Digital Pedagogies and Teacher Networks:
How Teachers' Professional Learning and Interpersonal Relationships Shape Classroom Digital Practices

by
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Dedication

I dedicate this dissertation to the English teachers at Borealis High School, who opened up their classroom doors, their practice, and their professional learning to this study. Your approaches to teaching may be complex and varied, but your dedication to your students is not. Thank you for all of your work – both for this study, and for today's young people.

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Abstract

This study investigates high school English teachers' collegial relationships, experiences, struggles, and successes as they learned about and integrated digital technologies into their teaching practice. Though many studies have argued that digital integration is happening much slower than one might expect, few studies have investigated how teachers' relationship networks have an impact on their uses of new technologies, and even fewer have attempted to define what professional learning is required in order for teachers to develop pedagogical beliefs and practices that integrate technology in the interest of advancing students' 21st-century literacies. To address this gap, I designed a study that combines qualitative methods and social network analysis to examine how teacher relationships and teacher learning experiences shaped their approaches to instruction using digital technologies.

This mixed-methods study combines the complementary methods of social network analysis and qualitative data analysis to examine teacher relationships alongside teachers' digital pedagogy. I followed four focal participants, all English teachers at Borealis High School (BHS), over the course of one semester as they worked to integrate digital technologies into their classroom practice. I also conducted a social network survey of the BHS faculty, which inquired not only about teachers' relationships and consultations about digital technology with their colleagues, but also their uses of digital devices and web technologies in the classroom. Data sources included interviews with Borealis faculty members, observations of four teachers'

classroom practice over one semester, observations of professional development sessions, analysis of teaching artifacts, and network survey data from 64 (of 83) Borealis teaching faculty.

My analysis showed that teachers integrate digital technologies for different reasons and to different ends in their classrooms, and that few of these uses promoted the development of students' digital literacies. Whereas *facilitative digital pedagogies* used digital technologies to complete tasks that may have otherwise been done in analog environments and separated technology from the space of the classroom , *integrative digital pedagogies* considered digital technologies an integrated component of content-based teaching and employed technologies as an interwoven component of the curriculum in the interest of increasing students' digital literacies. Though *facilitative pedagogies* were ubiquitous at BHS, more student literacy focused pedagogies were rare.

This discrepancy between literacy- and task- oriented pedagogies could be traced to teachers' networks within and outside BHS and their learning experiences within BHS. Professional learning opportunities within the school foregrounded technologies as ways to organize course content or make tasks more efficient, thus promoting skills- or task- oriented approaches to digital integration. In the absence of a space to develop integrative pedagogies, some teachers turned to their interpersonal connections outside of BHS, where they engaged in digital learning in graduate courses or other social learning spaces.

These findings have implications for how digital integration initiatives engage teachers in professional learning, suggesting that experiential learning and digital "play" are necessary components of teachers' digital learning and that teachers' in- and out-of-school professional networks are integral to teachers' digital literacy learning and digital pedagogical development.

Chapter 1: The Networked Lives of Teachers

In the past decade, *network* has become a contested term, as have *literacy*, *identity*, and even formerly more transparent words like *friend.* We can talk about *networks* as connections we maintain across space and time and multiple media, we can define *friends* as those with whom we share an occasional lunch, or as those with whom we share our food journals (MyFitnessPal.com), our pictures (Instagram.com), or our current "status" (Facebook.com). We can now *tweet, post, share, pin, tag, hangout, poke, blog, catfish, lurk, surf, spam, crowdsource, like, troll,* and *google* – all verbs that have taken on new meaning (or been invented) in recent years. We can create videos online using apps like Wideo and archive web content using apps like Storify, combining media to convey a message to a specified audience. The texts we are able to create online vary widely, from single-authored super-short 140-character tweets to co-authored peer-reviewed "book-length" academic webtexts. Likewise, the devices we can use to create these texts vary – from smartphones to tablets to laptops to desktops, using portable "mice" and keyboards or only our fingertips, capturing content with cameras and microphones embedded in or separate from our compositional devices.

With these shifts in writing practices and media have come theoretical and pedagogical discussions about how we – both scholars and the general public – understand and define *literacies* in relation to new means of developing and disseminating texts. Are literacy practices themselves changing, or only the means through which we practice them? Are digital tools and

technologies changing literacies, or are new literacy practices shaping the digital tools and technologies we use to create texts? In what ways are today's literacy practices "new," and in what ways are they manifestations of "old" literacy practices? How does the "new ethos" of the digital era, characterized by increased engagement in synchronous collaboration and co-authorship (Lankshear & Knoebel, 2011; Gee, 2000), shape our ways of connecting with our peers, our colleagues, or our friends? The answers to these questions depend in large part on how one defines *literacies* or *literacy practices* and the relationship of these practices to the networked interactions that shape them and the tools and technologies that enable (or limit) their persistence.

Questions like these are on the minds of not only literacy scholars, but also educators, who are tasked with preparing students to be "college and career ready" before graduating high school (National Governor's Association, 2010). The CCSS calls on educators to prepare students to engage in reading and writing practices for today's professional workplace or college classroom, which is constantly changing its literacy demands. Further, it is no longer simply the English Language Arts teacher's task to prepare tomorrow's literate citizens – the Common Core State Standards include literacy standards for major content area courses, requiring that literacy instruction occur in all disciplines. Digital applications, hardware, and web platforms are being created for all subject areas to aid teachers in developing curricula that address not only disciplinary literacies, but digital literacies as well. Yet teachers continue to find digital integration difficult, even as digital tools become more common in today's schools (Brun & Hinostroza, 2014; Belland, 2009; Kale & Goh, 2012; Kervin, Verinikina, Jones, & Beath, 2013); as such, teachers' resistance to incorporating digital media into their curricula has been the focus

of much scholarship recently. From qualitative studies on pre-service teacher attitudes about digital technologies (Burnett, 2011; Shoffner, 2009) to quantitative social network studies that examine the role of teachers' colleagues in shaping their uses of computers (Zhao & Frank, 2003; Frank, Zhao, Penuel, Ellefson, and Porter, 2011), scholars have been trying to figure out for over a decade why teachers are not using more digital technology in their classrooms.

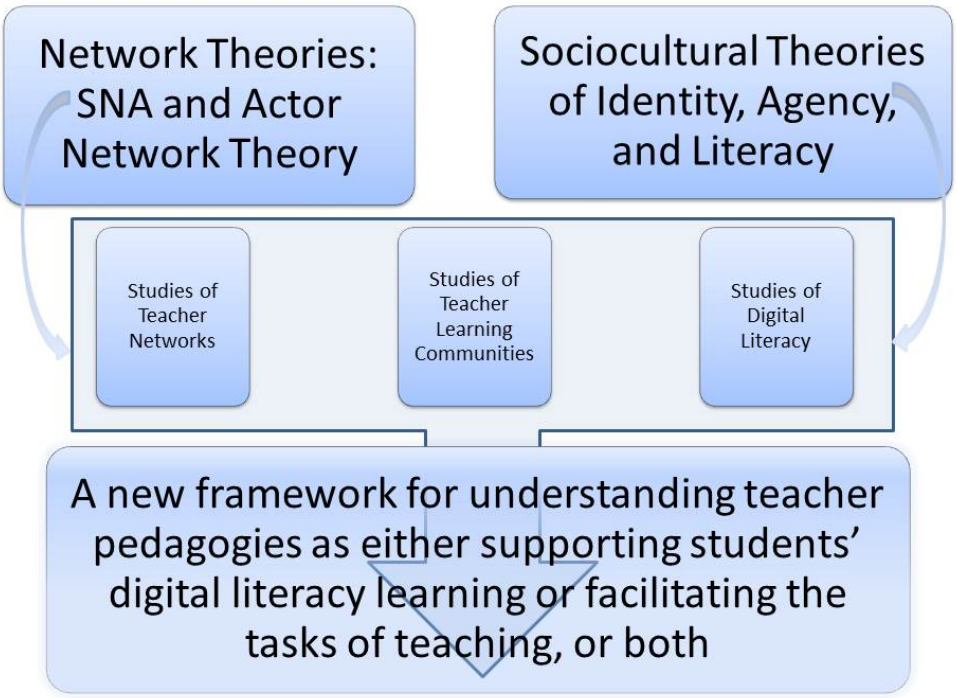
Answers to this question abound, but offer little help to administrators and researchers hoping to inspire increased implementation of digital technologies or a different approach to literacy instruction. Further, the answers to such questions might depend on what counts as "effective use" of digital technologies, or what uses of technologies actually promote student learning and digital literacies, since technologies can be put to many purposes in educational settings. Scholars have found that teachers are most likely to integrate digital technologies when they use time beyond their contracted hours to obtain digital literacy skills (Vannatta & Fordham, 2004) and when they have access to outside-of-school spaces for digital literacy learning (Frank, Zhao, Penuel, Ellefson, & Porter, 2011). Examinations of teacher attitudes towards technology have found that many teachers do not perceive digital spaces as "part of" the classroom space or "part of" a "teacherly identity" (Burnett, 2009; Burnett, 2011; Grabill & Hicks, 2005; Shoffner, 2009). These findings provide little guidance for schools and districts hoping to provide teachers with the resources necessary to inspire digital literacy instruction, because they indicate that mostly forces external to the school and district are responsible for teachers' digital learning, and that those teachers who are successful in integrating digital technologies are successful not because of what happens in school during professional

development time, but because of their willingness to pursue digital learning on their own outside of school.

In this dissertation study, I seek to better understand those factors that may play a role in teachers' digital learning lives *within school contexts*, and responds to the call from Burnett (2009) for more studies of teachers' experiences with and attitudes towards digital technologies. However, unlike the ethnographic and phenomenological studies Burnett suggests, I draw on multiple methods and epistemological perspectives in order to gain a thorough understanding of how teachers at one school utilize their networks, resources, and personal experiences with digital technologies in order to develop pedagogical practices that support students' digital literacy development. I look both to teachers who successfully engage in digital literacy instruction and to teachers who are still learning about and with digital technologies, in an attempt to ascertain what institutional, network, and learning opportunities "make the difference" when it comes to the development of successful digital pedagogies. I interrogate how institutional learning and interpersonal networks shape, support, or undermine teachers' different approaches to digital integration. I make the argument that teachers can either use technologies in ways that specifically support students' digital literacy learning, or *integrative digital pedagogies,* or use them in ways that facilitate "getting things done" and largely maintaining existing traditional pedagogical practices, or *facilitative digital pedagogies*. Ultimately, I contend that whether teachers use digital technologies primarily to support students' digital literacies or to facilitate task completion depends upon their beliefs about the role of technology in teaching, learning, and literacy; these beliefs might be shaped, supported, or undermined by social networks and institutional learning opportunities.

This chapter maps a course through a few of the research fields to which this dissertation study seeks to contribute, and explains how I aim to bring these fields together within a single research study in one Midwestern school, Borealis High School (BHS), where I followed four English teachers closely as they navigated the social networks, institutional demands, and digital landscape of their school. I begin by combining sociocultural and network-based theories and applying them to theories of teacher pedagogy. I then integrate empirical literature on digital literacies, teacher collaborative learning in professional development contexts, and teacher social networks in order to articulate (a) a justification for studies like this one, which combines methods to examine teacher pedagogies in context and in conversation with teachers' social and institutional experiences, and (b) my own definitions of digital literacies and pedagogies and how these are interrelated, synthesized from the work of the many scholars whose theories and studies have provided a foundation for this one (see Figure 1.1).

Figure 1:1: Overview of Relevant Theories and Literature



Theoretical Framework: A Network Approach to Understanding Teaching, Learning, and Literacy

My conceptual approach to the design and implementation of this dissertation study draws on theories from multiple fields. Among them, social network theory and actor network theory provide a means through which to understand human interactions (with other humans or with objects in their environments) as a fundamental basis of human actions and agency. Theories that define "communities of practice" situate learning as a social act that happens in the context of "organic" (as distinct from "institutionalized") learning situations in which professionals learn from one another through apprenticeship and situated practice. In both the humanities and social sciences, modern theories of literacy urge us to consider what we mean when we talk about "literacies" as "practices," "skills," or "competencies," and how the tools we

use to consume and create "texts" in multiple modes and media shape those literacies (Lankshear & Koebel, 2008, 2011; Gee, 2000; Moje, 2009).

All of these theories and the fields of research that have drawn on them have led me to understand teachers' digital literacy and pedagogical learning as shaped simultaneously by teachers' network connections and by the institutions within which they work. These institutions have multiple layers – state- and district- level concerns shape the values and concerns of school administrators, teachers, and parents, while the values of a single academic department might also shape a school's culture or a teacher's practice. These institutions have the potential to influence teachers' uses of technologies via professional development or by providing resources for teacher learning outside of the school context. Teachers' development of digital pedagogies, which I will define in more detail at the end of this chapter and again in Chapter 5, is both a social process, taking place in communities in which teachers share resources and advice that either enable or limit their digital literacy learning, and a material one, taking place as teachers pick up and handle digital devices, "playing" and creating in digital software and learning through, and with, the "stuff" of the digital world, which travels through teachers' social networks online and in person.

Theories from many disciplines highlight the impact of social interactions on one's behaviors, beliefs, and learning. Dorothy Holland and her colleagues (2001) place emphasis on the role of culture in shaping beliefs and identity, while Shirley Brice Heath (1983) focuses particularly on the social situatedness of language in shaping learning behaviors. Lev Vygotsky's (1978) theories of learning highlight the importance of social interaction for young children's language and cognitive development. Organizational theories of professional learning have

placed similar emphasis on collaboration and social learning environments; Lave and Wenger's (1991) Communities of Practice (CoP) theory argues that professionals form communities in which distributed knowledge is shared in order to accomplish a common goal or solve a common problem. Psychological theories of efficacy have similarly pointed to the role of social interaction, arguing that efficacy comes as much from one's own experiences as from reinforcement and modeling from others (Bandura, 1977). Each of these theorists understands the influence of the social world on individuals' behaviors differently, some examining entire cultural contexts while others focus on specific types of relationships (professional/collegial or teacher/student, for example). However, they hold in common a fundamental tenet that learning is, at its core, a social activity. Despite the fact that teachers often do much of their work in their classrooms, "isolated" from their colleagues, this dissertation argues that social interactions play a major role in shaping teacher pedagogy: teachers work in institutionalized settings divided into "formal" communities by disciplines, grade levels, districts, professional development, and so on. They also maintain "informal" professional learning communities via interpersonal relationships that develop in learning communities sponsored by universities or other institutions, or in book groups, friend groups, or families.

Despite the strong foothold of sociocultural, sociolinguistic, and social learning theories in the social sciences, some scholars have recently called into question the use of the concept of "social" as a catch-all for explaining complex human phenomena, such as learning (or parenting, or religious practice, or violence; the list goes on). Latour, in *Reassembling the Social*, problematizes the very notion of a "social world," arguing that "social scientists" (or "sociologists of the social") should instead give attention to the many types of *associations*

between individuals and objects; he argues, "'social' is not some glue that could fix everything including what the other glues cannot fix; it is *what* is glued together by many *other* types of connectors" (p. 5). Latour's actor-network theory (ANT) argues for a view of the world that is true to its acronym – like ants, the ANT scholar is a "blind, myopic, workaholic, trail-sniffing, and collective traveler," one who follows associations in order to develop an understanding of a group, a culture, or some other "social" unit. In keeping with this critique of the social, this study gives attention to the specific associations teachers have with objects and individuals in their environments.

Latour's rejection of theories that rely on some ambiguous "social realm" creates method and theory conundrums for social scientists, many of whom have relied on the construct of "social context" to explain various human behaviors. Previous studies have argued that social contexts are dynamic and are constructed by the actors that inhabit and create them (Heath, 1983; Learned, 2014; Moje, Dillon, & O'Brien, 2000; Wortham, 2005). These studies make clear that characterizing "context" for the purposes of research is difficult, since contexts are multiple and constantly changing, and are dependent upon the perceptions of actors within said context. Though scholars have made efforts, in extensive qualitative studies, to describe and analyze the ways in which the "social" is multifaceted and the ways in which "contexts" draw on multiple dimensions, Latour's argument draws particular attention to the most "basic" level of the social – actors (human or otherwise), and their associations. One field in the social sciences has worked to characterize networks on the more "microscopic" (or ant-sized) scale Latour suggests. Social network theory understands social capital as acquired via individuals' associations with one another. Through these associations flow resources, opinions, beliefs, practices, affection, and

the list goes on – "networks," as conceived by social network theorists and analysts, are made up of actors and their ties to one another, with an emphasis on that which moves from actor to actor; on the *types of associations*, to use Latour's words, that make up a network. Like Latour, social network theorists resist the notion of pre-defined "groups" of individuals, preferring instead to understand society as "networked:" "In networked societies, boundaries are more permeable, interactions are with diverse others, connections shift between multiple networks, and hierarchies tend to be flatter and more recursive" (Rainie & Wellman, 2012, p. 37). This theoretical approach to understanding human interaction has gained a strong foothold in recent years, as scholars across disciplines from economics to political science and organizational management have adopted network theories and methods to study diverse phenomena in social settings. In my design of this study, I turned to social network theory as a way to analyze and understand teachers' social contexts and how these shape and shift teacher practice.

