

Digital tools for social engagement around reading: a case study of Bookopolis

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Cindy Kim-Ngan Lam

Introduction

Learning to read is a fundamental skill that is critical for academic success. It is also a challenging skill for many children to acquire, despite extensive research on its development. The most recent data from the National Assessment of Educational Progress showed that 64% of students score below proficient in reading (NAEP, 2015). Of that percentage, students from minority backgrounds or less affluent socioeconomic backgrounds obtain even lower scores on standardized reading assessments. One reason for variability in reading outcomes has to do with differences in opportunities to read outside of school. Fundamental early reading skills emerge during the preschool period, before formal schooling (Foy & Mann, 2003). The development of reading expertise is especially nurtured by many hours of shared reading with families and caregivers. These interactions support the development of oral language, phonological awareness, print awareness, and understanding of narrative (Justice & Kaderavek, 2002). However, these basic skills also develop in schools and are often a primary target of intervention. Once competence develops in decoding, building expertise as a reader requires sustained engagement in the activity of reading both for pleasure and as a resource for learning and recent data suggests that this is an important area to work on. The National Center for Education Statistics' (2013) long-term trend assessment obtained a large national sample of students and asked how often they read for fun, using the same question format to measure changes over time. This study found that the amount of time that young children spend reading has been dropping, and other research suggests that variability in time spend reading is related to a number of factors including the availability of books and reading partners (Common Sense Media, 2014).

Much of the research on reading has focused on its development as a skill (National Reading Council, 1998). There is less research on how to nurture motivation and engagement to sustain a child's reading development into eventual expertise, both as an individual capacity and as a shared activity within a wider community. In particular, there is a need to understand the role of peers in supporting engagement in reading (Cooc & Kim, 2017). In this report, I attempt to address this gap in the literature with a two-part study. Study 1 is an exploratory study of two case studies of classroom teachers who use online peer recommendation tools to foster enthusiasm for reading in their elementary classrooms. Study 2 builds on the findings from Study 1 to examine another case study of an elementary classroom using the same recommendation tool, while incorporating the student perspective in addition to the teacher perspective. Both studies use insights from the learning sciences and sociocultural perspectives to examine the role of one online social networking tool, Bookopolis, in how children engage with reading across setting and time as it pertains to social interaction, meaning-making, and

interest development in a classroom community. Both teacher interviews and online peer recommendation data are analyzed to provide portraits of the interacting roles of teacher pedagogy, peer interaction, and the affordances of Bookopolis in supporting engagement in reading.

Background

Theoretical approach

In this report, I will examine engagement in reading through the sociocultural approach, which considers three foci of analysis in research: personal, interpersonal, and community processes (Rogoff, Radziszewska, & Masiello, 1995; Rogoff, Topping, Baker-Sennett, & Lacasa, 2002). Rather than framing reading development as a passive activity contained within the individual, this study assumes that learning to read is constructed across all three planes. Furthermore, Rogoff's sociocultural framework defines the unit of analysis as an activity or event "with active and dynamic contributions from individuals, their social partners, and historical traditions and materials and their transformations" (Rogoff, Radziszewska, & Masiello, 1995, p. 1). This study will examine the individual, interpersonal, and community aspects of activity of using Bookopolis in the classroom.

Complementing sociocultural theory are ecological perspectives on learning and development (Bronfenbrenner, 1974) that highlight the multiple and sometimes complementary settings for learning that children spent time in. Networked technologies extend the possible contexts for learning activities, leading to elaborations of ecological frameworks to acknowledge that an individual's learning ecology encompass "the set of contexts found in physical or virtual spaces that provide opportunities for learning" (Barron, 2006, p. 195). This learning ecology framework further underscores the interrelated nature of learners and their environments in the process of developmental change, highlighting the role of interest in driving the creation of new activity contexts when resources are available (Barron, 2006). This study will examine the learning settings in classrooms in which the physical and digital resources are intertwined with reading engagement.

The role of interest in learning to read

Interest-driven reading, or the act of young readers selecting books relevant to their interests, can sustain reading development and literacy engagement over time. In a review by McGill-Franzen, Ward, & Cahill (2016), students who were allowed to pick the books they were interested in for summer reading demonstrated more gains in reading than those who were not permitted free selection. These gains were especially significant in less confident or beginning readers. In another example, dyslexic students who struggled with the basic cognitive foundations of reading became exemplar readers in topics that they had "passionate interest" in (Fink, 1995). These studies suggest that interest-driven reading can support learners, particularly those with persistent difficulties in reading.

Social peer support in learning and engagement in reading

As described in sociocultural perspectives on cognitive development, learning occurs beyond the individual, extending into the interpersonal and community planes. Fostering a learning environment that is collaborative and peer-supported is one way to sustain reading development across these interrelated planes. Social peer support can be pivotal in supporting children as they learn to read and engage with literacy within a community. Previous research shows that when students engage in cooperative learning, or doing noncompetitive work with the explicit shared goal of learning something, this supports both cognitive and social development (Cohen, 1994; Olivera & Straus, 2004). Furthermore, learning in a collaborative group setting shows more transfer of learning to the individuals compared to when students learn independently (Olivera & Strauss, 2004).

Cognitive and social development are intertwined in peer-supported learning environments focused on reading. Social interaction during learning allows learners to develop their internal cognitive structures as described in Vygotskian and Piagetian learning theories, specifically as readers accommodate models or differing ideas presented by others (Lin et al., 2015). In the classroom setting, peer-supported learning environments can be especially beneficial to struggling readers. Previous studies show that peer collaboration plays an active and mediating role in enhancing the cognitive development of students who are lower performing (Cooc & Kim, 2017).

Consequently, it is important to create a collaborative environment that offers positive peer support. High quality interactions and positive social factors are key for gains in both group and individual learning (Barron, 2003). Further, a more positive environment results in students being more likely to seek help from peers who share qualities with them or demonstrate high performance in class (Lin et al., 2015).

Teachers can play an instrumental role in facilitating this peer positive, collaborative learning environment. A previous study showed that students are more likely to emulate strategies and practices for learning modeled by their peers than they are to emulate those modeled by their teacher (Lin et al., 2015). Thus, one way that teachers can support learning is by creating a positive, collaborative environment that encourages peer-based learning. Teachers can accomplish this by giving more authority to students to take responsibility in their own learning, such as offering a loosely structured learning activity with different learning activities to choose from (Cohen, 1994).

The present study

As previously mentioned, sustained engagement in reading as a lifelong skill is necessary for building expertise, though there is limited research in this area compared to basic development of reading. Interest-driven reading is one means that can create that engagement, as well as books that have cultural relevance to the reader. Engagement around reading is further shown to be a social endeavor, as it can be positively influenced and supported by peers

or teachers. However, there is a need to better understand how social support and interest-driven reading can be leveraged in the classroom to support reading engagement. With growing presence of technology in the classroom, there is especially a great need to understand how digital tools might be leveraged in fostering this type of reading engagement.

The research reported below aims to bridge these gaps in the literature by studying Bookopolis, an online reading community for children aged 7-12 to engage with peers around reading. This was investigated through a two-part study. Study 1 was an exploratory case study of two teachers using Bookopolis, focusing on the pedagogical choices that the teachers made to support the uptake of Bookopolis in their students and what tools they found most effective for achieving these goals. The findings from this study pointed to a need to better understand student motivation and perspective behind social engagement around Bookopolis. Thus, Study 2 replicated Study 1 while collecting in-depth data on students, including qualitative and artifact-based interviews and social network data. Together, the two-part study presented elucidates insights on how teachers can use technology to support peer-collaborative learning in their classrooms, particularly to foster socially-motivated interest in reading.

Study Context: Bookopolis

Bookopolis is an online reading community similar to Goodreads¹, but directed at children aged 7-12. On the “About” page of the website, Bookopolis is described as a “safe and fun online place for elementary and middle school kids to connect with other young readers about books and reading” (Bookopolis, 2017). It was founded by Kari Ness Riedel, inspired by her own observation that her two sons were more likely to take book recommendations from their friends than from their parents. In addition to being the founder and CEO, Kari plays an active role on the website as the “Mayor” of Bookopolis, who posts announcements about reading to members of the Bookopolis community.

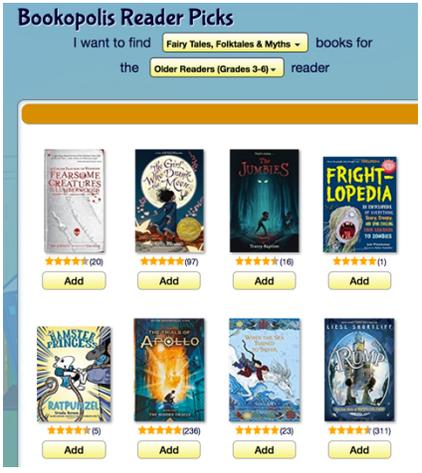
Bookopolis offers online tools to serve the needs of both educators and students. For students, the features include the capacity to make and receive book recommendations, maintain digital bookshelves of books they have read, want to read, or are currently reading, a point-based system that tracks and rewards reading achievements, and an online reading community. For teachers, Bookopolis allows them to create a classroom community with the capacity to view bookshelves, book recommendations, book reviews and other forms of online student activity. These features are further described and illustrated in Table 1.

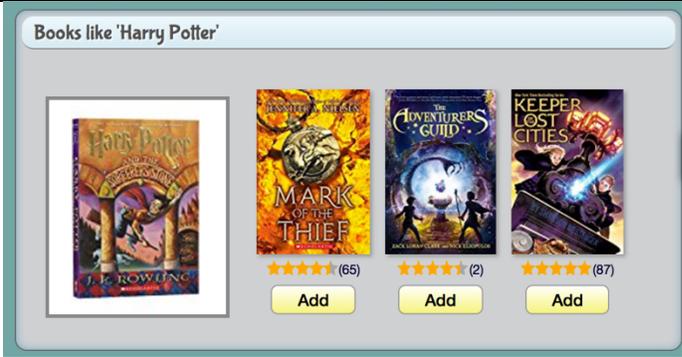
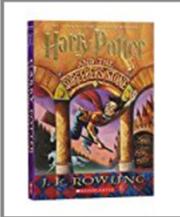
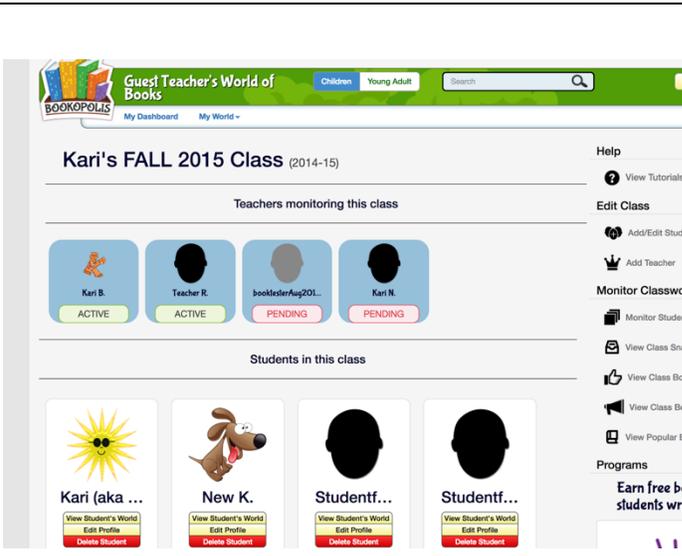
There are multiple functions for students to explore books of interest. First, students are able to find books that they are interested in through the online search function, which can look up books within genres of interest or within grade level. If students identify a book that they

¹ Goodreads' stated mission is "to help people find and share books they love... [and] to improve the process of reading and learning throughout the world." Goodreads also addressed "what publishers call the 'discoverability' problem" by guiding consumers in the digital age to find books they might want to read. Goodreads is now an Amazon company. The website allows individuals to freely search Goodreads' database of books, annotations, and reviews. Users can sign up and register books to generate library catalogs and reading lists. They can also create their own groups of book suggestions, surveys, polls, blogs, and discussions.

