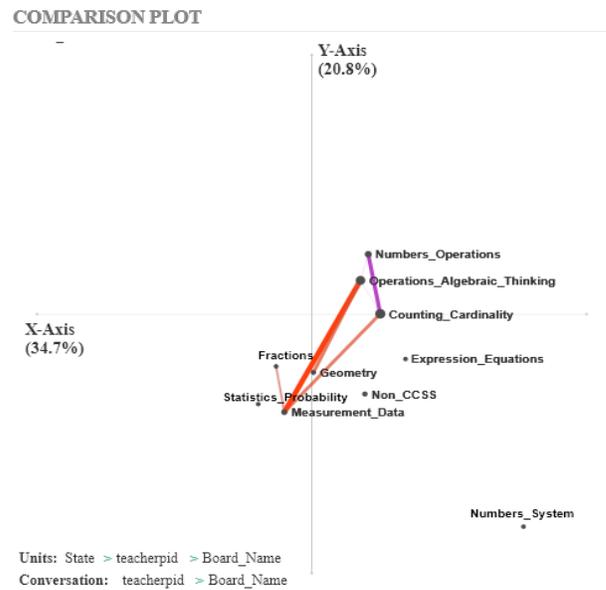

Figure 3: The subtracted network of two groups of teachers, in which the connections made by teachers in Indiana are subtracted from the connections made by teachers in other CCSS States.

As shown in the network structure comparison, Indiana teachers, when acquiring instructional resources for their mathematics instruction, tend to conceptualize content in the domain of Measurement & Data together with Operations & Algebraic Thinking and/or Counting & Cardinality. In contrast, teachers in those CCSS states tend to connect the two domains concerning the number senses more often such as, Numbers & Operations and Counting & Cardinality. The difference in these two networks are significant along the y axis, suggesting there may be systematic differences in teachers' sense making of curriculum as it relates to their statewide educational context. Table 2 summarizes the statistics on the comparison of networks.

Table 2: Statistics for Network Comparison (Effect Size in Parenthesis)

Comparison	P-value along X Axis	P-value along Y Axis
T Test	0.930	0.050* (0.359)
Non-parametric Test	0.894	0.046*(0.191)

5 CONCLUSIONS

In summary, we have coded a sample of early career teachers' mathematical resources accessed and shared within Pinterest in an effort to better understand how teachers make sense of a national policy. We performed Epistemic Network Analysis to investigate variations in sense making patterns as teachers respond to curriculum policy given the differentiated statewide contexts. Our work characterizes an emergent space for teachers to drive their classroom curriculum and professional trajectory. Real time observations of teachers' behaviors within online spaces may provide a narrative on teachers' professional engagement online as it relates to policy change. Future work will leverage a larger sample of teachers who are more representative of the teacher population in the U.S., and further illuminate teachers' sense making of educational policy in their curriculum curation online.

ACKNOWLEDGMENTS

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