However, actor network theory and social network theory part theoretical ways abruptly. Though both theoretical approaches to understanding the social world offer an alternative to former conceptualizations of "the social," "social groups," and "social interactions," they differ when it comes to how one might study such interactions. Latour notes that ANT puts into action those approaches already valued by ethnographers and anthropologists when he says, "ANT is simply an attempt to allow the members of contemporary society to have as much leeway in defining themselves as that offered by ethnographers" (p. 41). He eschews approaches in which social scientists determine "what groups are making up the world and what agencies are making them act" (p. 184). Conversely, that is just what social network analysts do when they study particular networks; first, they must develop a theoretical definition of the boundary of a

network, or “group,” while at the same time acknowledging that such boundaries are artificial. Whereas Latour avoids promoting a particular method (though he appears sympathetic to ethnographic methods), network analysts specifically use methods that will enable them to define, analyze, and compare different types of network associations across social contexts (Kadushin, 2012; Rainie & Wellman, 2012; Wasserman & Faust, 1994). However, there is much theoretical ground scholars from these two network-minded traditions can borrow from one another; in particular, the role of physical structures and tools on networked actors (ANT) and the analytical practicality of methods that allow individuals to define their own networks for purposes of statistical analysis (SNA). As I will show in Chapter 4 and will argue throughout this dissertation, networks do not exist absent the material; within their social networks, teachers take up and exchange physical objects and navigate physical barriers and structures in order to learn about technologies and teaching practice. Inscribed within the institutions and networks that shape teacher practice are the tools, spaces, and materials that mediate the work of teaching and learning.

Latour’s theory speaks to this interconnection between the material and the “social:” ANT does not focus solely on the role of human-human interactions. Instead, Latour posits that these associations can be traced through mediators and intermediaries, some of which may be other individuals, and some of which may be objects: “things might authorize, allow, afford, encourage, permit, suggest, influence, block, render possible, forbid, and so on” (p. 72). Holland et. al. (2001) similarly argue that agents who occupy figured worlds create artifacts that shape and aid individuals in defining their social spaces. Holland argues that artifacts are "manufactured or produced and continue to be used as part of, and in relation to, intentional

human actions" (p. 61). For Holland, these artifacts need not be purely physical (though they are physically manifest); instead, they *can be* material/tangible, but they can also be gestural or verbal. Though social network analysts have developed methods for studying how networks of individuals interact and influence one another, and some methods to account for common spaces and modes of interaction, social network analysis studies largely ignore the physicality of social relationships and the role of tools, physical spaces, and physical or non-physical resources in the development of social networks. However, in my analysis of the social networks of one group of high school teachers, I was sure to attend to the ways in which non-human actors in institutional and interpersonal relationships potentially mediated teachers' access to, use of, or talk about digital technologies and teaching. In Chapter 4, I make the argument that teachers' digital learning was tied both to their interpersonal associations with teachers as well as their associations with, or experiences with and access to, digital tools themselves.

Theories from educational psychology also acknowledge the important role of physical tools in shaping learning; Vygotsky, for example, noted that it is in the use of tools that children come to learn language, and vice versa: by "talking through" a practical problem while using a tool, children combine speech, object, and social interaction into one psychological process: "The path from object to child and from child to object passes through another person. This complex human structure is the product of a developmental process deeply rooted in the links between individual and social history" (1978, p. 30). Applied to this dissertation study, Vygotsky's, Holland's, and Latour's attention to the physicality of the "social" world – those "other things" (whether they are tools or gestures or, in Latour's example, sea scallops) that enter into social interactions – calls attention to how physical objects or artifacts shape teacher

learning and social interaction. For example, where a teacher's classroom is located in her school building may place physical limitations on her collaboration with a colleague situated at the opposite end of the building. However, this physical obstacle need not determine the teacher's actions; she has the agency to engage with her colleague digitally, or to walk to the other end of the building. The classroom computer or the building (artifacts, for Holland; intermediaries, according to Latour's ANT) have the potential to shape the teacher's interaction. The school's email server cannot perfectly emulate the face-to-face verbal conversation the teachers could have, and the building cannot reshape itself to allow for collaboration; however, the teacher can opt to use multiple modes in her digital communications (verbal/visual/video), or she can don her sneakers to overcome the physical barriers of her workplace. Similarly, and as I will explore further in Chapter 4, teachers and students learn how to compose both through social interaction (teachers with teachers, students with teachers, or students with students) and through manipulation of the writing tools they use to compose (pencils, iPads, phones, typewriters, crayons, or laptops).

Combining concepts from sociocultural, sociological, and social network theory enables me to theorize the social world not as made up of easily-defined and delineated "groups" or "cultures," but as both consisting of and complicated by dynamic networks of individuals and objects. These networks are characterized by the movement of resources, ideas, knowledge, affection, or any other number of "types of connections." They are "flat," to use Latour's language, in that individuals can have relationships with institutions, and institutions with objects, and objects with entire countries. The movements within networks – those things that connect individuals and objects within a network, whether we call them "associations" or "ties"

– are what pull elements of the network together or push it apart, binding people with other people, tools, or institutions, or creating distance between them. This networked conceptualization of the social world focuses my perspective on how tools and resources tied to digital literacy instruction are distributed across networks of teachers. It forces me to consider what "flows between" teachers as they collaborate and share knowledge related to digital instruction; do they share lesson plans? Website designs? Student work? Stories? Or Knowledge? How do their environments – social, physical, and institutional – shape how and when resources are exchanged in teachers' social networks? And most importantly – what does this mean for teacher learning and student instruction in the 21st century classroom? These are some of the overarching conceptual questions that led me to design and implement this dissertation study.

Literature Review

The Tools and Technologies of Literacy

As Lankshear & Knoebel (2011) point out, *literacy* is a relatively new concept in the field of education, becoming popular in the 1970s in response to the radical education movement, the rise of sociocultural theory, and the 1970s literacy crisis, among other factors (p. 4). These early theories of literacy sometimes focused on literacy as a valuable asset, one that could "restructure thought" (Ong, 1986) or "make us civilized" (Olson, 1977). Other theories understood literacy as a "set of skills," whether that skill involved placing an "x" on a signature line, writing one's name, or reading a religious text. Sociocultural studies of literacy contested this notion of literacies as "skills," positing that literacy was inherently tied to the goals and purposes of the people who put it to use (Scribner & Cole, 1981), or that literacy practices were different across

social cultures, races, and classes (Heath, 1983). From the perspective of these sociocultural literacy scholars, *literacy* goes beyond "knowing how to read and write," to "applying this knowledge for specific purposes in specific contexts of use" (Heath, 1983, p. 236). For sociocultural literacy scholars in the late 20th century, *literacy practices* therefore had more to do with social practices than with skills and competencies when faced with a book, pen, or paper.

From their outset, studies of *literacy* have focused on the benefits, or "consequences" (Goody & Watt, 1963; Olson, 1977), of literacy for various social groups. Freire's prominent *Pedagogy of the Oppressed* (1972) "provided the theoretical underpinning for the development of critical pedagogy, including critical literacy, in the USA during the 1980s" (Lankshear & Knoebel, 2011, p. 5) and set the stage for a focus on how literacy is used to reinforce inequalities between social groups. In other words, conversations about literacy have at their core conversations about democracy and access, about what role literacy plays in developing and fostering just societies. This is no less true today, as schools clamor to obtain hardware and software to integrate into their classrooms, encourage teachers to use such technologies, and spend money on professional development consultants to aid digital integration. This study in particular addresses issues of social capital within teachers' social networks, and highlights how in a digital age, frequent and adept users are often afforded more opportunities to learn and experiment with digital tools, "widening the gap" between those teachers with advanced digital literacies and belief systems that foster meaningful teaching with technology and those teachers who struggle to integrate technology into their teaching practice.

The relationship between literacies and the technologies one might use to engage them is a difficult one to define. Moje (2009) argues that careful researchers must not confound *literacy practices* with the *media* in (or with) which one might enact them:

> The differences between the tool (the media) and the norms or conventions that shape meaning making of the symbols offered via the tool (literate practices) are not only worth noting, but are worth distinguishing so that we can better understand the relative outcomes or consequences of each.

Moje distinguishes between the *tools* and the *literate practices* that employ those tools, arguing that "old literacies" are used to make meaning in "new media" spaces and that "new literacies" might be helpful in decoding "old media" (such as print text). Her distinction is an important one in that it separates the process of meaning making from symbol systems (literacies) from those tools with which literacy practices are enacted. This distinction is also important as we consider what constitutes "successful integration" of technologies into teacher practice. Pedagogical practices that integrate technology could simply replicate existing practices in digital spaces, or they might transform both the teaching and the content of the course considerably, combining the "technological" with the "pedagogical" and "content-based" (Mishra & Koehler, 2006). As I argue here, whether teachers use digital technologies to engage students in "digitally enhanced[1]" practices depends upon their beliefs about what constitutes "disciplinary content," about what constitutes "literacy," and about their students' needs as learners.

[1] I borrow this term from Hicks (2013), who argues that some uses of technology in the classroom are "digitally convenient" while others are "digitally enhanced" (p. 35). "Digitally convenient" uses of technologies do not transform the practice through the use of technology – students writing an essay in a word processor, for example. Digitally enhanced practices take into account the ways in which composing in digital environments changes texts and the processes of composing them; composing a video using text, image, and sound, and layering these over one another, for example.

What are *new literacy practices*, in what ways are they "new," and why might teachers be concerned about them? Scholars have argued recently that literacy practices and digital technologies are changing together, creating "new literacies" that are distinct in that they are driven by collaboration and co-authorship (Gee, 2000; Hicks, 2013; Lankshear & Knoebel, 2011). Lankshear and Knoebel point out that today's professional world has followed this shift; Web 2.0 technologies take advantage of a culture of collaboration and also contribute to it. These new literacies, Lankshear & Knoebel argue, are driven by "new technical stuff" and "new ethos stuff," or new technologies (digital-electronic devices that rely on programming languages and binary code) and new value systems (characterized by collaboration and sharing) (p. 55). Lewis and Fabos, in a study of adolescents' uses of Instant Messenger (IM) technologies, provide an example of how new technologies are resulting in new practices. Their study argues that "IM practices demand that users adopt habits of mind that are flexible, adapting across genres and modes, performing enactments of self (or identity), that relate to changing discursive and social spaces" (p. 495). Lewis and Fabos argue that schools should consider the literacy practices inherent in the use of digital tools like IM and how these practices are different from (or similar to) the literacy practices valued and emphasized in schools, an argument echoed by other digital-/new-/multi- literacy scholars (e.g. Herrington, Hodgson, & Moran, 2009; Hicks, 2012; National Writing Project, 2010; Knoebel & Lankshear, 2008). As Hicks (2013) argues, there is no longer much question about *whether or not* teachers "should" address digital literacies – instead, schools are asking *how to do more* digital literacy instruction.

Many terms or "types of literacies" come to mind when talking about composing and consuming texts in digital spaces: *new literacies, new media literacies, multimedia literacies,*

multimodal literacies, computer literacies and *digital literacies* are only a few of these terms, and scholars define (and sometimes use multiple) of these terms interchangeably. Selber (2004), for example, uses both the term *multiliteracies* and the term *computer literacies* in his framework for literacy instruction in the 21st century college composition classroom, in which he distinguished between *functional, critical,* and *rhetorical* literacy practices that engage technology. Bawden (2008) notes that some terms have come in and out of favor in reference to literacies in the digital age, from the initial popularity of *IT literacy* to *computer literacy* and *information literacy* and *e-literacy. Digital literacy* has become one such popular term used in reference to today's literacy practices, and it is the one I use in this dissertation. I have chosen the term strategically to highlight the digital tools and technologies that mediate the pedagogical practices and interactions of teachers in this study. I do not focus on "new" literacies, because in the process of collecting and analyzing data I noted many instances where digital technologies were used to enact "old" practices, or practices that one might conduct in an analog environment. Drawing on Moje (2009), I can see many ways in which "old" and "new" literacies and practices come together in digital-meets-analog spaces, making fuzzy the distinction between those literacies and pedagogies that might count as "new" when they are, in fact, so intertwined with the "old." A focus on "old" versus "new" literate practices therefore did not suit my purposes, since many "old" teaching practices are still in use and influential for student learning even as they require "new" literacy practices, and many "old" literacies can still be found in the classroom and in today's workplace. Instead, I focus on those literacy practices – new or old – that are enacted in digital spaces using digital tools for teaching purposes, with an explicit focus on digital tools as mediators of learning and doing in the 21st-century classroom.

I have drawn on research on digital and new literacies, as well as on my own experiences with teachers in this study, in order to come to my understanding of digital literacies as *socially organized practices one enacts in digital, often online, spaces using digital or non-digital symbol systems to produce or otherwise interact with texts*. This definition adapts Scribner and Cole's (1981) understanding of literacies as "a set of socially organized practices which make use of a symbol system and a technology for producing and disseminating it" (p.236), which highlights that literacies depend on *symbol systems,* or languages, bringing to mind communication based in letters and words. In an age when "literacies" has become somewhat ubiquitous, I tie *digital literacies* to *digital texts*, which might make use of digitally-bound symbol systems, such as binary code or a digitally-rendered videos, or systems based in non-digital symbol systems that have existed for centuries, such as words, sounds, or images. I also acknowledge that my conceptualization of digital literacies may differ from those of other scholars, and would argue that we do not need one single, unified definition of digital literacies, "nor is it sensible to suggest that one specific model of digital literacy will be appropriate for all people or, indeed, for one person over all their lifetime" (Bawden, 2008, p. 28).

Most studies of digital literacy have focused primarily on students and adolescents' digital literacies (e.g. Chase & Laufenberg, 2011; Gee, 2000; Ito et. al, 2009; Lankshear & Knoebel, 2011; Lewis & Fabos, 2005), but little attention has been paid to teachers', or even adults' more generally, digital literacy practices and learning. And yet, as one teacher in this study notes, many of today's teachers do not consider themselves "digitally literate." Pop culture theories of technology and learning position adults as "digital immigrants:" as not possessing or even capable of possessing digital literacy competencies, because they will always maintain an

"accent" (Prensky, 2011). Anecdotally, my mother – a long-time teacher and current elementary school principal – recently argued to me that the need for instruction in digital technologies and tools for teachers will diminish as today's "digital natives" take the positions of older teachers. Such an understanding of digital knowledge as age-based and as a problem that will eventually "take care of itself" is pervasive and ignores the reality that just because one knows how to use a technology does not mean one knows how to teach with it. Even those studies that argue for teaching practice that integrates digital literacies into instruction focuses on how *teachers* can facilitate *students'* digital literacy learning (e.g. Hicks, Turner, & Fink, 2013), not how teachers build their own digital literacies.

In English teacher education, some scholars have begun addressing this gap by studying how schools of education prepare tomorrow's English teachers for the increasingly digital classrooms and students they will encounter. Counter to my mother's well-intentioned assertion that young teachers will not need guidance when it comes to digital pedagogy, such studies have found that today's incoming teachers are not only surprisingly resistant to using new technologies in the classroom, but that knowing how to operate in digital spaces and knowing how those spaces might be used for academic learning are not one in the same (Burnett, 2009; Shoffner, 2009). In particular, The National Writing Project has published *Because Digital Writing Matters* (2010) and *Teaching the New Writing: Technology, Change, and Assessment in the 21st-Century Classroom* (2009) to support teacher learning about digital tools in the writing classroom, and has also sponsored online initiatives like *Digital Is* (digitalis.nwp.org) to help teachers learn about digital literacies and to engage teachers in the digital reading and writing tasks that they might use with their students in the classroom. Scholars affiliated with The

National Writing Project have argued that teachers learn best when they engage in digital environments and in literacy practices alongside students, seeing and identifying themselves as writers, readers, and learners and modeling digital writing practice (Grabill & Hicks, 2005; Hicks, Turner, & Stratton, 2013; Kittle & Hicks, 2009). However, the learning resources of NWP must be sought out by teachers, and their "learning by doing" model of teacher learning is uncommon for in-school professional development – the spaces in which most teachers' training takes place after they earn their degrees. As I will explore in Chapter 4, NWP and other external networks have the potential to contribute significantly to fundamentally shaping teachers' beliefs about and practices with technology and literacy, and offer useful models for schools hoping to promote ongoing teacher learning and pedagogical development in the digital age.

Teacher Collaboration and Digital Learning

As Lankshear & Knoebel (2011) argue, a "new ethos" is beginning to pervade digital cultures, and this "new ethos" is characterized by a widespread valuing of community-defined goals and standards, collaboratively-designed spaces for engaging in peer-mediated and reviewed work (e.g. affinity spaces), and crowd-sourced collective intelligence. This "new ethos" has manifested in schools in various ways, for example the explosion in popularity of Google Apps for Education, which promotes Google's most popular apps like Drive, less well-known apps like Google Moderator, and the newest addition to the suite: Google Classroom. Companies like Google use crowd-sourced data to improve and develop their software, which provides a space for synchronous and asynchronous interaction in written texts, presentations, blogs, or websites. The popularity of collaborative learning and practice can be seen in teacher professional development movements, as well. Communities of Practice (Lave & Wenger, 1991)

and Professional Learning Community (Dufour, Dufour, Eaker, & Many, 2010) approaches to organizing and conceptualizing teacher learning have gained a significant foothold in the literature, which has begun to cast aside one-shot professional development workshops in favor of models that bring teachers together around common problems and topics of interest. In this section, I explore some of the literature surrounding teacher professional development in school communities, examining how teachers' experiences with institutionalized "networks" have been characterized in the past and building connections to the arguments of this study.