Table 1

Screenshots from Bookopolis

Screenshot	Description
	<p>The Bookopolis homepage from a student view. The user can see trending or recently released books on the right side of the page as potential reading material. The screenshot also displays a direct message from the Mayor of Bookopolis, Kari Riedel, who uses this tool to further give book recommendations. On the left column, students can see the “Leaderboard” of classmates with the most accrued points from interacting with the website.</p>
	<p>An online search functions on Bookopolis that allows users to find books of interest. This tool allows them to explore books based on genre (i.e. “Fairy Tales, Folktales, & Myths”) or reading level based on age and grade (i.e. “Older Readers (Grade 3-6)”).</p>

 <p>Books like 'Harry Potter'</p> <p>     </p> <p> ★★★★★ (65) Add ★★★★★ (2) Add ★★★★★ (87) Add </p>	<p>An online search function that allows users can explore books of interest based on current favorites. When Bookopolis users identify a book they love, the website recommends similar books.</p>
 <p>Welcome to BookQuest!</p> <p>Answer a few questions and I'll help you find a new book to read.</p> <p>What level books do you usually read?</p> <p> <input type="radio"/> Early Reader Books <input type="radio"/> Thick Books <input type="radio"/> Chapter Books <input type="radio"/> Really Thick Books </p> <p>Do you want books that are magical or non magical?</p> <p> <input type="radio"/> Not Magical <input type="radio"/> Magical </p> <p>Here are your Magical Fiction books!</p> <p>      </p>	<p>BookQuest is a “choose-your-own-adventure” tool that helps users explore books of interest based on: grade level, level of book difficulty, style of book (e.g. chapter books or picture books), and genre. The avatar on the top left corner prompts the user with questions such as, “What level of books do you usually read?” After the user clicks through the prompts, BookQuest generates five books recommendations tailored to the user.</p>
 <p>Guest Teacher's World of Books</p> <p>Children Young Adult Search Log Out</p> <p>My Dashboard My World</p> <p>Kari's FALL 2015 Class (2014-15)</p> <p>Teachers monitoring this class</p> <p>     </p> <p> Kari B. ACTIVE Teacher R. ACTIVE booksterAug201... PENDING Kari N. PENDING </p> <p>Students in this class</p> <p>     </p> <p> Kari (aka ... View Student's World Edit Profile Delete Student New K. View Student's World Edit Profile Delete Student Studentf... View Student's World Edit Profile Delete Student Studentf... View Student's World Edit Profile Delete Student </p> <p> Help: View Tutorials Edit Class: Add/Edit Students, Add Teacher Monitor Classwork: Monitor Student Work, View Class Snapshot, View Class Book Reviews, View Class Book Buzzes, View Popular Books Programs: Earn free books when students write reviews </p>	<p>The Teacher page on Bookopolis. On this page, teachers are able to view individual student profiles. From these profiles, teachers are able to manage and respond to students' input, such as book reports, book reviews, reading logs, and messages to their peers. As seen on the right column, teachers are also able to view aggregate class data.</p>

love, Bookopolis can suggest books of a similar type. There is also a function called “BookQuest,” in which students answer a string of “choose your own adventure” questions to receive a curated list of books according to their preferences. The Bookopolis homepage additionally features books that are recently released or recently popular. Lastly, Kari herself offers recommendations as the Mayor of Bookopolis through announcements that she posts on the homepage or messages that she sends to users. Screenshots of these features are illustrated in Table 1.

Bookopolis is also offers a point-based reward system. Described on the website as a means of “positive peer competition,” Bookopolis is a gamified platform in which users receive badges and points as rewards for achievements in reading and using the website. This includes activities such as adding books, writing reviews, and inviting friends. Within a classroom, students are ranked according to the amount of points they accrued through interacting with the website. The ranking system can be observed in the screenshot of the Bookopolis home page in Table 1.

For teachers, Bookopolis offers the ability to create an online classroom community. Since the online classroom is invite-based, teachers can use this tool to create a virtual environment specifically for their students. Teachers can also engage with the reading community using all the same features that are available to students. On the Teacher page, teachers are also able to view individual student profiles. This enables teachers to review student book reports, book reviews, reading logs, and messages to their peers. Lastly, the Teacher page allow educators to view aggregate class data, such as the total number of books read or the average time spent reading per student. A screenshot of the Teacher page is available on Table 1.

Study 1: Aims

In this first study, I connected with the teachers who were actively using Bookopolis to learn more about how they used the digital tool to support socially motivated reading engagement in their students. Qualitative interviews with teachers were used to deeply understand teacher perspectives on this topic. The web usage data was also collected from their respective classrooms and studied to visualize the patterns of social, peer-to-peer networking in their classrooms. This study was guided with the following research questions:

1. What pedagogical choices were made by teachers to support the uptake of an online literacy tool like Bookopolis?
2. What features of the online literacy tool do teachers feel support peer-based learning in their classrooms?
3. From the teacher’s perspective, how does the use of an online reading community impact the early literacy engagement of young children?
4. What evidence of peer-to-peer engagement do we see from the online data?

Study 1: Methods

Participants

Two participants were recruited through the help of Kari Riedel, the CEO of Bookopolis. She contacted local teachers who were currently active users of Bookopolis. These participants, henceforth referred to as Ms. B and Ms. R, were selected because they both emphasized the in-class social nature of their Bookopolis experiences. Both teachers have extensive experience in the classroom. Both of their schools are located in Northern California, located in different public school districts. They taught similarly sized classrooms of about 30 students, typically to a proportion of students who were socioeconomically disadvantaged and a proportion of students who are English Learners. This information was extracted from interviews and validated using the School Accountability Report cards of the respective schools for the 2016-2017 academic year. More details can be found in Table 2.

Table 2		
<i>Characteristics of the case study teachers and their participating schools.</i>		
	Ms. B	Ms. R
<i>Teacher characteristics</i>		
Grade taught	3rd, 4th	3rd
Amount of experience	25 years	12 years
Average classroom size	26-30 students	30 students
Classroom makeup	English Only & English Learner	English Only, English Learner, & Special Day
<i>School characteristics</i>		
Total students	496	700
Grades served	TK-5	K-8
Proportion of students identified as socioeconomically disadvantaged	45.1%	33.8%
Proportion of students identified as English learner	12.7%	22.4%
Proportion of students identified as those with disability	9.8%	13.4%

Qualitative data collection and analysis

Each teacher was interviewed for about one hour, resulting in about 40 pages of transcript each. Interview questions were designed to be open-ended and cover four broad topics: the teacher's personal learning trajectory in using digital reading tools, the teacher's experiences with Bookopolis, the impact on student learning.

I began the data analysis process by discussing and refining research questions with my research group. These research questions would be used to broadly frame the qualitative analysis that followed. Next, I open-coded the transcripts in Dedoose, highlighting and memoing interesting points in the interviews that related to the research questions. After my first pass through the transcripts, I reviewed the codes that emerged, combined redundant codes, and organized them into parent codes by category: teacher pedagogy, student engagement and growth, student ownership, online features supporting social interaction, and community. With this preliminary codebook, I conducted a second pass of open coding through the transcripts.

In order to conduct inductive thematic analysis, I exported and printed all codes and their associated excerpts from Dedoose. After systematically reviewing convergence and divergence in the data within code categories, I organized these iterations of convergence and divergence into larger categories. From that, I extracted the primary themes presented in the Analysis section of this paper.

Quantitative data collection & analysis

Kari Riedel, the CEO of Bookopolis, provided extensive Bookopolis web usage data from each teacher's class during the 2016-2017 academic year. For the purposes of this study, I analyzed a subset of the quantitative data relevant that was most relevant to my research questions and to themes that emerged from the qualitative analysis. The social features of Bookopolis were a focal point both in my research questions and in the qualitative themes, so I chose to study the quantitative web usage measure of peer interaction. I selectively analyzed the data of the book recommendations that users made to each other within their online classroom communities.

The book recommendation data listed every instance that a user recommended a book to another user during the 2016-2017 academic school year. For each instance, I received information on the date of the activity, the unique anonymized ID of the user who sent the recommendation, the unique anonymized ID of the user receiving the information, the message included with the recommendation, and the Amazon ISBN of the book. Basic descriptive statistics were performed on the book recommendation data to understand patterns of peer recommendations, frequency of giving and getting, mutuality and variability among class participants.

From the book recommendation data, I also chose to look up the ten most popular books within the class to get a sense of their community reading profile. These books had the highest frequency students both recommending and receiving recommendations about. Ms. B's class

circulated a total of 169 books across 3,215 recommendations. Ms. R's class circulated a total of 137 books across 1,743 recommendations.

I also used Gephi, a social network data visualization tool, on the recommendation data. The purpose of these social network graphs was to illustrate the connectedness of peers within the online class communities based on their recommendation activity (Easley & Kleinberg, 2010). Within these graphs, individual students were represented as nodes, and their respective number of recommendations was represented as links between the nodes. The range of recommendations for links were set to 2-60, so that students who did not receive or send recommendations were still included in the classroom visualization. Two social network graphs were produced to visualize the magnitude of recommendations that students sent out, and recommendations that students received. A graph was also produced to illustrate reciprocal recommendations within students, in which the same students both send and receive recommendations to and from each other.

Study 1: Results

The first three research questions were addressed with an analysis of the teacher interview data:

1. What pedagogical choices were made by teachers to support the uptake of an online literacy tool like Bookopolis?
2. What features of the online literacy tool do teachers feel support learning in their classrooms?
3. From the teacher's perspective, how does the use of an online reading community impact the early literacy engagement of young children?

Three primary themes emerged in the qualitative coding: the importance of pedagogical choices, the social features of Bookopolis, and significant changes in students' ownership and agency of reading and sharing books. The following case studies illustrate two ways that Bookopolis can be used in the classroom to not only accomplish pedagogical goals, but also to engage students with literacy practices at the individual, interpersonal, and community levels. They further provide a deep dive into an illustration of the learning ecologies of Bookopolis in the classroom. For each focal teacher, I begin with a short teaching biography and then present findings for each of the primary themes.

Case 1: Ms. B

Teaching profile and school context

Ms. B has been a teacher for 25 years, teaching third grade at a public elementary school. Her classroom size is usually 26-30 students on average, with a combined makeup of students who are identified as English Only and English Learner. When asked to characterize the broader community that her school serves, Ms. B described it as diverse. Detailed demographic information taken from the School Accountability Report Card (SARC) is listed in Table 2. Additionally, the school received financial support from a local bond to access to technology as a tool for student learning.

Ms. B participated in online teacher communities such as Facebook, Twitter, and ClassDojo, in which she played a dual role as both a mentor and learner as she sought out and shared teaching strategies. Ms. B discovered Bookopolis through these online professional learning communities, specifically the mentoring community on ClassDojo. She was drawn to its similarities to Goodreads, an existing reading community and book recommendation website for adults. Ms. B was particularly interested in incorporating Bookopolis's social networking features into her classroom.

Scaffolding Bookopolis into the classroom was a time-intensive and shared learning experience for both Ms. B and her students. She "dove in" with her students as an equally naive learner during the springtime, about two-thirds through the school year. Because she had already spent significant time teaching her students, Ms. B "[felt] safe failing in front of them or not knowing," and she also felt that this practice gave her students more ownership in the learning process. She and her students spent ample time learning to use Bookopolis together at the start. After this, Ms. B gave her students free choice to engage with Bookopolis during regularly dedicated class time.

In her personal learning trajectory as a developing reader, Ms. B identified herself as a "struggling reader" as a child, growing up in a "dirt-poor" socioeconomic environment. Even so, adults in her life encouraged her to seek out reading materials, particularly through the local library:

Ms. B: I grew up in a library. I was dirt poor growing up. I mean, to where we had lawn chairs for furniture until I was 20 years old. We grew up in a library, in the public library. Every Tuesday, our neighbor took us, and every Thursday, my mom took us. I didn't know there were bookstores. I had no idea about a bookstore. I had no idea about classic books... I don't really have a memory of owning physical books.

Ms. B experienced a shift in her journey as a reader when she discovered a book that she loved in sixth grade. This led her to seek out similar reading materials in her school library, as well as engage in conversations about reading with her schoolmates. Through the "spark" moment that led her to fall in love with that book, Ms. B began pursuing and establishing her own reading community.

Ms. B: I didn't like reading until I was in the 6th grade. My teacher did read aloud and she read *The Rats of NIMH*. That was the first book she read. You would think I've never been read to aloud before... My mom said she read to me my whole life, and I believe her. I just don't have a recollection of it. I don't have a recollection of a book that I loved and literally, I was a struggling reader. Maybe that's the issue, but literally come sixth grade when my teacher read that book out loud, it literally just like, I was in love with that book..... It was much too hard for me, but that's what got me into the school library that was open at recess. And that's when I got some books based on what friends were saying. A group of friends and I would read at recess time.

Analysis of Ms. B

Pedagogical choices with Bookopolis

Ms. B's pedagogical goal for incorporating Bookopolis into the classroom was to nurture a passion for reading in her students. She strongly believed that the way to accomplish this was to be non-punitive, key into student interests, and offer them resources for reading within those interests. She cited this goal multiple times throughout the interview:

Ms. B: That's important to know what's out there for reading for your kids, to be able to recommend a book based on a certain genre that they're interested in. If you're not doing that, you don't know about those books, then you can never create that passion in your students if you don't know what is out there.

She also stressed that it is the active role and responsibility of the teacher to be able to support this passion. According to Ms. B, teachers should not only be aware of student interests, but also they should be spending dedicated time finding and recommending books to their students based on those interests:

Ms. B: A lot of teachers will use the library time to sit down and grade papers, or to sit down and check their e-mails. No, you should be up helping your kids find books. You should be up recommending books. You should be talking about books and trying to spark an interest in reading with your kids during that 30-minute library time.

In many ways, this strong principle in Ms. B's pedagogy parallels her own personal learning journey as a reader. As described in her teacher profile, Ms. B was a struggling reader until she found a book that she loved, was able to seek out more books on the topic of interest, and was able to socially engage with peers about that book. Ms. B hoped to recreate this experience for the students of her classroom by using Bookopolis as a tool for students to explore their interests in reading and socially connect to their peers in a reading community. Additionally, Ms. B cited libraries as a highly influential means of accessing books during her childhood. This is reflected in her teaching practices, as Ms. B listed multiple ways that she made reading materials accessible to her students. She offered Epic (an eBook program free to her students while they are at school), her extensive classroom library, the school library, and the public local library. Similar to her stories of her regular walks to the library as a child, Ms. B recreated this point of access for her students:

Ms. B: The other thing I am connected with is our local librarian, the real public librarian. She has already come to our school. I got her to come to Back to School Night... Then, I will take my class on a walking field trip to the library to get their own library cards, or at least get their application for a library card. If they have their own card already, I'll let them actually check the book out with their parent's permission, so that they, or you know, sparking the fire that way... Because for most of our students that are poor to [the point] that they wouldn't have access technology-wise or money-wise, or anything, the library's literally within walking distance from here.

To accomplish the pedagogical goal of sparking a love for reading, Ms. B highlighted two particular classroom practices she used: dedicated unstructured time and the combination of digital and physical tools. Both of these practices demonstrated innovative ways to meaningfully nurture a learning ecology with Bookopolis as a central site of learning in the classroom, as students reportedly not only used the features of the website, but also engaged with their peers within the classroom community and developed their own skills and interests as readers.

Dedicated unstructured time is described in the literature as a way for teachers to support peer collaborative learning by giving students more ownership over their time and learning choices (Cohen, 1994). This is observed in Ms. B's classroom practices when she allotted time for students to interact with Bookopolis and each other as they chose. Ms. B described how the classroom "came alive" during these periods. Ms. B found that as students had free choice to engage socially around Bookopolis, they resultantly appeared to be more excited and energized about reading:

Ms. B: They're going to get situated first before I hand out any technology with whoever they want to sit by and wherever they want to be, and have all their materials with them. Then, I'll pass out the technology, the Chromebook. Then, they just literally, I let them loose.

Ms. B: Literally, that whole social aspect, I can't even tell you the fire it ignites. I don't want to say chaos and pandemonium it brings to a classroom, but it's like the classroom can be dead and then, it's coming alive like it's a carnival because they're all on Bookopolis.

Ms. B: It's not quiet. It's very noisy. It's very loud. You cannot hear. It's not structured. It's happy. Otherwise, that's not exciting. I'm not saying they're screaming. I'm not saying that. I'm just saying it has to be social. They have to talk. They have to be doing the talking to each other. They have to be looking at each other. They're not going to get that they can do things unless they're experimenting together.

Ms. B did not use Bookopolis as a standalone tool – she created a rich learning ecology by also combining digital and physical resources into classroom practices. Because Bookopolis does not provide physical books or digital texts, Ms. B went out of her way to offer students access to physical books. In the classroom, each student had a designated book bin filled with their choice of reading materials. Ms. B also supported students in finding books from the classroom set, the school library, or the local library near the school. Within their book bins, students also had physical paper journals. Students were required to handwrite information about the books they were reading (title, author, level of difficulty, reviews) before entering that information into the digital Bookopolis interface.

Ms. B: Prior to that point is when you want them writing down what they read. I have a 40-book challenge that they are supposed ... It's a log, so I'm expecting each child to read 40 books during the school year. Before they can turn their book in to the class library and refill their book bin or turn it in even in the morning, they have to write down the title and the author, and the genre and if it was a just right book or it was too easy or it was too hard. Then, once they do that, that's their key to where they'll be able to get in

to Bookopolis and because it's written down. You know what I'm saying? It's written on a paper, in a journal. Then, they'll be able to take those and start logging them.

Bookopolis features identified as important for learning

While Bookopolis offers many educational features for both teacher and student users, Ms. B identified four features as important for her pedagogical goals: gamification, book recommendation, personalized bookshelves, and being a public member in an online social network. Ms. B found that these features supported her goals to not only nurture the excitement and love for reading in her students, but also her goals to help students explore their interests through reading.

Ms. B described how her students were excited by gamified features on the website, such as the ability to earn points, buy badges with those points, and display badges on their profiles. While she acknowledged that gamified incentives were not well regarded in her learning communities, she found that they added excitement and energy to her classroom.

Ms. B also found the recommendation feature incredibly beneficial for her goal of keying into student interest and offering relevant reading materials. She loved that ratings took into account both student interest and students' ratings. Book recommendation took a few different forms: directly, either personally from the website or another peer, or indirectly, by observing a peer's saved books on their online bookshelf. Ms. B observed that this not only got students more excited about books, but also was used as joint activity to coordinate in-person engagement. According to Ms. B, the recommendation tools were a major social resource that facilitated a peer-collaborative environment in the classroom.

Ms. B: Let's say I'm not sending you any messages but I could say, "You know, I want to know what [Ms. B]'s reading because she always reads the best books. I know when she recommends them to me that I get super excited about those books and I love them." Then, I can go on to [Ms. B]'s site and see what kind of books is she reading and what she's reading right now. What I had found with the Bookopolis is when they do that, the kids will oftentimes pick a book that is the exact same as the other person, so that when we're doing Daily 5, they can actually do read with someone and they actually are reading and talking about the same book.

Ms. B: They're all rating their books, and they're all ... They'll message you. I love how they'll send an instant message to each other or I can send you a book recommendation. I can tell you, "Oh, you know, I'm reading *It's Raining Cats and Dogs*," or whatever book I could recommend to you, you know, *The Day the Crayons Quit*. I could recommend books to you or I could just be on there looking at your bookshelf without you even messaging me about a book or me messaging you.

The above excerpts also highlight another important tool that Ms. B emphasized: the social aspects of Bookopolis and how they nurtured her students' excitement for reading. She identified the social nature of the website as "what really sparks [her students] and drives them on." Combined with Ms. B's pedagogical choice to give students unstructured, free-choice time

on Bookopolis, the social networking features nurtured interpersonal relations about reading, both online and in-person.

Ms. B: Literally, that whole social aspect, I can't even tell you the fire it ignites. I don't want to say chaos and pandemonium it brings to a classroom, but it's like the classroom can be dead and then, it's coming alive like it's a carnival because they're all on Bookopolis.

Based on Ms. B's observations, Bookopolis facilitated a reading community in the learning ecology spanning both the digital and physical worlds of her classroom. The act of connecting to each other in a shared virtual space mediated reportedly more discussion and collaborative learning in the classroom.

Outcomes on students' sense of ownership and agency as readers

The combination of Ms. B's pedagogical practices and the social features she chose to use from Bookopolis reportedly resulted in students demonstrating an increased sense of ownership and agency as readers. This aligned with Ms. B's pedagogical vision; as Ms. B discussed the importance of interest-driven reading in her students, she repeatedly cited her philosophy about the "right of a reader":

Ms. B: I just don't care for that genre. But that's okay because that's my right as a reader.

Ms. B: ...You have the right to not like a book and shut the book after two pages, you know, or maybe give it a try tomorrow. If you're still not liking it, close the book and get a new book. That's your right as the reader.

It is unsurprising, then, that one of the outcomes Ms. B was most excited to talk about was student's increased sense of empowerment as readers. She especially liked how Bookopolis gave her students the agency to look up books relevant to their interests, recommend books to their friends, and assign ratings and reviews according to whether they liked or disliked a book. From her observations, students also felt empowered sharing a user space with their teacher, since Bookopolis also allowed them to recommend books to Ms. B:

Ms. B: That was powerful for them to see books that I had read and rated as well. Then, they were recommending books to me as well. Some of the kids were even recommending books to me.