Many studies have recommended and described the benefits of community-based approaches to teacher development and promoting teacher collaboration within schools (e.g. Dufour et. al., 2010; Hipp, Huffman, Pankake, & Olivier, 2008; Little, 2003; Williams, 2013). These studies argue that PD approaches that include community models offer many benefits to teachers, including fostering a sense of community and even "family" among colleagues (Dooner, Mandzuk, & Clifton, 2008); enabling effective integration of technologies (Lieberman & Mace, 2010); and improving student achievement on standardized measures (Williams, 2013), all benefits teachers at Borealis noted in their survey responses or in interviews. As Dooner et. al. (2008) argue, community spaces like these can be productive spaces for teacher learning, especially when teachers are pursuing their own goals while engaging with difficult theoretical constructs and concepts within learning groups[2]. However, research on teacher learning communities provides little guidance as to how such communities should be organized, though

[2]Notably, this was notably not a component of the PLC and PD sessions I sat in on at Borealis. At no point during the DigLit PLC and PD observations did teachers reference research or theory or engage with theoretical constructs; this time was spent trying new digital technologies or compiling and completing paperwork for teacher evaluations. Allison, in one interview, noted that the DigLit PLC spent time the previous year reading about digital literacies and doing "some of that thinking work," but such work did not seem to be the focus of the PLC during the school year of my study.

studies describe learning communities structured around everything from larger thematic concepts (e.g. Dooner et. al., 2008) to school-wide reform initiatives (Dufour et. al., 2010; Hipp et. al., 2008), to cross-grade level groups focused on single school-wide goals for system change (e.g. Harris & Jones, 2010), to cross-disciplinary groups focused on single sets of shared students (Levine, 2011), while some do not describe how PLCs are structured at all (e.g. Williams, 2013). This study addresses this gap in the research on how PLCs are structured by analyzing different PLC organizational approaches alongside teacher networks, in an attempt to understand how such institutional organizations of teacher learning shape teacher practice with digital technologies. It also calls into question the recent fervor to create spaces for teacher collaboration by arguing that not all forms of "collaboration" are productive or positive[3], that just because one is highly "connected" in a network does not mean that individual is contributing positively to the network, and that schools must look to their goals and reasons for teacher collaboration before embarking upon initiatives that compel teachers to enter into collaborative practice. I discuss these arguments in relation to my findings in Chapters 3 and 4 and throughout this dissertation as I explore the tensions between what such formal teacher learning communities were *meant to do* and the role they *actually played* in teacher learning and practice at my research site.

Multiple frameworks exist for enacting collaboration in a school setting, which has led to some confusion about which approaches to collaboration are "best" for any given school. In addition to unclear guidelines related to organizing PLCs, many scholars have asked *what*

[3] Other scholars have similarly noted that with teacher collaboration in PLC or CoP settings often comes difficulty, tension, or struggle. For example, Dooner et. al. (2008) argued that group members may suffer tensions when they encounter diverse purposes for collaboration or differing means of collaboration. Similarly, Hipp et. al. (2008) found that schools must foster a culture of collaboration in order to successfully integrate learning communities into their professional development model; without these cultures, PLCs falter or eventually fail.

exactly constitutes a PLC, and how a PLC is different from a Community of Practice (Lee & Shaari, 2012) or a Teacher Professional Community (Levine, 2011). Lee and Shaari (2012) argue that the primary difference between CoPs and PLCs rests in the "lens they adopt towards teacher development:" CoPs take an "organic" approach to the formation of communities, whereas PLCs are usually developed based on top-down initiatives in which community structures are either partially or completely determined by administrators (p. 458). CoPs place control in the hands of teachers, and studies have suggested that schools or departments that build communities based on this model potentially hold more promise when it comes to interrogating and developing practice (Horn & Little; 2010; Lee & Shaari, 2012; Levine, 2011). However, PLCs are often a more practical solution for schools looking to accomplish quick change, often in the form of student achievement – a goal that has pushed many schools to adopt PLC approaches in recent years (Lee & Shaari, 2012; Williams, 2013). However, despite what may seem like clear-cut differences between PLCs and CoPs, in practice the different ideologies associated with these communities often blend to form unique dynamics in any given setting. Westheimer (1999) therefore suggests a model for defining teacher learning communities that drives at the underlying goals and values of a school, analyzing its reasons for developing or implementing teacher communities of practice. His study of two schools found that while one school valued individualized goals and autonomous teacher-decision making and used communities as a space for mutual support, another developed communities around shared goals that they worked together to accomplish. Both of these communities were successful, despite their inherently different reasons for and ways of forming professional communities. This study builds on Westheimer's, arguing that the multiple values and goals of an institution can sometimes create

conflictual goals for teacher communities, and can ultimately reify the status-quo and uphold traditional teaching practices, even in spaces where teacher experimentation and innovation is highly valued.

Much of the research on teacher learning communities has been qualitative in nature, in an attempt to define and articulate the characteristics of various types of communities of practice (e.g. Cochran-Smith & Lytle; Hargreaves & Dawe, 1990; Horn & Little, 2010; Richmond & Manokore, 2012). Other studies have used quantitative survey methods to assess the effects of PLCs on teacher attitudes and efficacy (e.g. Mintzes, Marcum, Messerschmidt-Yates, & Mark, 2013; Song, 2012), or have used regression analysis to assess the impact of PLCs on student achievement via analysis of scores on standardized assessments (e.g. Williams, 2012). However, no studies that I was able to identify have examined PLCs using social network analysis, though some combine the qualitative and quantitative approaches mentioned above (e.g. Mintzes et. al., 2013). Specifically, no studies to date have combined social network methods, growing in popularity in multiple social science fields (Daly, 2010), with studies of institutionalized teacher learning communities. Considering the focus of both research communities on the social nature of teacher interaction and learning, this study focuses on how PLCs might support – or discourage – teacher pedagogies that promote students' digital literacy learning, and on how PLCs interact with teachers' existing social networks. By taking a network perspective, this study offers a unique understanding of PLCs in the context a larger school network dedicated to digital integration.

Social Networks, Schools, and Teacher Learning

Despite a lack of research on PLCs in the social network research community, some network research has begun to focus on teachers and teacher practice, in particular practice associated with the use of computers and innovative technologies; such research provides models for this study's examination of how teacher learning communities respond to, and shape, teacher learning and digital integration. Zhao & Frank (2003) theorized that in the ecosystem of a school, computers or other innovations act as "invasive species" to which teachers and students must adapt their environment. Their theory was corroborated by their findings that teachers were more inclined to take up less complex technologies, and that technologies that required more learning on the part of the teacher took more time to integrate into curriculum and use with students. Further network studies have indicated that teachers at different points in digital integration benefit from different learning structures; Frank et. al. (2011) found that teachers at low levels of implementation benefit most from focused PD, teachers at intermediate levels benefit from time to play or "fiddle" with technologies, and only when teachers are at more advanced stages of digital integration and digital knowledge do they turn to their close colleagues as primary sources of knowledge about digital technologies. For the teachers in this dissertation study, interpersonal networks played a similar role for teachers whose belief systems supported integrative pedagogies; however, formal professional development surrounding digital technology largely focused on building teachers' functional knowledge and use of technologies, with little emphasis on building students' digital literacies.

The particular relevance of social network analysis for educational researchers rests in SNA's ability to make visible relations that might otherwise be difficult to notice or capture, particularly in schools where complex social interactions take place in the hallways, lunchrooms,

teacher learning communities, PD sessions, and even outside of school as teachers increasingly connect via social media. Social network analysis allows researchers to identify subgroups of individuals in a way that is not pre-defined by hierarchical structures (such as PLCs), but by the individuals themselves. Frank (1995) notes:

> Interpersonal actions often do not correspond to formally designated boundaries… Since actors are directly influenced by their interpersonal interactions, subgroups based on the pattern of interaction are more likely to be related to the sentiments of actors than subgroups based on formal positions. (p. 28)

Thus, while it might be useful for researchers to think about school faculty in formally defined groups – science teachers, English teachers, 8th grade teachers, administrators, or PLCs – these formally defined groups may not reflect the interactions that those individuals choose for themselves, and thus may not reflect the less tangible, less predetermined spaces that teachers inhabit and create. This was certainly the case for teachers at my research site, where teachers engaged in learning interactions both in their self-maintained, already-occurring networks and in the context of formally designed networks and communities, such as departments or PLCs.

Social network theorists argue that these *informal* networks – in contrast to those defined by the hierarchical structure of organizations – are of interest when examining human behavior and social capital (Coburn & Russell, 2008; Daly, 2010; Kadushin, 2012; Frank, 1998). Just because a teacher is the head of the department, for example, does not mean that this teacher has a large influence within the school network. Social network analysis allows actors to define their own groups for analysis and comparison, and also allows researchers to examine multiple types of relations, from friendship to the getting or granting of advice. Furthermore, research studies of

social networks in educational settings, sparse but growing in popularity[4], suggest that "the stronger the professional network, the more likely educators – at all levels – are to stay in the profession, feel a greater sense of efficacy, and engage in deeper levels of conversation around teaching and learning" (Daly, 2010, p. 1). Studies have interrogated what these "strong networks" look like, and how districts and schools can foster network "strength" among teachers and between teachers and district- or school-level administrators (Coburn & Russell, 2008; Daly & Finnigan, 2012). This dissertation study adds to these studies not by attempting to define network "strength," but by articulating what strengths interpersonal networks contributed to a few teachers' digital learning and by interrogating the role of interpersonal networks alongside more formal communities, such as PLCs or academic departments.

In educational research, social network scientists have used school-based network analyses to build inferences about everything from teacher attitudes about reform related to their social networks (Cole & Weinbaum, 2010), to teacher content expertise and how this expertise flows through teacher networks (Baker-Doyle & Yoon, 2010), to distributed leadership approaches and their impacts on social networks (Penuel, Riel, Krause, & Frank, 2009). More recently, social network studies, which had primarily used descriptive statistical measures to analyze networks, have begun employing analytical methods that seek to statistically model influence, selection, and causality. These studies examine how individuals' social networks influence their behaviors, how individuals' demographic or other attributes influence how they select and form networks, and how individuals' membership in particular subgroups predict their orientations towards particular issues. For example, Fletcher & Ross (2012) examined

[4] Approximately 300 publications in 2009, compared to less than 100 in 2000, according to Daly (2010, p. 5).

longitudinal data on adolescent health behaviors to examine how teens' friends may influence their propensity to engage in smoking or drinking, arguing that friend groups have a strong impact on adolescent decision-making. Other studies have found that teachers' interactions with close colleagues play a role in shaping their attitudes and beliefs about teaching and reform (Neal, Neal, Atkins, Henry, & Frazier, 2011; Penuel, Riel, Krause, & Frank, 2009) as well as their teaching practice (Frank et. al., 2011; Penuel, Frank, Sun, Kim, & Singleton, 2013; Zhao & Frank, 2003). I draw on these studies' findings here, as I trace the impact of institutional learning and interpersonal relationships on teachers' digital learning and pedagogies. I also use similar statistical methods to triangulate trends I identified in qualitative data, illustrating how network approaches can be combined with qualitative approaches to understand the complex interrelationships between institutions, networks, and teacher practice.

(Re)Conceptualizing "Pedagogy" in the Digital Age

This dissertation, in an attempt to develop a better understanding of what teachers at multiple stages of digital integration are doing with digital technologies in their classrooms, adapts and builds upon existing theories and definitions of "pedagogy" in order to provide a definition of "digital pedagogies," or pedagogies that integrate digital technologies in diverse ways. The concept of *pedagogy*, like "network" and "literacy," has undergone definitional shifts over many centuries, as Hamilton (2009) points out. Like Hamilton, I understand *pedagogy* as contextually and socially situated and based in teachers' beliefs about how content, teaching and learning, and the tools and space of the classroom come together. Based on these beliefs, teachers engage in teaching practices that reflect their belief systems about teaching and learning. In order for teachers to engage students with digital literacies, many teachers' belief systems

about learning and teaching may need to shift to align more closely with the "new ethos" of the digital age. This study will show that while putting hardware into the hands of teachers requires little more than some financial resources, changing belief systems about learning and teaching is a far more difficult challenge, especially given pressures to standardize and align curricula and evaluate teachers based on student achievement.

My understanding of *pedagogy* recognizes teaching practice of all kinds as socially situated and based in the goals and beliefs of the cultures and communities in which education – in its many forms – occurs. Hamilton (2009) argues that pedagogy is often reductively defined as "methods of instruction." This narrow definition "misses the point," Hamilton notes, that "teaching is a goal-directed activity where the goals and the means of reaching such goals are defined in terms of social values" (p.14). Drawing on this framework, I understand pedagogies as belief systems that inform teachers' goals and, by extension, their actions in the classroom – *pedagogies* consist of sets of *beliefs* which are then translated into specific *teaching practices,* and (as this dissertation will show) these beliefs and practices are shaped by the networks from which teachers draw resources and the values of the cultures and communities in which teachers do their work. This reaches beyond defining pedagogies as "methods of instruction" to include those belief systems – and the experiences, conversations, theories, and training that undergird them – that teachers carry with them into the classroom.

With this definition of pedagogies in mind, I understand *digital pedagogies* as consisting of teachers' beliefs and practices surrounding the use of digital tools (e.g. smartphones, computers) and technologies (e.g. "apps," online software) in the classroom. Drawing on a sociocultural understanding of pedagogies as inherently tied to one's social beliefs and cultural

values (Murphy & Ivinson, 2003), digital pedagogies are situated within and alongside teachers' existing pedagogical beliefs and practices. Teacher's approaches to integrating technology are therefore not separate from their beliefs about digital technologies, or even about teaching and learning more generally – for example, teachers believe social media technologies are "time-wasters," they are unlikely to value social media as a space for digital literacy development, and are therefore unlikely to integrate this particular technology into their teaching practice. On a more general level, if teachers believe that "literacy" consists primarily of reading and writing, they are unlikely to model analysis of a visual text or engage students in multimodal compositions of videos. Similarly, if schools maintain courses and curricula such as "British Literature" or "American Literature," as opposed to more recently-designed courses that combine humanities content across disciplines, they reify an understanding of English Language Arts as primarily tied to the teaching and reading of major works of (often canonical) literature – the teachers of such courses are unlikely to draw on texts composed in diverse media, or to engage students in composition and collaboration across diverse media[5].

The interplay of technology and pedagogy is nothing new – teachers have considered when and why to use an overhead projector for many decades. They have employed various tools, from pens to pieces of chalk in sharing ideas and knowledge with students. However, as I will argue throughout this dissertation, such uses of technology have enabled teachers to "get stuff done," perhaps more efficiently, but have not radically transformed the content of the

[5] This is not to say that such practices (multimodal composing, visual analysis) are not possible in literature courses or in schools where more traditional, long-standing organizations of ELA classes are common. As I will show in this study, some teachers are able to "redefine" the traditional content of the American Literature classroom, for example. However, I do mean to argue that traditional approaches to organizing and conceptualizing ELA (or other disciplinary) content may undermine teachers' ability to engage students with 21st-century texts and 21st-century literacies.

classroom or the literacy learning that took place within it. Though pedagogical trends have always shifted over time, the space of the classroom and the tools and technologies it houses have remained more or less stable for decades. This is no longer the case as schools purchase everything from laptops and tablets to recording devices, assistive technologies, and education app packages, expecting their teachers to swiftly learn and integrate these tools and technologies in order to ready students for their future jobs and college courses.

However, simply asking teachers to use these technologies fails to take into account how they interact with (and potentially clash with) teachers' existing beliefs about and practices surrounding teaching and learning. While some tools might be taken up in much the same way "old" technologies were – for example, the replacement of overhead projectors with LCD projectors or SmartBoards – other tools might allow for or even require a reconfiguring of the classroom as an interactive space. For example, Google Drive might be used as an alternative space for students to submit papers to their teacher, but it can also be used to develop spaces of collaborative synchronous and asynchronous composition and feedback between peers and teachers. As many digital writing scholars have argued, including Hicks (2013), Herrington et. al. (2009), Kajder (2010), and The National Writing Project (2010), new technologies enable and sometimes demand a restructuring of the traditional operations of and interactions within the classroom as students spend class time engaging in creation and design as opposed to absorbing content. This is not to say that such student-centered practices were not possible or even common without these technologies; certainly, some teachers structured their classrooms around workshop models that placed students at the center long before Google and similar collaborative tools arrived on the scene. However, some new technologies may assume particular pedagogical

beliefs and practices are already in place, creating a conflict for teachers when they are pressured to use such technologies without attention to how new tools might require shifts in teachers' underlying assumptions about teaching and learning.