With increased ownership and agency as readers, Ms. B found that the impact also extended to her students' writing. As students understood the potential audience afforded by their online community, they took more ownership of their words. While this took some scaffolding from Ms. B for the students to fully understand the virtual audience beyond their classroom, it reportedly held them accountable to a higher standard of writing about books and of general reading engagement.

Ms. B: It still did not, until they physically saw that I could see on my end, because I showed them on my teacher computer, until they physically saw it, their little eight-year-old brains did not comprehend that I could see that. Obviously, I don't have the

capability to show them that everybody else in the world can see it, so I had to make sure that, "Look, Mrs. Bartell can see it. That means other people can see it. You've got to be paying attention and be doing the right thing here."

I: Do you feel that with this added accountability, once they understood that you and the whole world could see it, do you feel like their writing changed?

Ms. B: Oh, yes. Yeah. It held them to a higher standard, for sure. Even though, I swear to you. It's so weird. You can tell them. You can preach it, but until they see, it's so different. Once they physically saw my side of it last year, they were like, "Oh," like it really made a difference.

Ms. B: Yeah, that accountability factor was like an eye-opener for them and I think it made the caliber of their writing better. It made them put more effort in. That was powerful for them to see books that I had read and rated as well.

Case 2: Ms. R

Teaching profile and school context

Ms. R has been a third grade teacher for 12 years at a public elementary school in the Bay Area of Northern California. Prior to teaching, she worked in the health care industry with a focus on integrating technology. Her classroom size was typically 30 students on average. Notably, Ms. R characterized her class as one that was "already a reading community," as all students in her class already liked to read. She described her classroom as one of integrated learning, inclusive of English Only and English Learner students, as well as "Special Day" students, or those who are not cognitively able to work at grade level due to a learning or developmental disability. In fact, some of her students were unable to type and so were limited in their use of Bookopolis. Ms. R's class also had more English Learning students than Ms. B's, and these students were primarily Spanish-speaking. Detailed demographic information taken from the SARC is listed in Table 2.

Ms. R was already adept at using technology, having found Bookopolis through her own means of searching online. This makes sense considering her learning trajectory – Ms. R described technology playing a core role in her professional development in her previous work, as she wrote tech manuals and did tech training and support in the healthcare industry before becoming a teacher. These experiences shaped her philosophy that technology needed to be more than a replacement for something in the classroom, but rather a meaningful tool with a contextualized goal.

Ms. R: I think what's critical not just replacing technology with what kids are doing on paper and pencil.

Ms. R's comfort with technology was also reflected in how she integrated Bookopolis into her classroom. She found and utilized the online learning resources provided by Bookopolis, particularly the "Getting Started" video tutorials on YouTube. From these instructions, Ms. R adapted what she learned into her classroom practice. She used this information to model to her students ways of engaging with the Bookopolis reading community.

Analysis of Ms. R

Pedagogical choices with Bookopolis

Ms. R's primary goal for using Bookopolis was to use technology to bring more reading into her classroom community. In particular, Ms. R wanted students to know how to meaningfully use technology for the purposes of reading and communication. As described in her learning trajectory, Ms. R believed strongly that students needed to be taught how to use technology at a "high level," or as a tool that they could manipulate in pursuit of a wider goal:

Ms. R: And I think in this day and age if you're not giving students access to tech in a high level manner, you're doing a disservice. If all you're doing is, "Okay. We're going to do Raz-Kids². Everybody put your headphones on and let's listen to a story and let's take a quiz." That's not enough. I just don't think it's enough. It is for some populations for a period of time, but they need to move on.

I: Okay, so what would you call high level access to tech?

Ms. R: I think high level is kids who are using tech as a tool, not just having it spoon-fed to them. And if kids are doing Reader's Theater and they're creating a background for it using tech, to me that's higher level. That's giving them ... It's how do they manipulate a tool, and the tool is tech.

The importance of a meaningful work for students is something that emerged repeatedly in Ms. R's interview. Beyond the realm of technology, Ms. R also emphasized her pedagogical goal of making activities around reading (e.g. reading at home, writing reviews, etc.) more purposeful for students. She cited traditional paper reading logs as an example of an activity that was not personally valuable to students, and one reason she was attracted to Bookopolis:

Ms. R: Whenever I go into a grade, it's like, "Oh, here's our reading chart." And the kids are expected to read for 20 minutes, and then they're expected to write a sentence or two. And then their parent signs it, and they bring it to me. And I personally have just always been really frustrated with that. I've not ever really seen the purpose behind it, and I've not seen a benefit. And so time for students is really precious in their homes, and I was looking for a way to make that time more valuable. And then in addition, one of the Common Core standards is to be using technology in a meaningful way. And so my thought was maybe there's a way I could pair those two things together.

² Raz-Kids provides comprehensive leveled reading resources for students. With 800+ eBooks offered at 29 different levels of reading difficulty. Students access their leveled text through an interactive learning portal designed to keep them motivated and engaged. Every eBook is available in online and mobile formats, and allows students to listen to, read at their own pace, and record themselves reading. Students then take a corresponding eQuiz complete with an extended answer response to test comprehension and determine future instruction needs. Once a child has read ten or more of the leveled eBooks and passed each of the corresponding eQuizzes, they advance on to the next reading level where they have access to lengthier and more difficult text. Digital management and reporting tools to easily track individual and class-wide reading progress.

Like Ms. B, one way that Ms. R accomplished her pedagogical goals of teaching students meaningful technology use while bringing more reading engagement into the classroom was to give students dedicated unstructured time for students to use Bookopolis. During allotted time for Bookopolis, Ms. R's students reportedly divided their time between writing, using the website, and talking to each other about books:

I: And can you paint a picture for me what a day using Bookopolis was like?

Ms. R: ... So we would log on every morning ... And so it was instead of, so it was like their book log on steroids in a way. So every morning they were expected to come in. And it was sort of like our bell ringing activity, so they would come in, they would open up their computer, they'd log onto Bookopolis, they'd have their book out that they had read the night before, and they would record. They'd record what they'd read. They'd write a sentence about it. If they were done with their book, they would then write a book report, and then they would share the information...

For me, I saw it as a way for [the students] to practice typing, to share about books, to speak about books, so there was an oral component to it as well as the technology piece, the writing piece.

Though students had free choice during this time, they seemed to mostly use it to do reading logs. Ms. R's classroom Bookopolis time seems to have been less unstructured than that of Ms. B's. This may be because Ms. R had to introduce more structure for the different levels of reading and cognitive ability in her classroom.

Bookopolis features identified as important for learning

Ms. R found several features of Bookopolis useful for her students: the ability to explore and choose genres, using reading logs to track books and amount of time spent reading, communicating via reviews and recommendations, and receiving feedback from the community. Though not all of these activities directly related to Ms. R's larger pedagogical goals, she described seeing gains in her students' learning and engagement as result of these features.

As previously described, Ms. R used the online reading logs as part of the daily morning routine in her classroom. She felt that this helped begin the conversation around what students were reading, as students used Bookopolis to reflect on books they were currently reading or wanted to read. Through this conversation, the reading logs contributed to engagement between peers in Ms. R's classroom reading community.

Ms. R found it especially useful that Bookopolis encouraged students to explore books of different genres, either through their own practices or through recommendations from peers. Though she considered her students to be a community of readers, she identified a recurring issue of students getting "stuck" on particular books:

Ms. R: I'll also say that it was already a reading community, so there wasn't ... I don't think there was anybody in the room who didn't like to read, but I would say there were kids who were stuck reading the same things. There were kids who weren't pushing

themselves to read anything harder than what they'd been reading.

Ms. R: They could search for books in different genres, and I thought that that was all really powerful, because kids at third ... Well, I think any grade, they get really stuck. They're stuck on Wimpy Kid. They're stuck on Captain Underpants. They're stuck on graphic novels. And I thought this is a way that their peers could say, "Hey, I just read this book. I think it's great."

Ms. R also highlighted the importance of features supporting student writing, particularly reviewing books or messaging peers with recommendations. These tools allowed students to "use their voice and express their opinions" within their reading community.

Lastly, Ms. R repeatedly noted that feedback was a useful feature in Bookopolis. Feedback came in various forms: from Ms. R, from the website in the form of recommendations, and in personal messages containing recommendations for reading and website use from the "Mayor." Ms. R also found feedback from the online video tutorials useful in her own process of learning to use Bookopolis.

Ms. R: There were videos. And that was part of what made that site interesting to me also is that it did have a lot of help. They got emails from the mayor of Bookopolis. They thought that was very cool. So there was a lot of feedback in a positive way.

Ms. R enjoyed giving feedback to her students in multiple ways. From the Teacher page, she was able to track student writing on reading logs, book reports, and reviews. This feedback was usually given through the social media features of the website, namely likes and comments. Ms. R also stated that the samples of student writing were helpful during hands-on guidance for improving writing. Ms. R used these writing samples to help students become more meta-cognitive about their writing and scaffold them into expanding it.

Ms. R: As a teacher, I was reading what they were writing, which I like that also because I could do it at home. So I could go home, I could log into my account, and I could see what they had done. I liked that I could make comments also, so that I was able to give feedback on what they were doing. The kids like getting mail, they like getting comments from teachers. So that was nice that I was able to do that for them.

Ms. R: But I think the fact that as the teacher I could look at what they were doing, and I could write ... I could create reports, and I could show the kids like, "This is what you did last week, and now look, what if we added this? What if you told me about this?" And I could sort of give also assignments like, "Okay, this week I want you to include information about the main character. I want you to include information about the setting. I want you to include an idea, like what made this book interesting to you? Or if it wasn't interesting, why wasn't it interesting?"

Outcomes on students' sense of ownership and agency as readers

Ms. R reported profound differences in the way that her students engaged with reading as result of using Bookopolis. Combined with Ms. R's pedagogy emphasizing purposeful learning

practices, Ms. R observed enrichment in the way her students engaged with reading: they were proud of and took ownership of their reading activities, more willing and active in their discussions around reading, and showed more sophistication in their writing. She observed that by giving students the digital space to use their voice in an online community, students felt empowerment and ownership as readers. Similar to Ms. B's class, the potential audience within a digital community also extended ownership and accountability to the way that students wrote.

According to Ms. R, her students felt increased agency, ownership, and empowerment through using Bookopolis. By understanding their place in the online reading community, they felt empowered knowing that their acts of reading could be shared with potential community members beyond their classroom:

Ms. R: As I said to the kids, it was sort of like going to the library. And they loved being able to find their library book online, and so if I had a kid reading picture books or I had a kid reading Harry Potter or Percy Jackson, they could all find the books that they were reading online or within the context of Bookopolis. And think that also is a very powerful message, because it shows that it doesn't matter what you're reading, you just need to be reading.

The students also found empowerment in their words. As Ms. R's teaching focused on giving students a platform to find their voice, students found power in not only expressing their opinions, but also being able to share those opinions with the community. In line with Ms. R's pedagogical philosophy, students particularly found power in their words when they understood that online messaging and writing could be used as a meaningful communication tool:

Ms. R: And it seemed like it just gave the kids ... You know, because initially there's that silliness, but then they found the power. They found the power of their own words and their own opinions. They were able to share those with people. They could share them with me. Also this was their first year using Chromebooks, so it gave them a legitimate reason to be on a computer and to see the power, that they could use it for a communication tool.

Ms. R also underscored how the online community nurtured an increased sense of ownership in her students. Ms. R compared it to her previous example of less purposeful classroom exercises, traditional reading logs. With online reading logs and reviews, students felt an empowered in the sense that their words were meaningfully contributing to their classroom and online community.

Ms. R: Well, I think that when you just go home every night and you write on a piece of paper, "So and so did this." And then it gets filed nowhere. Like the teacher looks at it, says, "Oh, it was done. Yay," and there's a check mark. Here, their words mattered. And other people would give them feedback, like a thumbs up on whether or not it was worthwhile. And I just saw a change.

The above excerpt also demonstrates that, like Ms. B's students, Ms. R's students also reportedly felt more accountable for the quality of their writing when they realized that their words was part of a public online space and viewable to other community members. Ms. R explained a shift, as students went from writing single-word reviews for themselves (e.g.

“Awesome!”) to more thorough reviews for other readers to reference. Ms. R also assisted in this shift, using writing samples from students and encouraging students to imagine the perspectives a potential reader.

Ms. R: I think they're writing for themselves, because it's like an opportunity for them to write online using a computer. And so I think that was part of where the writing development happened was when they recognized they were going from writing for themselves, awesome, to a wider population. I think that's when some of the shifts started to happen

Ms. R: And I think it also took, for me as a teacher, to highlight things as a class. And so once I started highlighting and saying, "Oh, it's so interesting how so-and-so made this comment, and the fact that so-and-so talked about this character. If I'm a reader, that would make me want to read this book." And so I think that once they saw that they could have an impact on other people's choices, that's then their reviews started getting richer.

Beyond impact on the individual student, Ms. R also remarked that using Bookopolis helped foster a reading community within her classroom:

Ms. R: So I feel like the reading in our class became more of community activity rather than an individual go to the library, pick a book, read about it at night, turn it in, get another book. It became more of an opportunity for kids to share what they were reading. And our Bookopolis time was done in class, and so kids had their books out on their desk, they were talking about the books. Books became more of a part of our classroom.

As students shared the activities of logging books, exploring genres, and recommending books to their friends, these activities afforded opportunities for them to talk more about books in-person. She reported that they brought physical books into the classroom as points of discussion. With the combined impact of students feeling ownership and empowerment, the participation within the reading community being framed as a purposeful activity, and the potential reach and discussions within the reading community, Ms. R observed a shift in how students engaged with literature and explored books of interest:

Ms. R: And I really, absolutely saw over time that they took pride in what they were doing. They felt like there was a reason for it. And I saw kids choosing books differently. I saw kids who didn't read chapter books start to read chapter books, because their friends encouraged them. And because they were seeing what other kids were reading, they wanted to read what their friends were reading.

Analysis of recommendation data

To investigate quantified measures of peer interaction on Bookopolis, I examined the peer recommendation data for Ms. B's and Ms. R's classes from the academic school year of 2016-2017. For Ms. B's classroom, the specific date ranges showing recommendation activity were 9/6/16 – 10/6/16 and 4/18/17 – 6/2/17. For Ms. R's classroom, the specific date ranges

showing recommendation activity were 3/30/17 – 6/1/17. In this section, I present basic descriptive statistics and visualizations of the peer recommendation data. The analysis sheds insights on the patterns of peer recommendations, frequency of giving and getting recommendations, and reciprocity and variability among participants.

The data collected online shows that there is a lot of recommendation activity in both classes: Ms. B circulated 169 books with 3,215 recommendations, and Ms. R's class circulated 137 books across 1,743 recommendations. 100% of students in both class sent recommendations to their peers, and a high proportion also received recommendations from their peers. There is also a high proportion of mutual recommendation relationships in both classrooms. The findings are discussed in detail below and summarized Tables 3 and 4.

Table 3				
<i>Proportion of students participating in recommendations on Bookopolis.</i>				
	Ms. B		Ms. R	
	Frequency	Percent	Frequency	Percent
Total students	33	100%	26	100%
Proportion of students making recommendations	33	100%	26	100.0%
Proportion of students receiving recommendations	28	85%	22	92.3%
Proportion of students with mutual recommending relationship	27	82%	21	81%

Table 4		
<i>Range, mean, and standard deviation of book recommendations activity.</i>		
	Ms. B	Ms. R
Book recommendations made by students		
Range	53-105	12-137

<i>M</i>	85.52	59.00
<i>SD</i>	10.71	20.10
Book recommendations received by students		
Range	0-635	0-279
<i>M</i>	97.12	67.04
<i>SD</i>	138.36	96.49

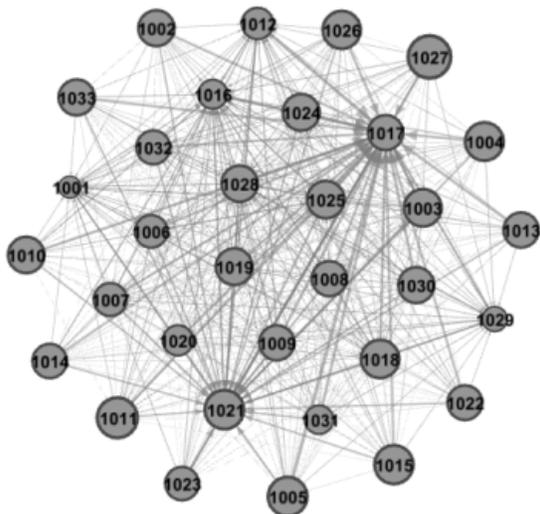
For both classes, 100% of students made recommendations to their peers. However, this did not mean that their recommendations were inclusive of the entire class. Five students in Ms. B's class and four students in Ms. R's class received no book recommendations from their peers. As result, 85% of students received recommendations in Ms. B's class, and 92.3% of students received recommendations in Ms. R's class.

The analysis revealed a large amount of variability in the number of book recommendations made by students. In Ms. B's class, the mean number of book recommendations made by students was about 86 books, with a standard deviation of 10.71. The range shows that students made between 52 and 105 books in Ms. B's class. There was even wider variation in the number of book recommendations received by students. While some students received as many as 635 book recommendations, five students in Ms. B's class received none. The mean number of book recommendations received by students was about 97 books, with a standard deviation of 138.36.

The above analysis showed the huge variability across the classes in terms of how many recommendations students receive or send out. This variability is observed in the number of reading recommendations that students both send and receive. This variability is also observed in the number of peers that students are sending or receiving recommendations from. I further investigated potential patterns in this variability using network analysis.

These patterns can also be seen in the network visualizations provided in Figures 3, 4, and 5. The visuals also show a stronger interconnectedness in Ms. B's classroom community relative to Ms. R's, particularly in the proportion of mutual recommendations. This may be due in part to the cognitive diversity in Ms. R's integrated classroom.

Ms. B



Ms. R

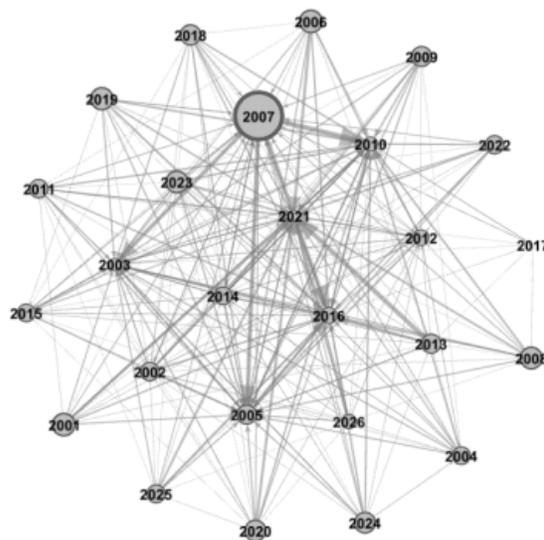
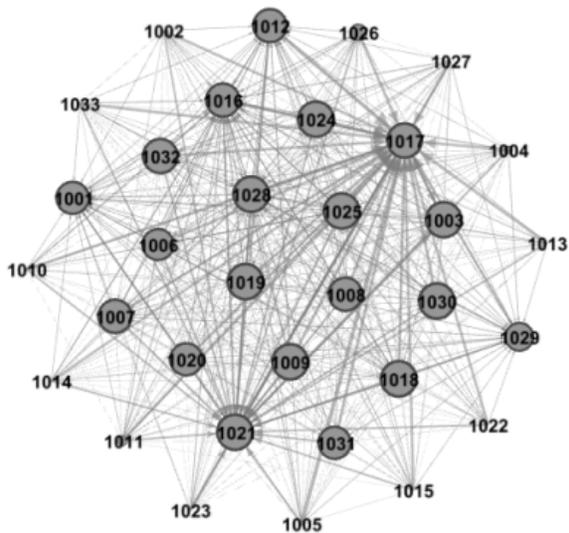


Figure 3. Network visualization of recommendations that students send out.

Individual students are represented as nodes with anonymized labels. A larger node means that this student sent out a larger number of recommendations. The range for the node size is set as 2-60, meaning that students with fewest recommendations are represented with a size of 2 and students with the most recommendations are represented with a size of 60. The links between nodes represent the recommendations sent out, with the head of the arrow pointing at the recipient.

Ms. B



Ms. R

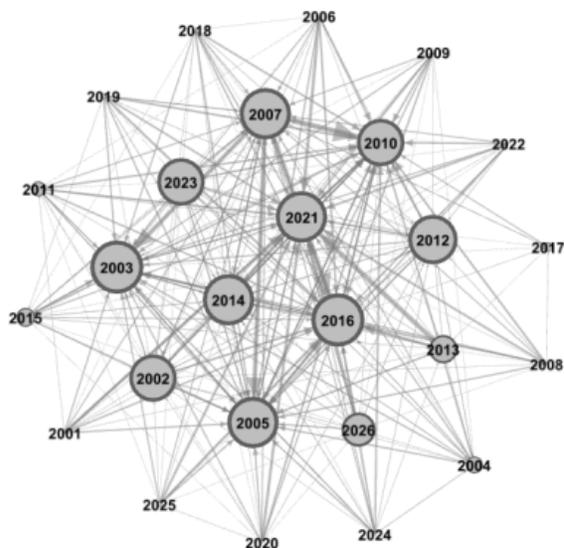


Figure 4. Network visualization of recommendations that students receive.

Individual students are represented as nodes with anonymized labels. A larger node means that this student received larger number of recommendations. The range for the node size is set as 2-60, meaning that students with fewest recommendations are represented with a size of 2 and students with the most recommendations are represented with a size of 60. Note that this means that even students who received zero recommendations are represented. The links between nodes represent the recommendations sent out, with the head of the arrow pointing at the recipient.