A few frameworks have been developed in recent years for thinking about what I am calling "digital pedagogies." Mishra and Koehler collaborated to develop the popular TPACK framework (2006, 2009), which builds on Shulman's (1986) concept of Pedagogical Content Knowledge (PCK). TPACK (Technological Pedagogical Content Knowledge) posits that teachers bring technological, pedagogical, and content-based knowledge to bear on their teaching practices and that it is when these three types of knowledge come together to inform practice that teachers are best able to meaningfully integrate digital technologies into their practice. I draw on this framework in my understanding of digital pedagogies as integrated with teachers' other pedagogical beliefs and practices: teachers bring together those content-based pedagogical practices (their PCK, or pedagogical content knowledge) and their knowledge and beliefs about particular technologies in order to develop pedagogies that bring together content and technology in meaningful ways.

This study adds to Mishra and Koehler's work by arguing that further distinctions need to be made if we are to understand (1) how teachers are taking up technologies in the classroom, and (2) why some teachers' practice with technologies looks so different from other teachers' practice. In Chapter 5, I make theoretical and practical distinctions between *integrative digital pedagogies* and *facilitative digital pedagogies;* however, I reference this distinction throughout the dissertation, and so it warrants some explanation here (see Figure 1.2). *Integrative digital pedagogies* require not only TPACK, but also call on students to build their own digital literacies

through conversations about and with digital tools and technologies. They keep students' digital literacy learning at the center, because they are focused on how students' literacy practices can be can be fostered and developed in the 21st century. They are *integrative* because they combine disciplinary content with digital literacies and pedagogical practice in ways that transform all three. In the English classroom, this might involve analysis of the design of webtexts and their use of multiple media to convey an argument or message. In the science classroom, it might include the use of a digital modeling program to "draw" chemical structures or to create 3-dimensional renderings of the various parts of a human blood cell. Such practices require students to not only use the technology to accomplish a task, but also require students to make critical choices about when to use a particular technology, to engage and create within the technology, or to discuss the technology with their classmates.

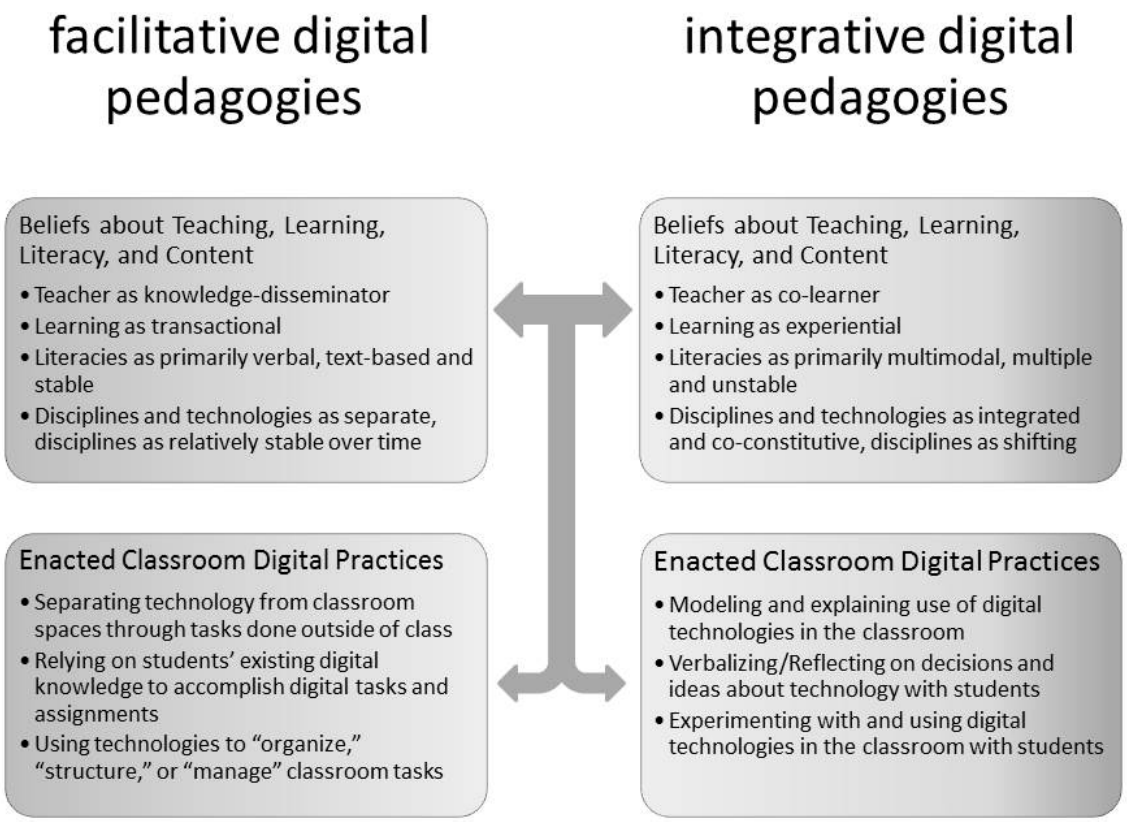
Facilitative digital pedagogies call to mind Hicks' "digitally convenient" texts – these pedagogies use digital technologies as convenient tools that enable teachers to "get things done," or to translate their existing practice into a digital space (p. 35). Much like digitally convenient texts are online purely for the sake of available audience or easy grading, facilitative digital pedagogies use digital technologies as "helpers" that allow them to either (1) move an existing practice or task out of the classroom for students to do as homework online, or (2) allow teachers to attend to the administrative tasks of teaching, such as organizing or assessing student work. In a classroom where a teacher engages in primarily facilitative pedagogies, a student might use a technology (like Microsoft Word, YouTube, or an online forum site) to complete an assignment (like writing an essay, watching an instructional video, or responding to classmates' thoughts on a novel), but in these instances the technology becomes "transparent" instead of "explicit" – the

student is not being asked to manipulate, engage with, make decisions about, or discuss the technology itself. Instead, the technology acts as a sort vehicle for completing a task, for getting the work of schooling done. Unlike the integrative practices I describe above, all teachers use digital technologies to facilitate their existing practices to some extent. As computers and student information systems become ubiquitous in education, it is impossible to avoid technologies as "task-completion facilitators." However, in order for teachers to challenge students' uses of technologies and to help students become digital citizens, they must employ *integrative digital pedagogies,* which integrate technology with the content of the course, transforming what it means to "do math" or "do history" and reshaping the space of the classroom for both students and teachers, as I describe in detail in Chapter 5.

What I have described above begins to make a distinction between the *practices* associated with facilitative versus integrative digital pedagogies, but what about the *belief systems* that undergird such teaching practices? As multiple scholars in digital literacy and digital writing fields have argued, digital engagement that transforms pedagogy and content requires a markedly different approach to and beliefs about teaching and learning (Gee, 2000; Hicks, 2009, 2013; Homan & Reed, 2014; Kajder, 2010; National Writing Project, 2010; Shoffner, 2009). Sara Kajder argues that today's teachers must *learn alongside* students, which can feel risky for teachers who are used to a more traditional schooling model of teacher-as-expert. And indeed, for teachers in this study who struggled with their confidence with technology, learning with students violated many of their beliefs about what a classroom should "look like," while others embraced the chaos that can often ensue when one tries a new digital composition assignment with a room full of teenagers. Beyond simply student-teacher interactions and dynamics within

the classroom, integrative digital pedagogies require teachers to have flexible belief systems when it comes to their disciplines – as Mishra & Koehler (2006) point out, TPACK requires teachers to understand how technologies transform, shape, or are shaped by academic disciplines. If, for example, a teacher understands ELA content as primarily reading canonical works of literature and writing literary analysis essays, her practices are likely to use technologies to facilitate such writing and reading, not to disrupt these practices through digital composition or analysis of hypertexts. And finally, integrative digital pedagogies often require beliefs about literacy that extend beyond the reading and writing linear text. Today's students engage with multimodal and hypertextual texts on a daily basis, often as they "mess around" on social media sites, in gaming systems, or on their favorite app (Ito et. al., 2000). Such practices require new literacy skills; new approaches to reading, writing, and navigating communicative spaces replete with images, video, audio, and text alike (Lankshear & Knobel, 2011).

Figure 1.2: Framework for Digital Pedagogical Beliefs and Practices



I have developed this framework for conceptualizing teacher practice from the data I collected in this study, and I will provide more comprehensive examples of each of these pedagogical approaches in Chapter 5. In Chapters 3 and 4, I will begin to map those institutional and network-based factors that shaped teachers' learning and supported either facilitative or integrative approaches to the use of technology in teachers' classrooms. However, I want to pause a moment here to emphasize that though this distinction might seem to reinforce a qualitative binary, most teachers do not fall into one or the other pedagogical "category." In fact, I make the distinction between *facilitative* and *integrative* not to distinguish binary and opposite

pedagogies, but to suggest two extreme, and practically non-existent in their totality, ends to a pedagogical spectrum. All teachers at my research site engaged in facilitative pedagogies, but very few fully integrated digital technologies into their teaching practice. Further, many teachers had beliefs about teaching and learning that aligned with integrative digital approaches, but because of the institutional and social factors I will discuss in Chapters 3 and 4, used technologies primarily to facilitate their existing practice.

Conclusion: Bringing Together Research Fields and Methods in Studies of Teacher Learning and Digital Pedagogy

Drawing on multiple theoretical and methodological traditions, this dissertation study combines network theory with sociocultural perspectives on human agency, identity, literacy, and pedagogy as culturally- and contextually-bound. In conceptualizing this study, I kept in mind Latour's (2007) argument that non-human agents can act as intermediaries or mediators, and applied this theory to my conceptualization of the role of digital technologies in the classroom, which can shape teachers' interactions with students and colleagues in ways that change pedagogy and collaboration in 21st century schools. However, Latour's theory (by his own admission, p. 148) proves unwieldy as researchers attempt to study networks using reliable research methods. To that end, I turned to social network analysis, which though it requires the articulation of somewhat "artificial" boundaries for study, provided a means through which to examine actors and the various associations that flow between them, and enabled me to "zoom in" on the complex inter-relational dynamics of teachers within a single high school.

By combining these theoretical traditions and drawing on the research fields of communities of practice, social network analysis, digital literacy, and teacher pedagogy, this dissertation examines the intersections of these fields, questioning how teacher communities are

shaped by teachers' social connections to one another, and how these networks and communities work together to shape teachers' implementations of digital technologies and development of complex and varied digital pedagogies. I make the argument, in the chapters that follow, that digital integration is a more fraught process than previous studies, which focus primarily on teacher beliefs about technology (Burnett, 2009; Shoffner, 2009) or on increasing teacher access to technology (Inan & Lowther, 2010) have made it out to be; that the answer to the question "why aren't teachers using more technology in their classrooms?" has many answers that move beyond teacher attitudes and access, and these answers have much to do with the social and institutional contexts of teachers' lives and with the beliefs teachers hold about teaching and learning literacies. These social-institutional factors, which I will discuss in detail in Chapters 3 and 4, include institutional values at both the school and state levels and interpersonal relationships with colleagues within and across academic departments and even outside of their school context.

In Chapter 2, I describe the methods I used for data collection and analysis, describing how I arrived at my design of this study and how I conducted my data collection and analysis. I explain my choice to engage multiple methods in this study in order to both confirm and trouble my qualitative and quantitative findings. I also outline my research questions and describe an iterative approach to data analysis that required me to examine multiple sources of data at once in order to reach the conclusions I share in subsequent chapters.

In Chapter 3, I begin sharing my findings by analyzing Borealis high school's institutional and full-network dynamics surrounding digital implementation and professional development. This chapter makes the argument that tension between attempts to standardize and

track student achievement and desires to innovate and experiment may ultimately uphold traditional notions of literacy and facilitative uses of digital technologies, even in schools where teacher leadership and pedagogical experimentation is highly valued. In this chapter, I interrogate both statistically and qualitatively how teachers' disciplinary beliefs and the school's larger value systems shape their approaches to PLC implementation. I begin the process of drawing connections between formal professional development structures and individual teacher practice, arguing that PD models that conflate "teacher learning" with "student outcomes" run the risk of encouraging learning communities focused on "getting stuff done," instead of communities where teachers can find the space to interrogate and develop their digital pedagogies.

In Chapter 4, I begin the process of "zooming in" on the focal participants of this study, arguing that teachers in the Borealis English Department developed or upheld their existing pedagogical beliefs through interactions in their interpersonal networks. I analyze how those teachers with fewer "tech consultation" network ties struggled with digital integration, despite an interest in educational tools and technologies, and often felt intimidated by their more advanced colleagues' knowledge. This chapter makes the argument that inequitable access to digital resources across the school alongside feelings of digital incompetence may lead some teachers to shy away from digital technologies, or even to adopt "anti-tech" identities as an opposition to pressure to conform, while other teachers draw on out-of-school networks and learning opportunities in the absence of meaningful in-school professional learning opportunities. Further, Chapter 4 argues that teachers' digital pedagogical learning happens primarily within the context of their interpersonal networks (as opposed to in formal PLCs), where teachers share resources

and foster ongoing conversations about technology and teaching. This chapter draws connections between the formal networks of Chapter 3 and the individual practice of teachers in Chapter 5 by beginning to align differing digital pedagogies with teachers' experiences in various learning spaces.

In Chapter 5, I focus almost entirely on the focal participants of the study, analyzing how their practices illustrated differences in pedagogical approaches to integrating technologies in the classroom. I describe the two types of digital pedagogies I introduce at the end of this chapter, though I acknowledge that these can, and for a some teachers do, occur simultaneously and are mutually constitutive. First, *facilitative digital pedagogies* understand technologies as a means through which to "get things done;" to disseminate student grades, to post announcements, to convey knowledge, or to conduct and organize class business. For teachers who engage primarily in these pedagogies, digital technologies facilitate practices that could be done in analog formats, but teachers integrate technologies in order to "streamline" a process or move a particular task out of the classroom space (such as review for a test or discussion of a text). *Integrative digital pedagogies*, in contrast, utilize technologies with the goal to call attention to digital literacy practices. Teachers who employ these pedagogical approaches engage students in conversations about and composition within digital spaces as a component of their existing pedagogical practices and goals. I make the argument in this chapter that though all teachers engage in *facilitative pedagogies*, *integrative digital pedagogies* offer the most promise for teachers and schools looking to increase *students'* digital literacies, because integrative pedagogies transform the curriculum of the ELA classroom to include reading and writing instruction in, about, and with digital environments. In contrast, *facilitative digital pedagogies*,

when used alone, reinforce existing disciplinary beliefs and practices and do not require *students* to think about the *where, when, why, and how* of digital composition or citizenship. I connect this chapter to the previous chapters by elucidating the institutional and interpersonal differences between teachers who were more inclined to engage in integrative versus facilitative digital pedagogies, and suggesting that significant support both within *and outside* of the school context are necessary if teachers are to develop lasting integrative and facilitative digital pedagogies that complement one another and support students' digital literacy learning.

Finally, in Chapter 6, I offer research and practical implications for schools and districts looking to implement teacher community models of professional development, for teacher educators preparing tomorrow's teachers for the digital classrooms they will soon encounter, and for research communities hoping to expand upon studies of teacher learning and digital integration. I draw on findings from Chapters 3-5 to argue for future research examining (1) how teachers' informal interpersonal networks shape institutionalized teacher learning, (2) how teachers integrate digital technologies in different ways across settings, grade levels, and disciplines, and (3) how we prepare future teachers in ways that honor how digital literacies, disciplinary content, and teacher pedagogy come together in the 21st-Century classroom.

Chapter 2: A Complementary Methods Approach to Examining Teachers' Digital Literacies and Pedagogies

> *I enter the still-dark school, a bag of bagels in one hand, a stack of plates precariously balanced on my arm. I make my way to Mary's classroom – I could see that her classroom light was on from the parking lot. It's a blustery January morning in the Midwest, and the coffee carafes swirl steam into the cold air. Mary, who connected me with BHS faculty and administrators earlier in the year, volunteers to help me carry coffee and bagels and unlocks the teacher's lounge, where we set out cups and napkins. As we do so, we chat about the start of second semester, about the piece we're co-writing for a collection on digital literacies, and about what her students will be doing in class this week. She asks me about the survey, which will be distributed via email later that morning. As we talk, the sounds of a school day begin to buzz in the hall: bells, announcements, socializing students, and the repetitive whir of copy machines mark the start of a new semester at Borealis High School.*

My semester of data collection at Borealis contained many mornings like this one: mornings when I arrived before students and a few teachers, usually to interview a teacher before the start of the school day (or, in this case, to deliver coffee and bagels as a thank you for teachers' participation). I would also stay after the final bell to work with Mary on our mutual project or to interview teachers, whose workdays extended into the evening as they stayed late to plan, grade, or speak to parents and visitors like me. This vignette provides something of a glimpse into my approach to research at Borealis High School. I spent much of my time with teachers in the "interstices" of their days – before school, after school, during PD sessions, and in the hallways and lunchrooms, though I also observed their classes. In addition to observing their teaching and learning, I shared my writing with them (and read some of theirs), was a

participant-observer in PD and PLC sessions, and reflected on their teaching with them. This chapter will describe my approach to data collection and analysis, and will specifically focus on my combination of two complementary research methods: social network analysis and thematic analysis of in-depth interviews, classroom and PD observations, and classroom artifacts. In the sections that follow, I will describe how these research methods complement one another, explain how my pilot research informed my research questions and study design, and delineate how I collected, analyzed, and interpreted both qualitative and quantitative data in an effort to learn more about Borealis teachers' digital literacies and pedagogies.