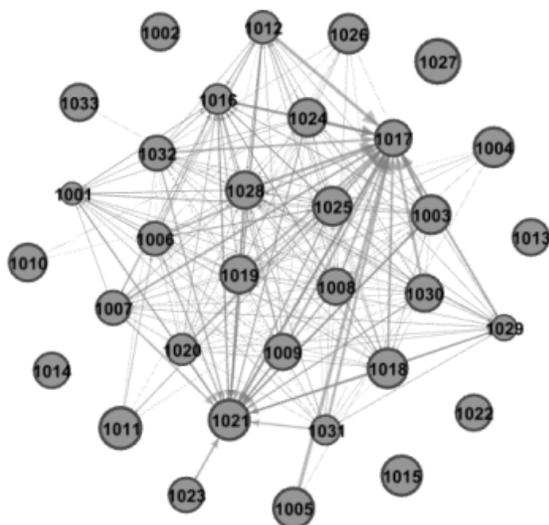
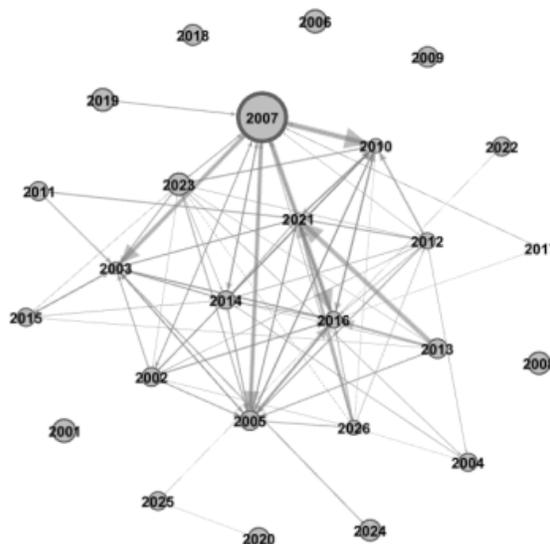
Ms. B**Ms. R**

Figure 5. Network visualization of recommendations mutuality.

Individual students are represented as nodes with anonymized labels. A larger node means that this student received larger number of recommendations. The range for the node size is set as 2-60, meaning that students with fewest mutual recommendations are represented with a size of 2 and students with the most mutual recommendations are represented with a size of 60. The links between nodes represent the recommendations sent out, with the head of the arrow pointing at the recipient. Links are only displayed if students have a reciprocal recommending relationship.

Study 1: Discussion

In Study 1, I presented two case portraits of teachers using Bookopolis as an online reading tool to achieve their respective pedagogical goals. I conducted a qualitative analysis of in-depth interviews with the two teachers to understand their motivations, how they incorporated Bookopolis into their classrooms, and the impacts that they observed. I additionally conducted an analysis of the quantitative peer recommendation their respective classes and using both descriptive statistics and network visualization. The quantitative analysis

shed insights on the patterns of recommendations that students made within their online reading communities.

The analyses highlighted the critical importance of peer interaction and the role of the teacher in supporting an online reading community. Both Ms. B and Ms. R felt that Bookopolis had an enormous impact on the way that students engaged with literacy mainly because it was used to foster a peer collaborative learning environment both in person and online. Social media tools such as messaging, sending recommendations, and viewing each others' bookshelves encouraged students to have more meaningful and exciting social interactions around reading in the classroom.

However, Bookopolis is not a standalone tool in creating this engaging classroom community around reading. The analysis shows that the teacher plays an enormous role in how students take on an online learning tool like Bookopolis. In both cases of Ms. B and Ms. R, their pedagogical philosophy and practices framed the rich learning ecologies that emerged from using Bookopolis in the classroom. The characteristics of these learning ecologies paralleled their respective teaching goals and personal learning trajectories. Ms. B stressed the importance of interest-driven learning in reading, particularly using student interest to spark a love for reading. This reflected in her observations of her classroom, as students demonstrated more excitement and enthusiasm over reading and exploring books. Ms. R emphasized the importance of meaningful technology use and creating a reading community. She similarly saw results in her classroom, as the use of Bookopolis created more of a social community around reading and afforded meaningful online communication. In both classrooms, the shift in literacy engagement encompassed more than students reading more books. As result of the combination of teacher philosophy and the social affordances of Bookopolis, teachers perceived that students took on more ownership and agency as readers. This was observed in the way that they engaged with reading through discussion, book selection, and genre exploration. This was also observed in the way that they wrote about reading, with increased sophistication for their potential online audience.

The analysis of the peer recommendation data showed that students were active as recommenders and receivers. There was also significant variability in each class in both giving and receiving recommendations. There was also significant variability in the proportion of students who had reciprocal relationships as sources and targets of book recommendations. This variability is possibly driven by friendship groups, or popularity and perception of reading levels or interest in reading (Cooc & Kim, 2017).

Limitations of Study 1 and Directions for Study 2

Though the case studies of Ms. B and Ms. R were highly illustrative, they are representative a specific subset of pedagogical philosophy emphasizing meaningful learning and passion for reading. Moreover, their pedagogies were critical influences on observed student outcomes. To better understand the implications of the learning ecologies that emerge from incorporating Bookopolis into the classroom, it would be beneficial to investigate teachers with differing teaching pedagogies.

Additionally, the mixed quantitative and qualitative data presented in this study raises many questions for the future. From the student recommendation activity, what are the individual profiles of students who are receiving or sending unusually large numbers of recommendations? Of those receiving or sending fewer numbers of recommendations, who is being left out and why? Further, what are the driving forces behind mutual recommendation relationships, particularly in the existing social relations within the classroom?

These questions highlight another limitation of this study, which is that I primarily examined Bookopolis through the eyes of the teacher. Though teachers repeatedly described student engagement and impact in their classroom observations, it was infeasible to include student interviews in this study. This paved the way for Study 2, which built upon the findings from Study 1 to guide data collection and analysis while incorporating the student perspective. By involving students in the interviews, Study 2 aimed to better understand the student motivations patterns observed in social networks created on Bookopolis.

Study 2: Aims

The first study highlighted the recommendation features of Bookopolis as the most notable in engaging students, particularly due to their social nature. This finding directed the focus of Study 2 to be on the social aspects of Bookopolis, particularly the learning opportunities afforded by the social nature of sending online recommendations. Study 1 also pointed to a gap in understanding student perspective and understanding, so the following study includes both student and teacher qualitative interviews. Like Study 1, the web usage data was also collected from their respective classrooms and studied to visualize the patterns of social, peer-to-peer networking in their classrooms. This study was guided with the following research questions:

1. What pedagogical choices do teachers make to support the uptake of Bookopolis as a digital tool for social reading engagement in their classrooms?
2. From both the teacher and student perspective, how does the use of Bookopolis impact students' reading activity and social engagement around reading?
3. What are the patterns of peer-to-peer engagement in the online recommendation data?

Study 2: Methods

Participants

Participants of this study were recruited through snowball sampling, starting from the two teacher participants in Study 1 (Palinkas et al., 2016, Patton, 1990). A total of nine teachers were recruited from public schools across the Bay Area. Preliminary results from a case study analysis of one of these teachers, Ms. C, will be discussed below. Ms. C teaches at a public school in Northern California to a classroom of 30 students. Information on her school, extracted from the School Accountability Report Card from 2018, is reported below in Table 5.

Table 5	
<i>Characteristics of the case study teacher and her participating school.</i>	
<i>Teacher characteristics</i>	
Grade taught	5th
Amount of experience	4
Average classroom size	30 students
Classroom makeup	English Only, English Learner, and Special Education
<i>School characteristics</i>	
Total students	938
Grades served	K-5
Proportion of students identified as socioeconomically disadvantaged	5.4%
Proportion of students identified as English learner	12.4%
Proportion of students identified as those with disability	7.4%

Qualitative data collection and analysis

Teacher interviews

The first teacher interview took place in September 2018 through a video conferencing tool (Zoom). Through a semi-structured interview, I asked Ms. C about her pedagogical philosophies, previous experience using technology in the classroom, and current goals for using Bookopolis in the classroom. This first interview was conducted to understand the background and pedagogical approach of the teacher, particularly how she planned to frame the uptake of Bookopolis in her classroom.

The second teacher interview took place in January 2019, after the end of Bookopolis data collection. Through a semi-structured interview, I asked Ms. C about her experiences using Bookopolis relative to her previously stated pedagogical goals, the perceived impact on student reading engagement from using Bookopolis, and any new thoughts on using digital tools in the classroom. This interview was conducted to understand the teacher's experiences with Bookopolis after three months of use, focusing particularly on whether there were any positive outcomes as result of digital or social affordances from Bookopolis.

Each interview was about one hour, and Ms. C was compensated \$45/hour for each interview. Both interviews were audio recorded and transcribed to produce 40 pages of transcription.

Student interviews

I sent recruitment requests to all 30 of Ms. C's students by emailing parents and giving each student a consent form to take home. 13 students and their parents gave full consent to participate in the study. In February 2019, these 13 students participated in semi-structured and artifact-based interviews, in which they were asked about the following: their interests and profiles as readers, who and where they usually seek out reading recommendations from, and how they use Bookopolis to socially engage with their peers. These interviews were conducted to offer a deeper understanding of the student perspective on using Bookopolis for reading engagement and interacting with a reading community. The student interviews were also conducted to complement the social network data, providing a qualitative view as to why certain students may have been more central or isolated in their classroom social networks.

Each interview was about 20 minutes. Students were compensated a \$20 gift card, a sheet of stickers, and a Stanford-themed pencil for their participation. All interviews were audio and video recorded. Transcription of the audio interviews produced about 90 pages of transcription.

Analysis

I analyzed the transcripts from teacher and student interviews using a mix of inductive and deductive coding. Using the themes from Study 1 as preliminary codebook, I used this to deductively code the teacher interviews for themes of pedagogical choices with Bookopolis, social use of recommendation tools, and perceived impact on student reading engagement. Further, using the research questions in Study 2 to frame my inductive analysis, I open coded for additional emergent themes that were relevant to the research aims. Codes resulting from the inductive and deductive analysis were combined to produce the primary themes presented in the Analysis section below. Note that all student names are replaced with pseudonyms to protect the privacy of the students.

Quantitative data collection & analysis

During recruitment in September 2018, Ms. C to agree have consistent usage of the recommendation features on Bookopolis. During Bookopolis data collection period in October-December 2018, Ms. C allotted students at least 30 minutes of weekly for her students to use Bookopolis, with particularly attention to its social recommendation features.

On a weekly basis during the data collection period, my research partner helped me collected log data from the Bookopolis website for each classroom. One of the datasets collected was the Bookshelf Data, which included: date of activity, anonymized student ID, book

ISBN, book title, book genre, reading status of book (i.e. “Already Read,” “Currently Reading,” “Want to Read”), and book review. The other dataset collected was the Recommendation Data, which included: date of recommendation, anonymized ID of sender, anonymized ID of receiver, and information about book recommended (ISBN, title, genre).

I produced social network visualizations of the recommendation activity using RSIENA (Snidjers et al. 2010). Whereas Study 1 used Gephi for visualizations, I opted to use RSIENA for Study 2 for its capabilities to do analysis beyond visualization, specifically because of RSIENA’s capabilities for modeling the influence of peers on later reading behavior based on the social network model. Though this deeper social network analysis will be pursued in later steps, I used RSIENA to produce social network visualizations of students’ reading recommendation uptake relationships, or relationships in which students sent recommendations that the receiving student took up onto their digital bookshelf. Each student is represented as a colored node in the network. The colors represent the number of books that they have on their bookshelf relative to their classmates, green being the fewest and red being the most. The demarcation of colors is determined by the interquartile range values in the range of books on the class’s bookshelves. Recommendation uptake relationships are represented as directed ties. This means that the directed arrows represent a relationship in which a student sent a book recommendation to another student, and the receiving student added that book to their digital bookshelf in the data collection time period.