Combining Approaches: Qualitative Case Study and Social Network Analysis

The use of multiple methods to study individuals' literacy practices is not new to the fields of education or sociology. Indeed, mixed methods studies in these fields have been carried out since before the term "mixed method" was coined and widely used, as it is today (Pearce, 2012). However, the term is a confusing one, and has developed into a sort of umbrella term for any studies that use more than one approach to collecting or analyzing data. It is most often used to refer to any study that uses both qualitative and quantitative approaches, though sometimes researchers will use it to refer to different approaches within qualitative or quantitative paradigms. The term is, by itself, minimally informative – it indicates only that the researcher defines his study as drawing on methods from multiple research traditions, but does not indicate how, why, or to what end said methods were "mixed."

Many have argued that mixing methods comes in different forms, and that researchers who mix methods do so for different reasons and in different ways. Greene (2007) lays out five different reasons why one might choose to mix methods: for purposes of triangulation (different methods are used in order to establish "convergence, corroboration, or correspondence"), of

complementarity (methods "tap into different facets or dimensions" of a complex phenomenon), of development (one method informs the development of another method), of initiation (seeking "divergence or dissonance" within a single phenomenon), or of expansion (methods are used "to assess different phenomena") (pp. 100-103). These purposes depend not only on the research questions at play, but also on theoretical and philosophical beliefs of the researcher, as methods are the means through which methodologies, or systems of practice and ways of thinking about them within a particular research community, are realized. For this study, I have mixed methods in order to both triangulate and complement findings; through the use of network analysis and thematic coding, I was able to both corroborate findings across methods and problematize my findings through examination of different dimensions of teachers' social interactions and digital practice.

Previous studies of teacher and student digital literacy practices have relied primarily on qualitative and ethnographic methods of data collection and analysis, including in-depth, semi-structured interviews with teachers (e.g. Burnett, 2009; Burnett, 2011) or observations of and interviews with students (e.g. Ito, 2009; Lewis and Fabos, 2005), that can be analyzed for their discourse characteristics, thematic trends, or emergent characteristics (as in constant-comparative analysis). Collection of qualitative data, followed by thematic analysis using open and axial coding, were the primary methods I used in my pilot study, in part due to my familiarity with qualitative methods. This dissertation study engaged similar qualitative methods; however, unlike many studies of digital literacy and teacher practice that have relied only on qualitative analysis of interview and observation data, this study also engages what Greene (2007) calls "iterative mixed method design," in which two different methods examine the same phenomenon and iteratively inform the design and implementation of one another. "In an iterative design,"

Greene argues, "the methods are by definition implemented sequentially and are preferably – though not necessarily – of equal weight" (p. 126).

In my analyses of teacher network data, I used both sociocentric social network analysis[1] and egocentric social network analysis[2]. Sociocentric analysis (alternatively, "whole network analysis") requires the researcher to place a somewhat constructed and artificial "boundary" around the network. This boundary affords the ability to examine the space between actors in such a network (at least within the defined boundaries) and to statistically analyze those ties and their relationships to individuals' behaviors. Sociocentric analyses thus give researchers a more complete "snapshot" of an entire network of social relationships, which can then be triangulated against observations of social relationships, evidence from collected classroom artifacts, or assertions from in-depth interviews within the defined network. Egocentric analysis, or analysis of "ego networks," challenge the boundaries of sociocentric networks by focusing on one individual's social ties with other actors (or "alters"), and potentially the connections between alters. In Chapter 4, I use ego network analyses to examine how some teachers' technology consultation networks were less extensive throughout the school, giving them less access to available resources and learning opportunities. I also use analysis of individual teachers' digital learning networks to analyze how some teachers' connections reached far beyond Borealis High School.

[1] *Sociocentric analysis* is a type of network analysis in which the researcher must place "boundaries" around the network in order to survey all of the actors within the network. In order to conduct a sociocentric analysis, the researcher must assume that most of an individual's ties fall within a theoretically-defined "group" or network – in this case, a single high school, and collect data accordingly from all individuals within that network.

[2] *Egocentric analysis* is a type of network analysis in which an individual defines his or her own network, a network in which he or she is "at the center." As Wasserman & Faust (1994) define it, an egocentric network "consists of a focal actor, termed *ego*, a set of alters who have ties to ego, and measurements on the ties among these alters" (p. 42). They note that egocentric approaches have been widely taken up by anthropologists because of their ability to obtain in-depth information about one individual's perceived network (p. 42), but they also have disadvantages compared to whole-network (or sociocentric) analyses, which can obtain information from all actors in a network.

Qualitative methods are not new to social network studies. For example, McFarland (2001, 2005) used classroom observations to code classroom interactions in order to explain how resistant student behaviors are often the result of classroom social structures. However, many social network studies have integrated interviews with teachers or students as complements to survey data (e.g. Frank et. al., 2011; Penuel et. al., 2009), and not as primary or equal means of data collection and analysis. This dissertation study, unlike former mixed-method studies of networks, places roughly equal weight on network and qualitative data collection and analysis.

Research Questions

Derived from my work with one teacher blogger during my pilot study (see Appendix 2.6), the following research questions reflect my interest both in teachers' digital literacies and pedagogical practices and in how these shape and are shaped by teachers' social connections. As is often the case in studies that analyze individuals' experiences in in-depth observations and interviews, my research questions shifted as I worked with Borealis teachers. These shifts were primarily motivated by the issues teachers found most salient when it came to teaching with, and learning about, technology. For example, my initial focus on the physical resources available to teachers expanded to include "intangible" resources, such as time or access to professional learning, which is reflected in questions 2a and 2c.

1. **How do teachers' social networks shape their digital literacy learning and, by extension, their pedagogical beliefs and practices?**
    a. How do teachers' social network connections foster or impede their digital literacy learning?
    b. How do the characteristics and structures of teachers' social groups correspond with teachers' digital pedagogical beliefs and practices?

c. How do institutional structures and teacher networks, taken together, shape teachers' digital pedagogical beliefs and practices?

2. **As teachers develop digital practices, what factors play a role in the development or change of teachers' existing pedagogies?**
    a. What tangible or intangible resources foster the translation of digital literacy beliefs and practices into teachers' pedagogical approaches?
    b. How are teachers' approaches to integrating technologies in the classroom different, and how are these differences reflected in their practice?
    c. What obstacles do teachers in this school encounter when they are learning how to integrate new digital technologies into their practice?

It is important to note that many of my research questions benefit from the contribution of *both* sets of methods – social network analysis *and* thematic qualitative analysis, including open and axial coding – in order to be thoroughly answered. For example, Question 1b asks about teachers' social groups and how these correspond with teachers' digital pedagogies. Because I have both statistical data about teachers' clustering tendencies based on their network surveys and because I spent time with teachers throughout the school day and was witness to their social interactions, I am able to answer this question using multiple qualitative and quantitative data types, illustrating the integrative nature of my approach to collection and analysis across research methodologies. I will discuss this integrative approach further in the final section of this chapter.

Research Site and Participants

Borealis High School

Situated five miles from a state university, Borealis High School[3] serves the small city of Borealis, a community of approximately 21,000 citizens. BHS's enrollment during the semester of my study (Spring 2013) was approximately 1,400. The students at Borealis High School come from varying racial and ethnic backgrounds, though the majority of students (70%) at Borealis are white, and the largest minority group (15%) is Asian Pacific Islander. 15% of students qualify for free or reduced price lunches.

Digital initiatives, though important to Borealis administrators like Principal Jameson and other district leaders, were not firmly in place or enforced at Borealis. This is not because administrators and teachers did not see technological integration as a priority – indeed, teachers at Borealis were afforded many opportunities to learn about new technologies during my time at the school, as I will describe in Chapter 3. I witnessed multiple professional development sessions in which teachers were invited to choose focal workshops focused on particular digital tools. In these workshops, which took place twice during the 2012-2013 school year, teacher leaders and district administrators led informational and hands-on sessions on Google Drive, Blogger, Quia (an online assessment tool), Camtasia (a screen capture software), and other digital technologies. Despite this focus on digital technologies in professional development sessions, the use of digital technologies in teachers' classroom was not necessarily required; some teachers chose to experiment with new tools following development sessions, while others maintained their existing pedagogies and focused on the teaching goals on which they would be evaluated.

[3] All school, district, and individuals' names are pseudonyms to protect the identities of those who participated in the study.

I chose my site in part purposefully and in part as a matter of convenience; after visiting three schools that could serve as potential research sites, I chose Borealis because the school met my criteria as a school that was interested in promoting digital technologies but was encountering some difficulty with digital integration, according to both the principal and the district's technology coordinator. The site was also a convenience sample, because I was connected with teachers at this school through mutual colleagues. In my search for a research site where I could conduct a case study of teachers' digital literacies and pedagogies, I wanted to conduct my research at a school where teachers were free to make many of their own decisions about digital technologies, as was the case at Borealis. I also wanted to conduct my study at a school where technological devices were available, but not ubiquitous. In other words, I was not looking for a school where a 1-to-1 initiative was in place (one computer to every student and teacher), but where teachers and students needed to share and seek out the necessary devices, which is most typical in today's secondary schools, including urban, suburban, and rural environments. This would enable me to interrogate how the sharing and distribution of resources shaped the social environment of the school and teachers' integration of technologies.

The Borealis High School English Department

Of the approximately 83 faculty[4] who were initially invited to participate in this study, 14 of them were English teachers. Two English teachers were on maternity leave during my time at Borealis. Of the 12 long-term English teachers who were present during my time at Borealis, all 12 participated in the initial survey, plus one long-term substitute participant, for a total of 13 English teacher participants. Seven of these 13 teachers agreed to be interviewed, two agreed to provide artifacts and to be recorded during professional development sessions, and five agreed to

[4] This number represents all faculty who were invited to participate, which included all faculty designated as classroom teachers or guidance counselors.

be observed and interviewed beyond my initial interviews and the first round of the survey. One of the five was the long-term maternity leave substitute and an early career teacher. The other four teachers became my focal participants, and I also observed Carrie (the long-term substitute) on one occasion when her students were creating online blogs.

The English department at BHS had classrooms in two hallways, separated by floor. Every teacher had his or her own classroom, and computer resources were shared amongst faculty in each hallway. There was one computer cart – called "COWs," or Computers on Wheels, at BHS – in each hallway, and these carts "lived" in one teacher's classroom on each floor. The teachers on each floor could often be found outside their classrooms during passing periods, watching students pass by and chatting with one another, bouncing between rooms looking for a computer, asking about who has reserved what technologies for that day, transporting COWs from one classroom to another, or swapping lesson experiences or resources. They could also be found in the copy room chatting about their children, or in the lounge during lunch time talking about making yogurt, sharing crockpot recipes, or swapping exercising tips, all conversations I observed or participated in at Borealis. The English teachers at BHS mingled often with the special education teachers, having lunch together in the lounge during their shared lunch periods or conferring about a shared student during common prep periods.

When it came to using digital technologies with students, teachers in the BHS English department did not always agree about how often, how much, in what instances, and which digital technologies should be integrated into the English curriculum. Some teachers integrated very few digital technologies into their pedagogical approaches, using technology for more utilitarian tasks like recording grades or presenting a lecture on the Smart Board. Other teachers had integrated digital technologies or conversations about digital environments into various

elements of their pedagogy; they articulated goals and assessments related to digital environments and expressed multiple reasons why they find it important for students to engage with digital technologies. Borealis English teachers' reasons for either incorporating or not incorporating digital technologies are many and varied, as I will discuss in the chapters that follow.

Borealis and Professional Learning Communities

Approximately two years before this study began, Borealis High School changed their professional development model to include Professional Learning Communities, or small communities within the larger community of the school designed to engage teachers in collaborative professional learning. Once a month on Wednesdays, students came to school for a half-day, after which teachers spent the final two hours of the day with members of their Professional Learning Communities, or PLCs. These PLCs looked different in each department. In most departments, they were organized around content courses – for example, Donna was a member of the American History PLC during my time at Borealis, which consisted of the four teachers at the school who taught 9th grade American History. In the science department, there were two PLCs – one focused on chemistry and the other on physics.

In the English department, PLCs were divided up somewhat differently. Instead of being divided by the primary course content taught, PLCs were divided into interest groups. For example, I spent much of my time observing professional development sessions with the Digital Literacy PLC, or the "DigLit group," as they called themselves. This group had been in existence for a year and a half prior to the study, and maintained as a focus the use and integration of digital technologies in the English Language Arts classroom. Other English PLCs

included one that focused on writing achievement in 9th and 10th grades and another that focused on student experiences with eBooks.

Four Borealis English Teachers

During the first five weeks of the semester, or Phase 1, I interviewed teachers in the English department to ascertain which teachers would be willing and appropriate participants for Phase 2, when I would conduct further interviews and observations. In order to select Mary, Allison, Donna, and Kristin, I used a limited form of purposeful, maximum variation sampling, first defined by Glaser and Strauss (1967) – "limited" because of the relative size of the available sample. In maximum variation sampling, individuals are chosen who represent "the widest possible range of the characteristics of interest for the study" (Merriam, 2009, p. 79). This range is made most powerful when there is some connection between participants, and other dimensions on which they vary widely. For this study, all four of these participants had an interest in and desire to use digital technologies in the classroom. They varied, however, in both their implementation of technologies and in their comfort and perceived digital skills when it came to technology in the classroom.

My use of this selection method was limited by teachers' willingness to participate in the study; only seven of the fourteen teachers in the department were willing to be interviewed, and of those seven, six were interested in the larger study and five agreed to be observed during classroom time. While I interviewed all five of these participants, one teacher participant was a long-term substitute teacher and thus was not included as a focal participant. Despite these constraints, the four teachers with whom I worked closely integrated digital technologies to varying degrees; had different perspectives about when, how, and why to use digital technologies with students; and faced different challenges when it came to the development of their digital

literacies and their transfer of digital learning into their pedagogical practices. Each participant is described here in no particular order. These brief descriptions are merely introductions to each teacher; richer descriptions of teachers' practices with, beliefs about, and literacies surrounding digital technologies can be found in later chapters.

Allison Paul's digital journey started a few years ago, when she began blogging on her own time. Frustrated with state policy surrounding teacher evaluation and educational funding, she decided she needed an outlet for her opinions, and turned to the Internet. She started her blog, on which she sometimes wrote about educational issues, but also wrote about being a mother to a child with special needs, being married, pregnancy, having dogs, shopping for Christmas presents, and other miscellaneous topics that did not necessarily pertain to her work as a teacher. After a year of blogging, Allison joined the "DigLit" PLC at Borealis in 2011, with Michelle (another English teacher), Kristin, and Sarah. She incorporated online discussion forums using Spruz.com into her American Literature courses, and at the start of the 2012-2013 school year, began introducing blogs to her 9th grade English classes. During the time I spent observing Allison, her students wrote blog posts on course blogs in response to their reading of *The Adventures of Huckleberry Finn*, participated in discussion forums, and used Diigo, an online research archive and annotation tool, to annotate texts for research papers. Allison articulated in multiple interviews a need for students to understand how to use tools like these, because they would use them in college and in their future jobs.

Kristin Lewis's work with digital technologies similarly started recently, but unlike Allison's blogging, Kristin's digital engagement has been primarily motivated by her learning and teaching at Borealis. She focused for the year and a half prior to the study on meaningfully incorporating online forum discussions into her pedagogical approach to teaching literature. For

Kristin, discussion was one of the richest and most challenging parts of teaching English. She spoke often of the literature circle unit in her British Literature course as a particularly fruitful unit for developing students' discussion skills, since students were reading multiple texts that covered similar themes. This was her favorite unit, in part because of the discussion she was able to foster with students through their forum posts and either handwritten or typed dialectic journals. Kristin regularly invited me to observe on days when discussions were scheduled, because she felt that these days best reflected her teaching approach overall. Kristin struggled at times with her own digital literacies, mostly because she did not feel she was afforded the time to build these skills on her own without taking time away from her family. She often noted in interviews and observations that time with her daughter was important to her, and that many of her colleagues were able to learn new digital skills during time outside of contracted hours.

Mary Abington had been involved with the Blue Hill Writing Project (BHWP), a chapter of The National Writing Project (NWP), for the past several years of her teaching career when I met her. During the time we were working together, Mary was a co-director of BHWP and was working closely with many former and current members of local NWP chapters. Mary's close friend Trent is the director of another area National Writing Project chapter, and is also a scholar in the field of digital literacy and composition. It was Mary's and my mutual acquaintance with Trent that led me to initially pursue Borealis, among other schools, as a potential research site. All of these professional connections played a significant role in Mary's thinking and pedagogy, as I will discuss in later chapters. In Mary's classroom, I observed students developing digital stories using various media platforms, discussing the differences between media depictions of a text, discussing the rhetorical expectations of emails between students and teachers, and using Google Drive documents to collaborate on co-authored short

stories. Mary articulated many challenges related to her use of digital technologies in the classroom, including the role of society in shaping students' digital literacies and the impact of policy and resource distribution on her ability to accomplish some of her goals.