Study 2: Results

The first two research questions were addressed with an analysis of the teacher interview data:

1. What pedagogical choices do teachers make to support the uptake of Bookopolis as a digital tool for social reading engagement in their classrooms?
2. From both the teacher and student perspective, how does the use of Bookopolis impact students’ reading activity and social engagement around reading?

From Study 1, we know that the pedagogical choices of the teacher plays a key role in framing the uptake of Bookopolis. The qualitative analysis revealed this same theme in the case with Ms. C, whose pedagogical goals of using Bookopolis framed it as a social means for promoting reading engagement. This is reflected in its effect on students, as Ms. C and her students report the recommendation feature as a powerful tool for reading engagement and creating a reading community in the classroom. Students also describe other means of socially engaging in reading by using the social media affordances of Bookopolis or discussing books with their friends across settings. These findings are described in depth below.

Ms. C: Teaching profile and school context.

Ms. C has been working as a credentialed teacher for four years, teaching fifth grade at a public elementary school in Northern California. She described the population as mixed in income, with a general pressure for academic achievement in the community. Her classroom

size was typically about 30 students. Detailed demographic information on her classroom is provided in Table 5.

Prior to this, Ms. C worked in a line of careers that suggested ongoing expertise in technology: she was a software developer, a consultant for the software industry, and then a technological instructor for the school district. As a teacher currently, she serves as a representative on the district technology community, in which she meets with representatives from other schools in the district to discuss ideas for incorporating technology into education. Overall, Ms. C has a strong interest in technology dating back to her past careers, and this is an interest she continues to expand with workshops and community meetings in her current role as a teacher. The year before joining the study, Ms. C attended a workshop at an Ivy League university, after which she took away the importance of students sharing excitement about books together:

Ms. C: When I went this reading workshop, they were talking about how that part of this has to be internally generated passion for reading and excitement for reading... That most passion is when [kids] get excited from another kid talking about a book.

Ms. C went on to say that she was interested in using Bookopolis specifically because it fit this philosophy described in the workshop, focusing on the socially generally excitement for reading amongst students. This is described further in the following section. Overall, Ms. C is a teacher who is both experienced and an ongoing learner in the technology realm, and she actively draws from external insights such as committee meetings or workshops to expand her knowledge in this area.

Analysis of Ms. C's classroom

Pedagogical choices with Bookopolis.

Ms. C's primary goals for introducing Bookopolis were to encourage peer-supported enthusiasm around reading, support more book exploration, have her students read more. Primed with knowledge both from the Teachers College workshop and with what she previously heard about Bookopolis when recruited for this study, Ms. C's intentions revolved mainly around fostering social engagement and excitement around reading. When asked to elaborate on this point, she stated:

Ms. C: I am hoping it's going to be more social and the excitement level of reading is going to increase because of the recommendations. Just knowing somebody else read that book and they liked it is going to encourage other students to want to read it, too.

Notably, this quote also shows that Ms. C specifically spotlights the recommendation features as the main tool for creating social opportunities for reading engagement. Thus, recommendation features were central in how she framed Bookopolis in her classroom – she would not only introduce Bookopolis as a tool for recommending books to friends, but also she regularly checked in asking students to volunteer what books they recommended to whom.

In addition to the goal of creating social excitement around reading, Ms. C stated one of her teaching goals was to foster an excitement for reading in her students. As opposed to

viewing reading as a requirement for school, Ms. C hoped that Bookopolis would help students shift their perspective into an excitement that she described as: “Oh, I’m so into my book. I want to keep reading.”

In her discussion of pedagogical goals, Ms. C also underlined the importance of interest-driven learning. In order to generate that excitement for reading described above, Ms. C framed Bookopolis as a tool specifically to help her key into students’ interests for more engaging learning. She describes this in the following quote:

Ms. C: Bookopolis is more of an engagement strategy. One of my goals is engagement in reading and getting kids super excited about being readers... I do feel like if I understand students' interests, then I can incorporate that into classroom discussions or small groups or... When they're doing writing, I can be bringing that up. "Oh, well, remember this thing that you're interested in," because sometimes they have little writer block, and I help them brainstorm ideas.

The social and interest-driven focus of Ms. C’s pedagogical goals were reflected in how she incorporated Bookopolis to her classroom. When asked how she introduced the tool, Ms. C told the students that “[they] were going to have a new tool to help them learn about new books and be able to share books with their friends.” Because of Ms. C’s previous expertise in technology, she was also able to learn and use Bookopolis by going through the tutorials provided by the website in her own time.

In Ms. C’s follow-up interview at the end of the study, she described Bookopolis as a “tool to help [students] learn about new books and be able to share books they liked with their friends.” Across the period of coming into the study as well as during Bookopolis use, Ms. C prioritized the social capabilities of the digital tool in her pedagogical approach to using Bookopolis.

Like the teachers in Study 1, Ms. C described students’ reading choice as a central tenet of her teaching philosophy. She emphasized the importance of students having agency to decide on their own reading materials reflecting their interests.

Ms. C: Choice is super important for me with reading because what's going to interest one person is not going to interest another person, so definitely giving them a lot of choice, and that's part of this Lucy Calkins' Unit of Study is really into that. That's one of their foundations in that reading program, choice, student choice. Then, it's in their writing program to. What they write about, they have choice about that. We don't assign topics, we assign genres that they're going to be writing about and future writing skills, and it's the same thing with the reading, too. So, I'm not sure what else to say about reading right now.

Impact of Bookopolis on students’ reading engagement

Overall, Ms. C reported that Bookopolis was an engaging and exciting activity for her students. Even for her more reserved students, using the recommendation features were very exciting, likely because of how much she foregrounded and rewarded it in her instruction

approach. Aligned with the social focus of her goals for introducing Bookopolis, Ms. C saw excitement for reading stemming from the social nature of recommending books to one another. This is also reflected in the student interviews, in which students frequently cited the recommendation feature as an exciting way for them to socially engage with their peers of reading. Interestingly, students reported an interest in social features beyond recommendation tools, specifically the social media affordance for viewing their peers' reading profiles to support their own reading engagement. The results from this qualitative analysis combining the insights of Ms. C and her students are explored below.

The impact of the social affordances of Bookopolis

The analysis of the teacher and student interviews highlighted that the peer-to-peer recommendation features of Bookopolis were key for supporting students' increased reading engagement. Considering the critical role of teacher pedagogy in framing the uptake of technology, this is unsurprising considering Ms. C's strong focus on social recommendations in her pedagogical philosophy. When I asked Ms. C what she thought students liked most about Bookopolis, she stated:

Ms. C: They really liked doing the recommendation. They were excited about recommending the book to other people. I mean, to me that's what it seemed like the most engaging part was for them.

They really were excited about using it. Billy and Tara... is more kind of a reserved student, and he would be very excited about getting recommendations or being able to recommend the book to other people, and the same with Tara.

This was also reflected in the student interviews, as many students identified recommending books as their favorite activity on Bookopolis. The qualitative analysis showed that the nature of online recommendations afforded unique opportunities for students to socially engage around reading for various purposes, ranging from book exploration and to socializing with peers around reading. In the excerpts below, two students express that they enjoy sending recommendations to help their classmates discover books:

Ina: So, you can actually share the joy of the book. Not only you, but other people can also have the joy.

Petunia: I like sending recommendations because other people get to know different books, and then they can recommend back to me.

These quotes are two of many that suggested students used the recommendation with prosocial and empathetic intentions. In many cases, this was described as a desire to help their peers discover books they might enjoy. The second excerpt also shows a desire to send recommendations as a social initiation for receiving a social response in return. This is mutually enjoyed on the receiving end of recommendations, as shown in the following excerpt from a student whose favorite feature was receiving recommendations:

Kimmy: My favorite thing [about Bookopolis] was seeing what [my classmates] recommended to me and stuff. So I can go to my recommendation page and see what books they recommended.

Interviewer: What do you do with all this information usually?

Kimmy: Sometimes if I find a book that's interesting like, *Spy School* seems interesting. Then I add it to my books and then I say I want to read this book.

The prosocial, empathetic nature of recommendation use is also reflected in the finding that students did not always send recommendations indiscriminately – many students stated that they curated their recommendations based on their classmates' interests. When I asked Petunia how she decided to send recommendations, she stated that she determined it based on the interest of her classmates in certain genres:

Petunia: I would see who would like it. Because I know a few people are reading these type of books, I would recommend it to the people who kind of like those type of books, like action, mystery, that stuff.

Adding nuance to the nature of social recommendations, one student also reported that she enjoyed using digital recommendations as a unique form of communication in contrast to in-person, verbal communication. She elaborates this below, stating that she is better able to articulate her reasons for sending recommendations in a digital written form than when speaking in person:

Amelia: My favorite thing about Bookopolis is that it's recommending it to people, because I think it's a really good thing you can recommend to people and not just be like, "Yeah, it was okay." Sometimes you can't really explain it when you talk to them in person. But when you recommend it and write a review about it, they can see what you think about it. Then that's good.

Overall, Ms. C's pedagogical focus on the recommendation features as a social capability reflected in the effect on students. Interestingly, the qualitative analysis also revealed that students went on to leverage other social media features of Bookopolis to support their own reading engagement. Many students enjoyed the social media capability to view their classmates' Bookopolis profiles showcasing digital bookshelves. Students used this information for prosocial means, such as understanding their peers' interests to tailor the recommendation that would be sent to them, or for personal book exploration means if they knew this peer had similar reading interests. The social media affordance resultantly created a sense of reading community in Ms. C's classroom – it enabled students to be aware of their classmates' reading preferences and use this information for encouraging book discovery overall.

Amelia (student): Usually, I'll look up... new book ideas and then go into fourth and fifth grade [categories]. Or I'll go into "Readers also liked." I like that. Or actually, normally, I'll go into my best friend's [profile].

(while looking at her best friend's Bookopolis profile) And so actually most of my books are on here. I love mystery books. I feel like that would be a mystery book because it's the "London Eye Mystery." So I find a lot of books on [her bookshelf].

Overall, the social engagement from Bookopolis powerfully impacted the students from the perspective of Ms. C. Reflecting on how the social aspect of Bookopolis changed students' reading experiences over the year, Ms. C noted that her struggling readers in particular experienced a shift when they had the opportunity to share their reading interests with their peers – the prosocial nature of this activity created a new form of engagement in reading:

Ms. C: I definitely see more in a lot of my lower readers students, more engagement in reading... like a new attitude toward reading and engagement in reading.

When asked to recall examples, Ms. C noted Amelia, one of the students quoted above who enjoyed Bookopolis as a unique form of communication through recommendations and as a means for discovering books through her friends' profiles. When I interviewed Amelia, she was effervescent about sharing her experiences with Bookopolis, and so it was unsurprising that Ms. C noted her as someone who particularly benefitted from using it:

Ms. C: My mid-reader, Amelia, who really [struggled] at the beginning of the year with reading comprehension... And she's a student that I saw that were really engaged using Bookopolis and being able to find new titles that would interest her. And then that helped her increase her reading volume. So I feel like Bookopolis is really beneficial for her. And now she is making progress in her reading comprehension because she's doing more reading. So I feel like that's really helped her.