Donna Snyder taught for both the English and the social studies departments at Borealis, and during the semester I observed and interviewed her, she was teaching mostly social studies classes. This was the first year in which this was the case for Donna; Borealis administrators needed someone to step in and take social studies courses after a few teachers resigned during the summer. As such, Donna relied on her collaborative work with colleagues in the social studies department to develop curricular materials and align her curriculum with the existing expectations of the social studies department, which included the use of Quia, an online assessment tool that Donna "repurposed" for formative assessment and exam review games in her classes. Unlike Mary, Kristin, and Allison, Donna was not a member of the DigLit group and often expressed feeling a little "out of the loop" with her English colleagues during the semester I observed her. Donna was also the journalism advisor during my time at Borealis. She had interest in incorporating digital writing into her curriculum, but had done so rarely, citing both the variability of her course assignments and time within the curriculum for her sparse use of digital tools. Donna had done her own digital composing in WordPress, and felt confident using many of the digital tools that teachers were beginning to experiment with at Borealis during my time there.

Data collection

Data collection for this study took place in three phases (see Appendix 2.2). These phases were designed to help me get to know the faculty and introduce myself to administrators in Phase

1, to enhance the depth of my understanding of teacher practice and collaboration in the English department in Phase 2, and to enable follow-ups and final data collection as needed in Phase 3. They were also designed to separate quantitative and qualitative data collection to some extent, though qualitative data collection took place in all three phases. The phases further enabled me to clearly delineate a time period between the two phases of survey collection and to engage primarily with focal participants in the English department during Phase 2.

In Phase 1, I conducted the first round of a social network survey that I specifically designed to collect information about three types of teacher networks and teachers' uses of digital technologies in the classroom. This survey is further described below. During this phase, I also conducted initial interviews with faculty in the English department who were willing to participate in the study. During Phase 2, I focused mostly on Donna, Kristin, Mary, and Allison, and attended professional development sessions with the DigLit PLC on professional development days. I also conducted two interviews with faculty members – one math teacher and one science teacher – who were interested in the study. In Phase 3, I conducted the final round of surveys with the entire faculty, conducted final observations and interviews with participants in the English department, and collected artifacts from English teachers who were willing to provide curricular materials. In the following sections, I will lay out first my data collection procedures – qualitative, then quantitative – and then my data analysis process, qualitative and quantitative. Though I treat qualitative and quantitative data separately here for the sake of clarity, it is important to note the degree to which these processes were mutually informative and iterative; to that end, I will end with a discussion of how these methods complemented one another, drawing my attention from statistical to interview to artifactual data and back again, in order to address my research questions.

Ethnographic Interviews, Observations, and Artifacts

Interviews with Faculty

During Phase 1 of data collection, I conducted semi-structured mini-interviews with all members of the English faculty who indicated that they were willing to be interviewed on their surveys. These interviews were similar to semi-structured qualitative interviews in which the researcher prepares probing questions and allows the interview to meander along a protocol without sticking rigidly to it (Merriam, 2009); however, I labeled them "mini-interviews" because the goal was not necessarily to gain an in-depth understanding of each individual teacher's identity, digital literacies, or digital pedagogies. Instead, these interviews were designed to help me better understand the social and curricular structure of the English department and the individuals within it, to probe results from early social network analyses of the entire school, to get to know faculty in the English department, and to begin to recruit and select participants for the second phase of the study. I also collected some curricular artifacts during interviews from teachers who were willing to share them, in the form of assignment sheets, rubrics, course websites, or class forums.

Semi-structured in-depth interviews with focal participants took place during Phase 2. The foci of these interviews were in some ways predetermined, divided into four primary categories, which were flexible and changed somewhat throughout the study to reflect what teachers were doing in their classrooms, what concerns they had raised, or what questions I had about their digital practices. As many scholars note, ethnographic interview protocols need not be rigid, lock-step protocols, but should make room for the interviewer to investigate other themes and topics related to the research questions (Corbin & Strauss, 2008; Emerson, Fretz, & Shaw, 1995; Merriam, 2009). The major orienting topics of each interview were as follows:

1. Interview 1: Teaching beliefs and practices surrounding technology
2. Interview 2: Observation follow up and overall professional learning experiences
3. Interview 3: Social relationships and interactions with colleagues
4. Interview 4: Social relationships with colleagues, continued, and relationship impacts on pedagogical approaches and professional learning goals

I purposefully ordered these interviews; for each teacher, I wanted to first learn about her and her classroom, the practices that mattered most to her, and how digital technologies "fit," or did not fit, into these practices. I then wanted to talk to the teacher about her social relationships, but before I asked her to discuss directly her relationships with specific colleagues, I asked her about professional relationships in general – inside and outside the school – and how she felt these relationships helped her learn about digital technologies, in an effort to define the teacher's social networks and to "ease into" talking about colleagues. Interview three refined the focus of interview two, asking participants about their particular interactions with colleagues in the school. I asked teachers for stories about particular meaningful or difficult interactions with colleagues during this interview. The final interview was placed towards the end of the data collection process, and left space for me to follow up with teachers about pedagogical approaches I saw them using in the classroom and relationships they had cited as influential to these approaches. In this interview, I asked for stories about particular moments when teachers learned something valuable about digital technologies, tried something new with a digital tool, or struggled with a digital learning task (see Appendix 2.3 for full protocols).

As often happens in qualitative research, however, my questions and concerns shifted slightly to reflect emergent themes and patterns. For example, in my initial interview protocols, I had not included questions about how teachers structure their in- and out-of-school time to

account for digital literacy learning or the incorporation of digital pedagogical practices. However, time management was very much on the minds of the teachers I interviewed. And teachers were not only concerned about the impact of digital literacy learning on their own time, but also commented on the time they felt their *colleagues* invested in learning and pedagogical development, comparing themselves to their colleagues and reflecting on their own uses of time. Further, while my initial interview protocols and observation plans were not specifically focused on professional development and PLCs, I began to focus on the social dynamics of the DigLit PLC and the English department during data collection. Many other emerging themes also shifted the focus of interviews, such that during many interviews I skipped questions or added questions as I spoke with participants.

As an illustrative example, in my final interview with Mary, we were discussing a project her students were completing that required them to develop their own argumentative texts. It became clear to me as Mary spoke about the many "texts" students were creating – videos, posters, written essays and letters – that Mary's definition of what constitutes a "text" is very broad. As Mary described the project to me, it became clear that her broad definition of "text" shaped the assignment significantly and that this might be tied to Mary's pedagogical beliefs when it comes to teaching students how to read and interpret various types of text. I asked Mary: "What constitutes a text?" And, "How do you foster this definition of text in your classroom throughout the year?" Our conversation "veered off" into a discussion of multimodal argumentation, and Mary told me a story about a lesson related to argumentation in multiple modes. Though this part of the interview did not *necessarily* focus on Mary's uses of digital technologies in the classroom, which was the initial focus of the interview, it did allow me to understand Mary's teaching philosophy more completely and how her belief systems informed

her use of digital technologies in the classroom to support student literacies. Her belief that texts are multimodal and that argument can happen across modes and media was tied to her pedagogical practices, which engaged students with multiple types of argument in both digital and non-digital spaces, as I will argue in Chapter 5.

Observations of Focal Participants

At the start of the second phase of the study, I spent one full school day with each of the four focal participants. These initial full-day observations allowed me to gain familiarity with participants' daily routines and course schedules. During these initial observations, I paid particular attention to teachers' social interactions and the technologies they used throughout the day. Emerson, Fretz, and Shaw (1995) suggest that ethnographers spend 3-4 hours in the field before leaving to take field notes; these longer observations, therefore, were not dedicated to gaining an in-depth understanding of these teachers' daily lives. They were instead designed to help me learn more about each teacher and his or her school routines in order to inform future observations and interviews. Later observations were dedicated to taking more in-depth field notes and gaining as thorough as possible an understanding of teachers' pedagogical practices.

Later observations were purposefully chosen based both on the teacher's preferences and on the foci of the study – teachers' uses of digital tools, digital literacy learning, and digital pedagogies. As such, I planned to attend on days when:

1. A teacher was doing a lesson or activity with students that involved writing in a digital environment;
2. Students were engaging with digital technologies for an assignment;
3. The teacher was engaging or collaborating with colleagues, especially if this collaboration involved the use of digital technologies;

4. There was a professional development event taking place, especially if this professional development involved the use of digital technologies; and/or
5. The teacher identified a lesson or activity as particularly relevant to his or her "typical" pedagogical practices, as defined by the teacher.

In addition to audio recording all observations, I took ethnographic field notes both during and after field observations using a tablet computer, on which I hand-wrote notes interspersed with pictures of teachers' classroom spaces, scans of handouts, and direct quotes. These field notes served as the primary source of data for observations. Some observations were chosen for transcription if I felt they particularly pertained to teachers' digital literacy learning or digital pedagogies; for example, all of the PLC days I attended with the digital literacy PLC were transcribed, because these were rich interactional spaces and were designed by BHS administrators to facilitate teacher learning and pedagogical development.

In addition to the day-long observations at the start of Phase 2, I conducted approximately four additional observations of each of the four participants. The number, timing, length, and purpose of these visits varied across the four participants. For example, Mary's students were working on digital storytelling in her creative writing course and on a major project entitled "This I Wish to Change" in her American Literature course, both of which took place at the end of the school year. Therefore, most of my observations of Mary's teaching occurred at the end of the semester, though I visited her classroom twice in the middle of the semester. Donna only occasionally engaged students with digital technologies, and rarely in the context of writing instruction, which she attributed to the nature of the social studies curriculum. Because she was teaching primarily social studies and knew my focus was primarily on digital technologies in the context English Language Arts, she only invited me to come visit her

classroom three times during my semester at BHS (see Appendix 2.4 for a description of my observation and interview activities during my data collection period).

When I observed teachers, I focused my observations on elements of the teacher's professional activities that were of interest to this study, in particular:

1. Teachers' interactions with and talk about their colleagues;
2. Teachers' talk about and enactment of ELA pedagogy (especially as it related to digital technologies);
3. Teachers' talk about and reactions to students' digital literacy practices and uses of digital technologies; and
4. Teachers' professional learning, in both formal contexts (on PLC days, for example) and informal contexts (in the hallway or during lunch).

During observations, I took notes using a tablet and stylus, which enabled me to walk around the classroom. I maintained distance while observing teachers' classes – instead of being a participant-observer, I largely remained quiet and out of the way during classroom observations unless invited into discussions by the teacher. I adopted this approach because of my stated goal to examine the teacher's pedagogical approach to incorporating technology. At times, teachers called on me to contribute to a conversation or to help a student with a task; for example, in a class discussion about students' uses of digital technologies in Kristin's room, Kristin and I both talked about the technologies available to us as teens. Certainly, a new person in a classroom is sure to be noticed and is likely to shape and shift the nature of classroom discourse or activity. I aimed to minimize this effect by participating very little in classroom interactions, unless called upon by the teacher to do so.

During my observations of professional development sessions and of teachers' interactions with one another outside the classroom, my role as an observer shifted to participant-observer on many occasions, in part because remaining a "fly on the wall" became impossible as teachers got to know me, learned more about my research, and became used to my presence in the school. On one occasion, for example, I was called on to help a teacher organize a Google Drive folder system, and on another, was called out of the room by another PLC to help with a question a teacher had about Microsoft Excel. Beyond being seen as a "tech expert," a few teachers knew I enjoyed blogging, running, or cooking, and would talk to me about these interests. As I will explain further in a later section of this chapter, this status potentially shaped the data I was able to collect in ways that limit, but also contribute to, what I was able to learn about teachers' digital practices and social relationships at BHS.

Collection of Literacy and Pedagogical Artifacts

Whenever participants were comfortable sharing them, I collected artifacts to document teachers' digital literacy or pedagogy practices or their interactions with colleagues surrounding digital technologies and teaching. Collected artifacts included curricular materials such as handouts and lesson plans; teachers' SMART goal forms, submitted to the administration for teacher evaluation; teacher correspondences with colleagues, including blogs, Facebook, and other digital writing communications; and teachers' online compositions, particularly blog posts. When I collected curricular materials, I did so selectively and purposefully, asking teachers if they were willing to share rubrics, assignment sheets, or lesson examples whenever their teaching practices involved digital technologies.

Teachers' digital interactions were also of interest to me, because teachers often used digital tools to communicate with one another or with students. I learned in my pilot study that

digitally-enabled spaces like blogs or social media sites allowed teachers to keep in touch with colleagues from around the country, as I have written about elsewhere (Homan, 2014). I therefore collected Facebook posts and interactions and blog posts from teachers when they gave me their consent to use the posts. For example, Allison regularly solicited advice on Facebook regarding lesson ideas or interactions with parents and students, while Mary sometimes posted victories or positive experiences at school on Facebook. Three of the teachers who either participated in the survey or whom I interviewed were also bloggers, and I collected a few examples of their online writing, some of which linked to colleagues' posts. Allison and her colleague Sarah developed websites for their colleagues outlining how they have used Google's Blogger and Google Drive in the classroom; online materials like these that teachers developed for use in professional learning and teaching were collected, as well. However, while I analyzed these documents and have included them in my interpretations of teachers' experiences, I do not quote these artifacts in the dissertation; this is to maintain the anonymity of teachers, because quoting texts from the web could compromise their identities and confidentiality.

I also collected forms related to administrative tasks, such as SMART goal forms, which were used at BHS for teacher evaluation. Every teacher at BHS, as part of his or her work in PLCs, developed a SMART (specific, measurable, attainable, realistic and timely) goal at the start of the year. During the year, teachers documented their progress on SMART goals in PLCs by analyzing student progress and submitting evidence of student work[5]. I collected these forms from three of the four focal participants. I also collected correspondences that Principal Jameson shared with me related to professional development with teachers.

[5] I discuss this organization of PLCs and SMART goals further in Chapter 3.

Beyond Qualitative Data Collection: Developing Lasting Relationships with Participants

I developed unique relationships with participants that at times extended beyond my role as a researcher investigating their uses of technology in the classroom. For example, during the course of the study, I drafted and submitted a chapter for an edited collection with Mary, one of the focal participants. I connected with Allison, Kristin, Mary, and their colleagues Amanda and Kate via social media, as well, after they initiated these connections with me. I still maintain online and face-to-face relationships with all of these teachers, as well as with other teachers in the school. I follow three Borealis teachers' blogs, because I want to learn more about their online practices, because I enjoy reading their writing, and because they follow my online writing. I share interests with BHS teachers that do not relate to school, teaching, or digital technologies; two Borealis teachers share my interest in running, and we encourage one another's races and workouts via various social online communities.

Do these relationships have any bearing on my research at Borealis High School? Perhaps my conversations about running with Allison or her colleagues in the math and special education departments do not significantly impact my research findings, but it is certainly conceivable that my desire to know participants not only as teachers, but also as digital writers with lives and interests outside of their school context shaped what they were or were not willing to share with me. It is also possible that other teachers' interactions with me were shaped by the relationships they saw me developing and sustaining with their colleagues. It is impossible for me to know exactly how my interactions with participants – within and outside of school, online and in person – influenced what I was able to learn about teachers' digital literacies and pedagogies. To be sure, by the end of the study, I was not only a researcher studying the teachers' networks, but I had also become integrated into some of their social networks myself; a

few of them named me on the final survey as someone they considered a "close colleague" or as someone with whom they consulted about digital technologies. I consider this a strength of my research approach – it allowed me to understand and empathize with my participants as individuals, as teachers, and as learners. It allowed me to interrogate how multiple facets of teachers' lives work together to shape their uses of or rejection of particular technologies, and it enabled me to probe how the school context fostered or limited teachers' already-existing interests in digital writing.

In this way, my qualitative data collection was ethnographic in nature, even though the case study was not "an ethnography," per say. Though I was not specifically examining the "culture" of the school, teaching alongside my participants as their colleagues or staying for an entire school year, I did seek to develop lasting relationships with my participants as fellow professionals, and much of my observation revolved around some of the cultural and social norms of teachers within the school and especially within the English department. With my four focal participants, my interest in their lives extended beyond their capacity as educators; we joked about our collegiate alliances, shared recipes with one another, and emailed articles and memes in addition to holding interviews and scheduling observations. I integrated myself into a small community of individuals in order to not only study their learning and teaching, but to get to know them as teachers, mothers, lovers of books, writers, Tweeters, pinners, and Facebookers. I therefore understand my research as having been done *with* teachers, not *on* them.

Quantitative Social Network Data Collection

A Network Survey Examining Teacher Technology Use

In the first phase of the study, all teachers at BHS were asked to complete an online survey[6] that inquired about their uses of digital technologies and their relationships with their colleagues. The survey was designed to collect information about teachers' friendship, advice, and digital networks, and was modeled off of survey designs from Zhao and Frank (2003) and Frank et. al. (2011), both studies which examined teachers' implementation of computer technologies alongside their network connections. The survey also contained items to obtain attribute data[7] concerning teachers' regular uses of technology in and out of school. Data from the survey generated three different networks for analysis and comparison:

1. Who teachers considered their "close colleagues" within the school, or a *friend network.*
2. Who teachers approached to consult about curriculum, or a *curriculum consultation network.*
3. Who teachers approached to consult about technological issues, ideas, or questions, a *technological consultation network.*

I have chosen to collect *consultation* data instead of *advice* data purposefully; though many studies have set a precedent for collecting advice network data (Lazega, Mounier, Snijders, & Tubaro, 2012; Baker-Doyle & Yoon, 2010), *consultation* is a broader term that might include advice, but could also include idea-sharing or collaboration. One might *consult* with a friend, but get *advice* from a superior, for example. This term originated during my pilot study, when the

[6] I used my university's Qualtrics license to develop my social network survey; teachers were provided with a link that directed them to the survey, and Qualtrics recorded their responses for me to download at the conclusion of data collection.

[7] Attribute data, in social network studies, is used to learn more about participants in what might be considered a "typical survey" item. Wasserman & Faust note that these data "have the same nature as those [data] measured in non-network studies" (1994, p. 38). Attribute data allows me to analyze how particular teacher attributes, like frequent use of technology, gender, or discipline, might correlate with particular network positions or structures.

teacher I observed did not often seek advice about technology but regularly *consulted* with her colleagues, not to get advice from them, but to brainstorm, obtain feedback about a lesson plan, or experiment with something new together (see Appendix 2.6). *Consultation* allows for a less hierarchical positioning of individuals within spaces than do advice networks, but still captures the respect and value of a relationship between two colleagues (one is unlikely to voluntarily consult with someone she does not trust). Other studies have similarly asked teachers to identify others with whom they interact or have conversations, in an effort to compare these relationships with teacher attitudes or practices (e.g. Coburn and Russell, 2008; Coburn, Choi, & Mata, 2010; Cole & Weinbaum, 2010). Researchers have experimented with different ways to characterize teacher relationships in network studies; *consultation,* I posit, offers one way to conceptualize the network ties of teaching professionals, and as I discuss further in Chapter 4, revealed the extent to which teacher ties might reflect the movement of teaching artifacts through teacher networks.

The survey used the roster technique or recognition method, in which "respondents are given a list of names and are allowed to nominate as many other actors from the list as they choose" by either circling or placing checkmarks next to the individuals' names (Avila de Lima, 2012, p. 250). This method is favored in social network studies over free recall methods, in which participants are not given a roster of other potential actors, because it "increases the likelihood that more of the actual ties, and also weaker ties, are reported" (p. 251). Teachers' names were divided by primary department affiliation, to aid teachers in quickly locating the names of those colleagues with whom they most frequently consult. It took most teachers between 5 and 15 minutes to complete the survey (See Appendix 2.5 for the full survey instrument).

In Phase 2, I also obtained information about the four focal participants' individual, or "ego," networks. To do this, I conducted face-to-face interviews that asked teachers about both their work connections and their out-of-school connections. These interviews were more in-depth than the survey, because I was able to ask follow-up questions about connections and to ascertain the relative strength and importance of these connections in the focal participants' lives. Including analysis of teachers' individual networks in this study has two advantages: it allows me to problematize the somewhat artificial boundary of the school by acknowledging teachers' professional ties outside of the school, and it enables me to better understand the broader social ties of four teachers and how these social ties enable or limit their uses of digital technologies.

In addition to questions about teachers' consultation and close colleague ties, the survey contained questions about teachers' uses of digital technologies and the obstacles teachers faced related to digital integration. Specifically, I asked teachers how often they use specific web technologies in their lives outside of school and in their capacities as educators. I piloted the survey with three former teachers prior to its implementation, gathering their feedback and questions for revision. In this portion of the survey, teachers indicated how often they used each technology by choosing from among five options ranging from "never" to "all the time:" Teachers could then name up to three other web technologies they used in their daily lives and in their work as teachers. The list of web technologies was developed based on my initial conversations with teachers, both at this school and in my pilot study, and on what I knew about the technologies Borealis administrators and teachers were already using. I also asked teachers *why* they used particular technologies. For those technologies that teachers indicated they used "often" or "all the time," they were given a number of options for when, where, and why they

used the technology. Teachers were also able to specify other spaces and reasons for using each technology by writing in a response.

The principal distributed a link to the survey to the entire faculty with information about the study, inviting teachers to participate, after which I followed up with an email that contained further information about the study and information about incentives for completing the survey[8]. I also sent one email reminder to teachers approximately a week after the initial distribution of each round. The survey was conducted at two time points: in late January, 2013 (the start of second semester at BHS) and again in early June, 2013 (the end of second semester). The second round of the survey was shortened to encourage maximum participation at the recommendation of Principal Jameson, who was concerned about teachers' time commitments during finals week. Thus, the second survey omitted questions about teachers' uses of technology in their daily lives and questions about professional development. Response rates decreased between the first and second administrations of the survey. In the first round, 77%, or 64 of 83 teachers completed the survey. In the second round, 53 teachers participated, or 64%. 48 teachers, or 58% of the BHS teaching faculty, completed both rounds of the survey.

Data Analysis

Qualitative Data Analysis

During observations and interviews, I engaged in an adaptation of what Glaser and Strauss (1967) and Corbin and Strauss (2008) call theoretical sampling, a grounded theory approach to iterative collection and analysis of data. As Corbin and Strauss (2008) note, in theoretical sampling "the researcher has to let the analysis guide the research. The researcher has to ask questions and then look to the best source of data to find the answers to those questions"

[8] Incentives for this study included drawings in each academic department for a $100 Visa gift card. Additionally, all faculty were entered in a sweepstakes to win one of two Kindle Fire HDs.

(p. 146). This method can also be described as following "an analytic trail" (p. 146). Traditional theoretical sampling methods require the researcher to continue "following trails" until the point of saturation, at which point "all the concepts are well defined and explained" (p. 145). It also assumes little, if any, *a priori* theoretical focus on particular concepts.

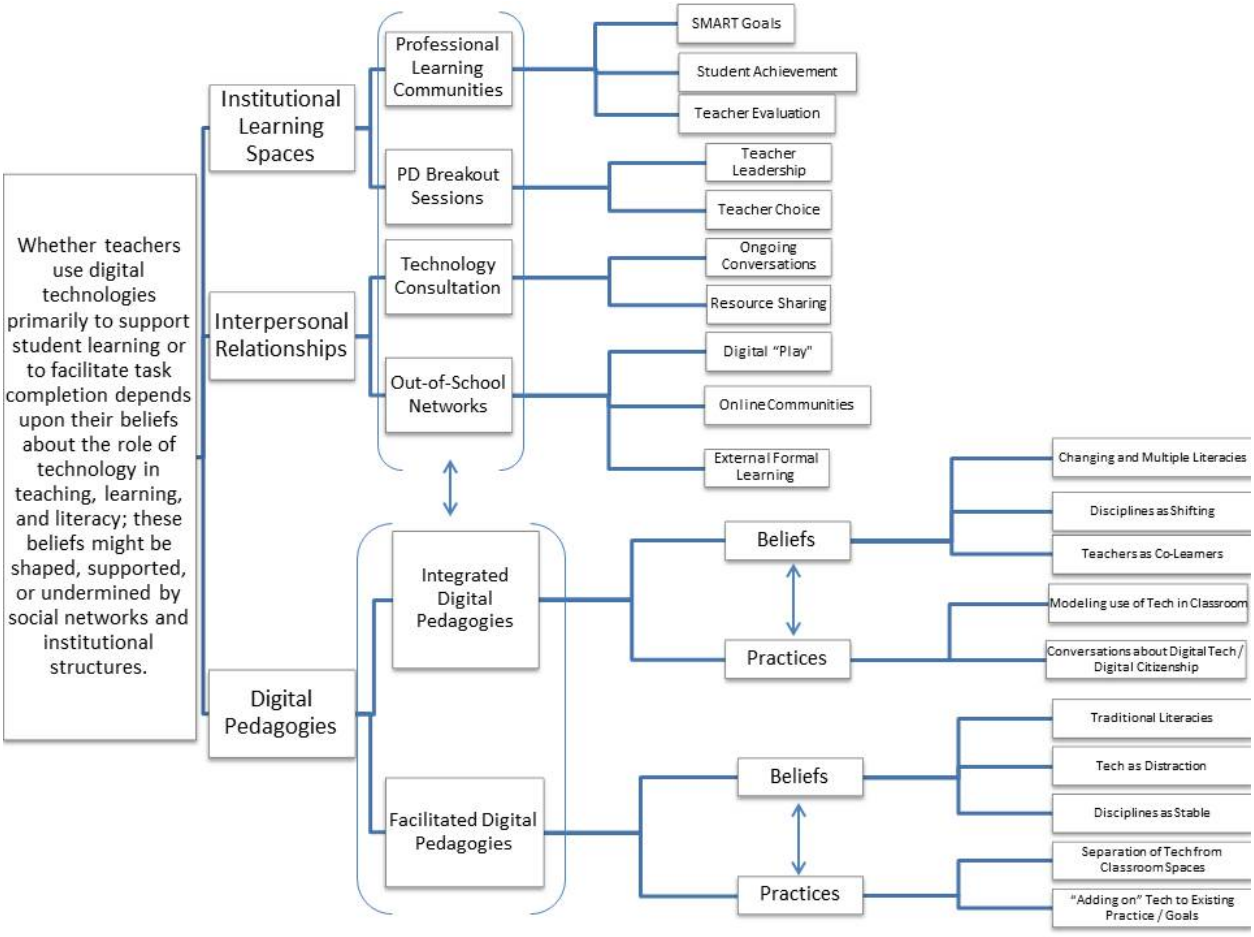
However, as Corbin and Strauss also note, there are obvious practical limitations to this approach; in my case, I only spent time Borealis for a single semester, and new questions continued to surface during the process of data analysis, after my official data collection period had ended. Thus, it was to some extent impossible for me to reach complete "saturation." Furthermore, constraints on my time did not allow me to do as much analysis in between data collection periods as I would have preferred, limiting the degree to which I could use analysis to guide collection of data. I mention theoretical sampling here not to suggest that my methods align perfectly with grounded theory approaches to qualitative sampling and analysis, but instead to emphasize my approach to data collection and analysis as mutually informed and iterative – as I observed and talked to teachers, I was also analyzing data and memo-ing about key issues that arose in order to analyze what themes and concepts were emerging related to digital literacy learning and digital pedagogies. As I collected data, I returned to those themes in observations and interviews in an attempt to better understand teachers' beliefs and practices from their perspectives and based on their concerns.

At the conclusion of data collection, I continued writing memos and engaging in open coding, or "delineating concepts to stand for blocks of raw data" (Corbin and Strauss, 2008, p. 195). My explicit focus during open coding was on teachers' talk about technology – specifically, I focused on what they said about their uses of digital technologies; about students' uses of technologies; about where, when, and why they used various technologies; and about

how their colleagues used or shaped their uses of technologies. As I engaged in this open coding, several categorical themes began to emerge related to resources, digital literacy practices, pedagogical beliefs and practices, teacher confidence, school values and policies, hardware and software resources, and intangible resources like connections with others and time to experiment.

Once these smaller categories had emerged, I began axial coding, or grouping various codes and concepts into major categories (Corbin and Strauss, 2008, p. 195). I did this by reading through data multiple times, pulling quotes that fit into various categories and examining them alongside one another, and refining categories as they developed. For each major category, I developed a "master memo," which I would add to after each data analysis period. I added to these memos as I added examples to each category, incorporating the examples and connecting them to relevant literature. I would often spend a single data analysis session analyzing interviews and observations with a focus on a single category, after which I would write about my findings and impressions from that reading session in each category's "master memo." In between analysis sessions, I searched for relevant literature on each of the major themes and tied previous research to my evolving findings. During the axial and categorical coding process, I began to map connections between major concepts in a key linkage chart, which illustrated the connections between major concepts and codes in my analysis (see Figure 2.1):

Figure 2.1: Key Linkage Chart



As I wrote about my findings in memos and ultimately in this dissertation, I revised the key linkage chart and the connections between major categories in order to develop the major argument of the dissertation as a whole and the arguments of its individual chapters.

Quantitative Data Analysis

I began conducting statistical analyses of quantitative data primarily after the conclusion of the first round of surveys, using preliminary analyses to guide early qualitative data collection. For example, I used English teachers' responses on the survey to guide my development of interview questions in department mini-interviews. Using teachers' reported network connections, I created early network graphics after the first round of data collection, which

helped me identify teachers whose colleagues perceived them to be "digital experts" in two other academic departments: the math department and the science department. I later interviewed these participants. At the conclusion of data collection, I conducted multiple statistical analyses, including selection model refinement, in order to triangulate interpretations and findings from qualitative data and to identify trends in teachers' network connections and uses of digital technologies.

Observations and conversations at BHS, in addition to the existing research on teacher networks and uses of technology in the classroom, led me to develop the following hypotheses about teachers' social networks and digital pedagogical practices. These hypotheses guided my quantitative data analysis:

1. Teachers will use digital technologies more often in the classroom if they use these technologies in their daily lives, outside of the classroom.
2. Teachers' participation in formal communities will overlap with their informal collegial networks, and vice versa.
3. Teachers will use digital technologies more often if and when the space of the school allows for the equitable and efficient distribution of tangible and intangible resources.

I discuss findings related to each of these hypotheses in the chapters that follow, particularly in Chapters 3 and 4, where I present statistical models and data findings to support all three hypotheses.

Clustering and Network Graph Analysis

As social network researchers, anthropologists, and psychologists across fields have shown using various methodological and theoretical approaches, individuals are likely to take up (or to shape) the beliefs and practices of those in their primary social groups (Frank, 1995;

Scribner and Cole, 1981; Heath, 1983). Frank (1996) illustrated that teachers at one school formed networked social groups first by race and gender, and then based on subject matter and proximity to other teachers (p. 107). If indeed individuals shape their behaviors based on the characteristics, behaviors, and expectations of peers and others in their contexts (and vice versa), then it stands to reason that analysis of the cohesive subgroups of teachers at BHS could reveal how teacher relationships and uses of digital technologies are connected and mutually informative.

There are multiple ways to conduct analyses of subgroups and clustering using social network methods (Frank, 1995); for example, one might examine the structural equivalence of actors in a network, focusing on the roles actors play and how these roles define actors' interaction patterns (e.g. Neal et. al., 2011). Conversely, one might define groups using metrics such as transitivity or reciprocity, measures that tell the researcher the level of cohesiveness within any particular subgroup of actors. High reciprocity and transitivity patterns often indicate the existence of cliques, or dense subgroups of individuals who are highly connected to one another within the larger network (Wasserman and Faust, 1994). Many different algorithms, and associated software programs, exist to estimate and define subgroups within a network and each of them use different metrics of "group-ness" (my term) to place boundaries around connected subgroups within a network. The measures and approaches used to define these boundaries vary based on the researcher's disciplinary focus and research goals.

In order to ascertain both whether BHS teachers have established statistically significant social subgroups and whether these subgroups play a role in shaping (or being shaped by) their digital practices, I used Frank's (1995, 1996) algorithm in which a parameter, Θ, is "associated with the increase in the probability that two actors interact if they are members of the same

subgroup" (p. 97). According to Frank's algorithm, maximization of this parameter, which is based in participants' choices of others within their network and the density of ties within the subgroup, indicates strong cohesion within a subgroup. At maximum Θ, in other words, the algorithm has identified groups in which individuals are most likely to have ties with the largest number of actors in the same subgroup, and least likely to have ties with individuals outside their subgroup. If Θ is statistically significant, there is evidence of clustering in the network that is unlikely to have happened by random chance. I analyzed all three of the networks I collected (two consultation networks and one close colleague network) for evidence of clustering using Kliquefinder (Frank, 1995) to estimate Θ, and then analyzed teacher "clusters" for qualitative characteristics that explained how teacher network dynamics reflected both teacher learning spaces (like PLCs) and teacher practice.

Frank has also developed methods for visualizing subgroup data using Kliquefinder and Netdraw (Borgatti, Everett, & Freeman, 2002), a network visualization software. Kliquefinder defines the clusters using the aforementioned algorithm, at which point the researcher can adjust the visualization to show interactions between and within cohesive subgroups identified by maximizing Θ. These visualization analyses allowed me to examine the characteristics of subgroups at BHS; notably, how teachers group themselves (i.e. based on factors like departments, gender, uses of technology), and where perceived technology "expertise" lies in BHS networks. Such visualizations are minimally informative without additional analyses, however, such as qualitative observations, interviews, or quantitative model refinement, all of which I used to triangulate my interpretations of network visualizations.