Ms. C recalled Aaron another notable example of student who shifted from being a struggling reader to one who presented a book as one of his most special possessions in class. This is described in the excerpt below:

Ms. C: We were doing this social emotional learning lesson where [students] brought in things that were special for them. And Aaron brought his first baseball ball trophy and the new *Diary of a Wimpy Kid Meltdown* book.

And so I thought that was very interesting...That that's one of his prize possessions, right? A book. And at the beginning of the year he was having a hard time writing down any favorite books that he had.

Aaron, at the beginning of the school year, qualified for an IEP for reading because of his reading level things. So that's very exciting for me to see a student who's a struggling reader be so engaged and excited about reading and books and say, "Okay, everybody should read this book," because he loves it too. Then Aaron spurred this kind of movement through the class of other people who [wanting] to read [his favorite book] too, because he'd be so excited. He would want like read the little sentences out loud and the stuff to the class and everything so. So that's exciting to me to see that growth.

In this case, the social nature of Bookopolis uncovered a new motivation for reading engagement for Aaron, specifically the ability to share his reading interests with his friends. This is reflected across the digital and physical space, in his interest in recommending books, to sharing his book as a prized possession in class, to reading excerpts to his classmates who also expressed interest in his favorite book.

In all, the qualitative analysis on the impact of Bookopolis on students overwhelmingly underscored the power of social affordances in fostering reading engagement. Ms. C and her students both reported the recommendation feature as particularly engaging as students used for prosocial means: helping their peers discover interesting books, initiating to receive a social response from their peers, and receiving new book ideas themselves. Students went on to use social features of Bookopolis in other ways to support their reading engagement, namely look at their peers' profile for ideas on what to recommend or what to read. Ms. C observed these social capabilities as particularly impactful for her struggling readers, such as Amelia, who elaborated that the recommendation feature enabled a unique form of communication about reading that she was not afforded in in-person verbal communication. These findings align with the literature that peer positive, social learning environments can promote new and deeper means of engagement. Considering Ms. C's heavy emphasis on social learning in her teaching, these findings also corroborate those from Study 1 that teacher pedagogy is central in how digital tools for learning are taken up by students.

Emergent theme: socially engaging across settings

An interesting theme that emerged from inductive coding is that students, when asked about book discovery, often mentioned socially engaging with their friends across settings. This included spaces outside of school such as at home, in the library while searching for books, or during recess, as illustrated in the excerpts below:

Petunia: Like, Geronimo Stilton is similar, but it has not like a comic, it's more of a story. And it has words written in funny ways. And the stories are interesting, that's why I started it, and I've been realizing a lot of people read those books. So I wanted to try them out. And I actually have two books of Geronimo Stilton in my backpack.

Interviewer: Can you tell me more about the people that were reading the books?

Petunia: There's my classmate named Jenny, she always go to the Geronimo Stilton aisle in the library, and both of us look for the good books in Geronimo Stilton because there are a lot of those books.

Interviewer: Do you ever talk about books together with your friends in person?

Kimmy: Yes. Before I was doing Bookopolis last year, Alice was reading *The Land of Stories* that I never read before. I read the sixth book instead of the first so I started reading that and it was like I found that really interesting. One time when we were going to recess in line I was like, "Do you know what the fifth book was?" That time [Alice] only read the second book or something. We were talked about that book.

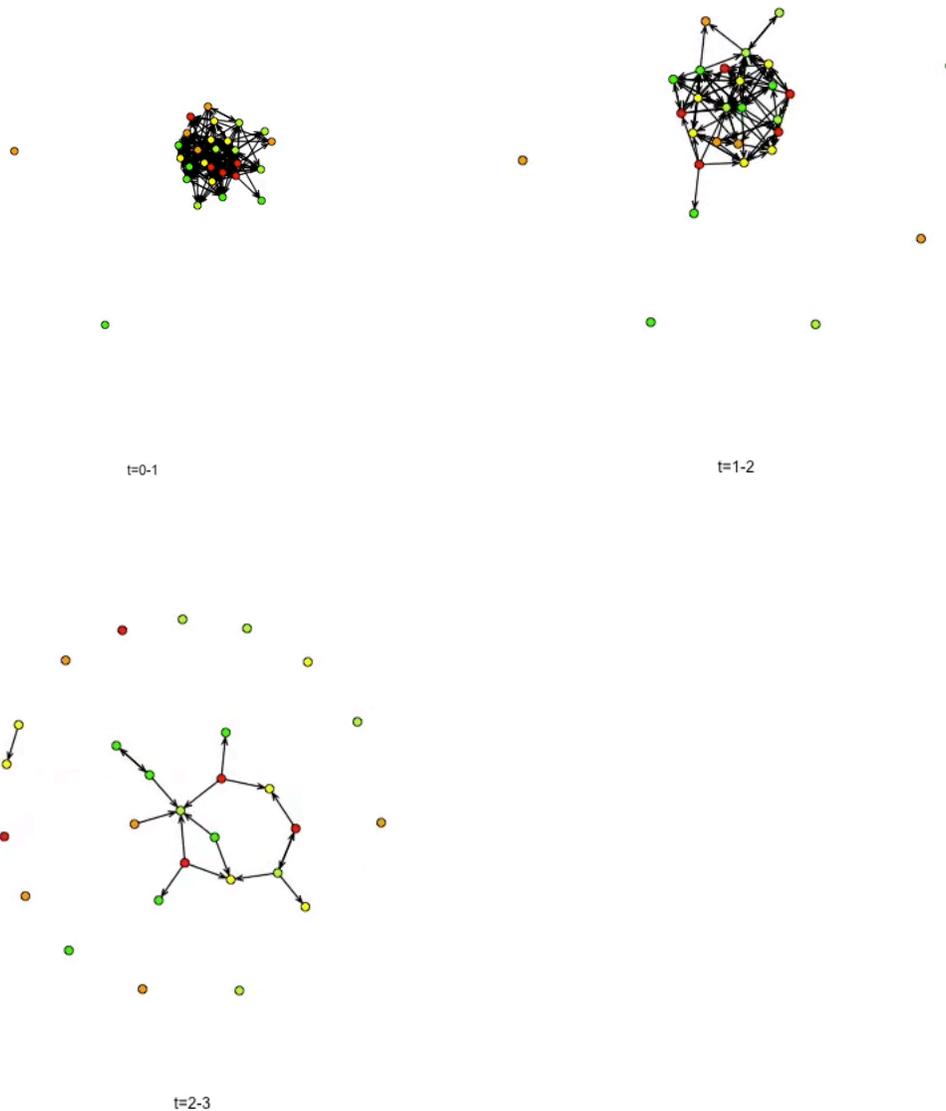
Alice: Kimmy and I both enjoy *The Land of Stories* series, and she would talk about her favorite book in the series, the fifth one. We both like *The Wide Awake Princess* so she would talk about the second book and give me a summary of the other books.

These excerpts further highlight at theme of interest-driven reading shared across friend groups, especially in the case of Alice and Kimmy, who both individually reported discussing books they enjoyed together. This theme suggests that both socially engagement across settings and interest interact to support reading engagement in Ms. C's students.

Analysis of recommendation data

To investigate the final research question of what are the patterns of peer-to-peer engagement in the online recommendation data, I examined the data collected on weekly basis from Ms. C's classroom from the time period of 10/01/18 – 12/21/18. In this section, I present visualizations of the peer recommendation data to illustrate the patterns of peer recommendations amongst students. The results below are preliminary analyses, as the full social network analysis modeling the effect of peer recommendation on reading activity is still in progress. Visualizations are presented to help illustrate the patterns of peer-to-peer engagement in the online recommendation data.

The social network visualization below, produced using SIENA, showcases the recommendation uptake relationships of students in Ms. C's classroom over the data collection time period. As stated in the methods section, recommendation uptake relationships are operationalized as instances in which a student sends a book recommendation to another student, and the receiving student adds that book to their bookshelf within the data collection period. In the visualizations, the nodes represent individual students, with colors corresponding to the number of books they have on their bookshelf relative to their classmates (green being the fewest and red being the most). The ties represent recommendation uptake relationships, the arrow pointing from the sender to the recommendation receiver. These snapshots in the networks are taken at the end of each month of the data collection period (October, November, December):



The visualizations indicate that the reading recommendation uptake relationships became more sparse over time. While at the beginning of the data collection period, most of the students in the class were taking up reading recommendations from their peers, students seem to be more selective with the reading recommendations that they take up towards the end of the data collection period. This might be due to students becoming more selective in recommendations, perhaps from their friends, considering the strong pattern of engagement with friends in the qualitative data. Across the entire time period, there were always students who were not included in the recommendation network, or whose reading recommendations were not taken up by their peers. There does not to be a particular pattern whether those at the

center of or the periphery of the network are those who are sparse readers or voracious readers. Further analysis will be conducted in RSIENA to understand the driving factors for these changes in the network over time.

Limitations and Future Directions

For Ms. C's classroom, the social network analysis is ongoing. My next steps in this analysis will be to continue social network modeling to investigate questions of what measures of peer influence predict changes in reading behavior. RSIENA enables social network modeling that specifically examines whether peer influence, or the presence of recommendation uptake relationships, relate changes in reading behavior over time. The aspects of reading behavior I will study are the amount of reading, based on the number of books on students' bookshelves, and the diversity of reading, based on the number of unique genres on the students' bookshelves. Though social network data does not fully capture reading behavior and activity of students, this analysis will be complemented and informed by the qualitative data and analysis.

Additionally, beyond Ms. C's classroom presented in Study 2, I collected qualitative and social network data on three other classrooms in the Bay Area. I plan to replicate the qualitative and quantitative analysis presented in this for the other three classrooms to further elucidate the potential impact of social affordances of technology on reading engagement.

Maintaining subject recruitment was a major limitation in this study, resulting in an oversampling of schools that mainly serve high income populations. Initially, this project prioritized the recruitment of teachers from schools serving low income populations, particularly to more deeply understand the ongoing impact of the digital divide in the Bay Area. While the study began with five other teachers from Title I schools (schools in which more than 50% of the student population qualifies for free or reduced lunch), all of them dropped out over the course of the study. Interviews with these teachers are currently ongoing to better understand what barriers contributed to participant drop-out, and preliminary themes are showing that a lack of resources and time in these schools was the major factor in being unable to introduce Bookopolis as an engaging digital reading tool. Further research in this area is critical to better understand how we might support the uptake of social digital tools for reading engagement in high need populations.

Conclusion

In the U.S., there are profound issues in children gaining competence as readers. Many children are not reading, and one potential reason for this is a lack of resources that can nurture a sustained motivation and passion for reading. This two-part study showed that digital tools with social affordances can be a powerful means for supporting this love of reading, as they can enable unique opportunities for engaging around reading with prosocial motivation. However, digital tools such as Bookopolis must be coupled with the appropriate digital tools to achieve this goal, as the uptake of the tool exists within a broader learning ecology. With scaffolding and support within the classroom, social digital tools such as Bookopolis can be used to create a

positive, peer-collaborative learning environment around reading that enriches a student's development as a reader from the individual, interpersonal, and community levels.

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