Modeling Selections of Friendship in Teacher Networks

In addition to visualizing networks and defining social subgroups, analyzing network data can also allow a researcher to examine and predict trends in networks in order to foresee particular network outcomes or to develop causal inferences. Two such modeling methods, selection and influence modeling, allow one to examine how a network might influence a behavior (e.g. Frank et. al., 2011; Lewis, Gonzales, & Kaufman, 2011; Penuel et. al., 2009) or how individuals within a network might select friends (or experts, or collaborators, or spouses) based on demographic or behavioral characteristics (e.g. Crosnoe et. al., 2008; Frank & Fahrbach, 1999; McPherson, Smith-Lovin, & Cook, 2001). I used a P2 model, refined in StOCNET (Huisman & van Duijn, 2003), to develop a multi-level model that accounted for the frequency of nominations received and sent by participants as well as a nominator-level dummy variable to control for whether individuals in the model participated in the network survey at time 1 (see Figure 2.2). This model controlled for variances in nomination frequency among teachers and discrepancies in the data related to whether teachers participated in the survey.

Figure 2.2: Model Predicting Teacher Close Colleague Ties as a Function of PLC Membership, Gender, and use of Web Technologies

Level 1:

$$log\left[\frac{p(i\,nominates\,i'\,as\,a\,close\,colleague)}{1-p(i\,nominates\,i'\,as\,a\,close\,colleague)}\right] = \alpha_i + \beta_{i'} + \theta_1\left|use\ of\ web\ tech_{\ i} - use\ of\ web\ tech_{\ i'}\right| + \theta_2[i\ and\ i'\ are\ same\ gender] + \theta_3[i\ and\ i'\ are\ in\ same\ English\ PLC] + \theta_4[i\ and\ i'\ are\ in\ same\ Math\ PLC] + \theta_5[i\ and\ i'\ are\ in\ same\ Science\ PLC] + \theta_6[i\ and\ i'\ are\ in\ same\ Special\ Education\ PLC] + \theta_7[i\ and\ i'\ are\ in\ same\ Social\ Studies\ PLC]$$

Level 2a (nominator):

$$\alpha_i = y_{\alpha 0} + y_{\alpha 1} Participant\,Y/N_{\ i} + u_i$$

Level 2b (nominee):

$$\beta_{i'} = y_{\beta 0} + v_{i'}$$

My second hypothesis posits that teachers' engagement in formally-defined, or institutionally-defined, communities (such as PLCs or other PD groups) would shape their interpersonal interactions and ties with colleagues in their school. In other words, I predicted that teachers' social networks would be shaped by their participation or membership in particular institutionally-defined spaces. This selection model tests this hypothesis by predicting that teachers' "close colleague" relationships are a function of their gender, their self-reported frequency of use of digital technologies, and their PLC membership. I chose these variables based both on my focus on digital technologies as well as preliminary analysis of relevant variables, such as gender, which was correlated with teachers' departmental affiliations. My method for defining PLC variables enabled me to analyze not only whether PLC membership

was predictive of collegial ties, but also the predictive strength of membership in particular departments and PLCs. Instead of developing a single dyadic network covariant indicating whether teachers were in the same PLC, I divided this covariant up into multiple variables indicating whether teachers were in the same PLC and department. This allowed me to compare, for example, the strength with which participation in math PLCs was a stronger or weaker predictor of friendship than participation in English PLCs or science PLCs. I share my reasons for analyzing PLCs and teacher networks departmentally as well as the results of my model in Chapter 3, where I make the argument that particular departments had a stronger tendency to "cohere" when they focused on alignment of curriculum, whereas other departments tended to "bridge" across social subgroups and departments when their PLCs were more thematically-focused.

Conclusion: An Iterative Approach to Complementary Methods

As I noted earlier, my organization of this chapter may lead the reader to perceive my collection and analysis of quantitative and qualitative data as separate, distinct processes. However, I have separated my discussions of qualitative and quantitative data here only for the sake of clarity and ease of reading; in fact, these processes were intertwined throughout my data collection, analysis, and writing. Each research question was in some way addressed by both qualitative and quantitative data, though some questions were more heavily reliant on one or the other (see Appendix 2.1). Though the methodological approaches of qualitative and social network research hail from very different traditions and theoretical trajectories, they were perpetually in conversation with one another throughout this study.

Take, for example, Question 1b: "How do the characteristics and structures of teachers' social groups correspond with teachers' digital pedagogical beliefs and practices?" This question

calls on me to use both network data (to define the characteristics and structures of teachers' social groups) and qualitative case study data (observations of teachers' uses of technology in the classroom and interviews in which teachers express their beliefs about technology's role in the classroom). In addressing this research question, I spent time defining, based on the literature and on my data, what a "digital pedagogy" might look like: what is "digital pedagogical practice" in the classroom? I compared my interpretations to teachers' reported uses of digital technologies on the survey, asking what "types of uses" might characterize a "digital pedagogical practice." I then examined teachers' belief statements from interviews, as well as their written responses on the survey, to find what was important to teachers when it came to incorporating digital technologies. I compared these findings to what I had observed in teachers' classrooms: are teachers' beliefs reflected in their pedagogical practices? Throughout this process, I compared English teachers' beliefs and practices with those of their peers: what beliefs and practices are shared at BHS? How are they different? Examining survey data, I looked for patterns across departments or across cohesive subgroups of teachers; do teachers in the same social group tend to express the same obstacles with, benefits of, or apprehensions about digital technologies? As I discuss further in Chapter 5, it soon became clear to me that, at least at BHS, teachers' digital pedagogies were intertwined with other pedagogical practices, not separate from discipline-specific pedagogical approaches like "process-based writing" or "student-generated discussions," and that teachers who shared similar beliefs related to digital technologies were more likely to borrow and emulate the practices of one another and to form both groups of friends and professional, formal group units (like PLCs). As I hope is clear from this example, my work with social network and qualitative methods was highly blended, in that the two methodological approaches were treated as equal contributors to the findings of the study, data

collection and analysis processes took place concurrently, and concepts were connected during analysis (Greene, 2007, p. 125). In the following chapters, I will present my findings in much the same way that I have collected and analyzed my data, blending statistical network findings with descriptions of moments from interviews and observations.

Chapter 3: "There's not a space for it:" Institutionalized Learning, Digital Integration, and Teacher Social Networks

> *I don't totally feel disvalued and stuff, obviously [one teacher] and I met and talked about things we're doing together, and… we all collaborate. I just don't, I don't think that people want that, they don't want the challenging conversations that I have with people [outside of school]. So, there's not a space for it. I do think we're on the cusp of some of this stuff, like really close, there are people who would push me forward.* – Borealis English Teacher and Focal Participant, May 2013

Once a month on a Wednesday afternoon, Borealis students were released early and Borealis High School teachers would gather in small groups with their colleagues in their "Professional Learning Communities," or PLCs, a professional development format that had been instituted at Borealis a year and a half prior to the start of my study. The Borealis Principal, Principal Jameson, cited DuFour et. al.'s (2010) PLC model as the one Borealis followed, a popular text targeted at administrators that describes a rapidly-growing approach to teacher professional development. PLC concepts are similar to Lave and Wenger's (1991) Communities of Practice theory, but with significant revisions for school settings, as I discussed in Chapter 1. DuFour et. al. (2010) offer a definition of PLCs as "an ongoing process in which educators work collaboratively in recurring cycles of collective inquiry and action research to achieve better results for the students they serve" (p. 11). According to Dufour and his colleagues, who have been widely cited in the literature on learning communities and whose resources and strategies have been purchased and adopoted by administrators worldwide, in "ideal" PLCs, teachers trouble their own practice, asking questions about how their teaching approaches impact student

achievement. They compare data from their classrooms, considering what this data tells them about their practice. They develop instructional interventions and assess the interventions' impact on student learning and performance on various types of assessment, both formative and summative (DuFour et. al., 2010). However, as I will argue in this chapter, these "ideals" are difficult to realize in schools when PLC organization and teacher goals are in tension with one another. Further, at least at Borealis, PLCs were structured primarily around the "ends" instead of the "means" – on student achievement gains and teacher evaluation – which ultimately promoted the use of digital technologies to collect and manage student data and assessments and to organize courses, instead of promoting discussions about teaching that fostered integration of digital technologies into content for the purposes of engaging students in digital literacies.

In this chapter, I will analyze Borealis High School primarily at the "institutional" level, treating "institutional" values as the concerns of the state, district, or school – larger entities to which teachers regularly needed to answer in evaluations or in conversations with other teachers or their principal. I will describe how professional development at Borealis was institutionally organized and how this organization corresponded with teachers' existing networks. Finally, before moving on to discuss specific examples of teacher practice and network connections at Borealis, I will argue that multiple interrelated institutional factors – including teacher networks, PD goals and organization, and implicit institutional values – ultimately promoted facilitative digital pedagogies over integrative pedagogies. My analysis of Borealis networks alongside institutional learning in this chapter suggests that in schools where "student achievement[1]"

[1] I place this in quotes here because I use the phrase "student achievement" not to refer to what those words literally mean, but to what they have come to mean in the current political climate in the United States. Student achievement, as used by DuFour et. al. (2010) and by many members of the secondary community, has come to mean high performance on standardized and often high-stakes measures, such as standardized tests. "Student achievement" levels are often ascertained through analysis of student performance data, and while it certainly can be used formatively to inform practice, such measures are often used to grade schools and evaluate teachers, according to recent laws passed in Michigan, Indiana, and other states around the country.

becomes the primary focus of teacher professional development, attempts to engage in innovative classroom practices and creative integration of digital technologies may be stifled.

Professional Learning Communities, Professional Development, and Teacher Leadership at Borealis High School: An Overview

When it came to how PD was structured at Borealis High School, administrators combined full-faculty sessions with departmental meetings, professional learning communities, and faculty breakout sessions. Each of these types of PD fulfilled a particular purpose and spoke to the implicit and sometimes explicit values of Borealis leadership. Here, I will focus primarily on PD break-out sessions and PLCs, which were given the most emphasis by Principal Jameson in my meetings with her and were where teachers spent most of their PD time. Principal Jameson first described the school's approach to PLCs in relation to state teacher evaluation guidelines, which required teacher evaluation to be based on student achievement. In an interview with me, she defined the goals and purposes of PLCs as follows:

> PLCs are really an opportunity and time built within the school day for teachers to collaborate, and the collaboration is not supposed to be focused on activities but really focusing on results and looking at student achievement.

This "focus on results" and "student achievement" took the form of SMART[2] goals, in which teachers articulated goals for student achievement. SMART goals were common across a PLC: every teacher in a PLC had the same SMART goal, and the goal of PLC groups was to help everyone in the PLC reach that goal. For example, the SMART goal for one mathematics PLC was "To increase the percentage of students that earn at least a 70% on the semester final exams

[2]SMART stands for specific, measurable, achievable, relevant, and time-based. This acronym has been used across disciplines and professional settings as a heuristic for effective goal articulation.

demonstrating mastery of the Learning Targets for Algebra 1." The principal went on to explain the kind of work she hoped would go on in PLCs:

> Everyone wrote a SMART goal for their PLC work. […] PLCs are really looking at data, they're looking at student achievement, but more specifically they're looking at, "what do I want a student to learn, how will I know if they learned it, what am I going to do if they don't, what am I going to do if they attained that level of proficiency, and extend it for that student."

The Borealis approach to PD that standardized SMART goals across PLCs runs counter to some literature on PLCs and their organization; for example, Dooner et. al. (2008) analyzed PLCs in which teachers work towards their own distinct instructional goals in a collaborative space that also shares a common mission. Whether or not individual goals should be aligned or diverse within professional learning communities is unclear in much of the literature; many models argue that both are important (e.g. Dooner et. al., 2008; Hord, 2009; Lee & Shaari, 2012). Though Borealis English teachers had different goals for their own classrooms – for example, Kristin wanted to expand discussion through the use of online forums, while Mary wanted to improve peer feedback through the use of online peer review software – these teachers articulated the same SMART goals for their evaluations. Teachers' articulation of common classroom outcomes for evaluation, as I will argue in Chapter 5, masked some of the unique digital integration approaches of teachers in the English department. Furthermore, the need to develop single common goals contrasted with the value administrators placed on teacher experimentation and integration of digital technologies, and foregrounded the need for teachers to demonstrate improvement on single, standard measures on assessments.

In general, the response to PLCs among teachers at Borealis was positive. The teacher whose quote opens this chapter was friends with many of the teachers in her Digital Literacies (or DigLit) PLC, the group in the English department whose meetings I observed monthly. She nominated many of her PLC members as "close colleagues" on her survey, she maintained connections with them online via social media, and I frequently observed her socializing with members of her PLC in the lunchroom, lounge, or hallways. Indeed, though much of the DigLit group's PLC time was spent attending to school business, teachers always found the time during these meetings to catch up with one another, tell a story from class, ask about one another's children, or discuss their weekend plans with one another. In my survey of teachers across the school in January, 96% of teachers reported having positive relationships with individuals in their PLCs, and many reported that their PLC members helped one another beyond PLC time. Overall, the sentiments individuals expressed on surveys and in interviews with regards to PLCs cast them positively, as a "better way" to do professional development than models teachers had previously experienced.

In recent years, Borealis has also focused on giving teachers leadership roles within the school. Mary described the school's approach to teacher leadership compared to former models in which decisions were made primarily by administrators:

> …many people have hands in the pot, because we have these ad-hoc committees and so we have a lot of people involved. Years ago […] it was like administrators met in someone's house for a few hours in the summertime and pieced it together. Now when we develop a team, like an ad-hoc committee, we talk about getting across departments and making sure we have equal representation. Whose voice haven't we heard for a while, or who would be a good voice to pull in on this?

At Borealis, teachers had regular opportunities to become members of ad-hoc committees committed to addressing issues within the school, from reading across the content areas to communication with parents. They were provided with substitute teachers on days they met with committees and were called on to make recommendations to administrators and colleagues. In addition to serving on ad-hoc committees and choosing their PLCs and SMART goals, teachers participated in all-day professional development workshops (PD days). During my semester at Borealis, parts of these PD days were dedicated to teachers' digital learning. Breakout sessions were practical workshops on how to use popular digital technologies in the classroom; those that I observed first explained what a technology was and what it did, followed by a quick tutorial to help teachers get it set up and a few moments for teachers to work with it on their own. One breakout session focused on Quia, an online assessment tool, another on GoogleDrive and Blogger, and another on "cool tools" like PollEverywhere, Prezi, and Evernote. Teachers and administrators led these sessions, and teachers chose which session to attend. Such sessions illustrated the importance of digital integration for Borealis administrators and teachers alike, but because sessions were short and infrequent, they often focused on "how to use" a technology, with little attention to how the technology enhanced or addressed students' digital learning.

The professional learning and teacher leadership structure at Borealis gave teachers many opportunities for inquiry and research; allowed time for learning, questioning, and reflecting; encouraged teachers to plan and collaborate with colleagues; and left room for teachers to make their own decisions about how they contributed to and participated in school leadership. When it came to digital integration, in particular, teachers had significant autonomy: they were able to make many of their own decisions about what hardware they wanted in their classrooms, what tools they wanted to learn about, and what technologies they wanted to integrate into their

instruction (and *whether* they wanted to integrate). However, despite this autonomy, teachers at Borealis were not exempt from the pressures of state and school initiatives to tie teacher practice to student data for purposes of teacher evaluation. As I will show in the sections that follow, this ultimate purpose of PLCs – to collect and record student data for evaluation purposes – ultimately promoted facilitative uses of digital technologies to "get stuff done," eclipsing how digital technologies might transform pedagogy or how different uses of technologies might shape students' in-school literacy experiences.

Because Borealis teachers and administrators placed much value on teacher choice, learning, leadership, and digital integration, the experiences of Borealis High School teachers can reveal much about how schools might structure PLCs or similar professional development models to foster teachers' digital learning and digital integration. Analysis of Borealis' institutional organization suggests that the organization of PD has the potential to shape how teachers think about and integrate digital technologies, and that the ultimate goals of PLCs play a significant role in promoting either facilitative or integrative digital pedagogies. In the sections that follow, I first describe the institutional value tensions that I observed at Borealis High School, and then analyze how these tensions ultimately resulted in PLC and PD opportunities that indirectly promoted skills- or function- based uses of digital technologies across Borealis.

Digital Diversification at Borealis High School

When I initially approached the Borealis principal about conducting my dissertation research at her high school, she was motivated to participate in the study so that she could learn more about how teachers at Borealis were using digital technologies in their classrooms. She spoke each time we met of her desire to increase teacher uses of digital technologies, to encourage integration of technologies into teacher practice, and to encourage teachers to learn

about and experiment with new technologies both in their classrooms and during times set aside for professional development. In a recorded interview at the conclusion of the study, she identified increased technology integration as an ongoing and important process for Borealis teachers:

> I think we can continue to improve our use of technology across the board. […] We have pockets, pockets that are really excelling and collaborating, and that sort of thing, but they're still pockets, it goes back to that time and professional development.

In multiple conversations with Principal Jameson, she acknowledged the presence of "pockets" of teachers who were interested in and actively integrating technology into their teaching. It was her hope that these "pockets" would expand and share their resources, encouraging more teachers to integrate technologies into their teaching. One of these pockets was the DigLit group, and the principal encouraged the expansion of this "pocket" of knowledge by inviting teachers in the group to present to their colleagues about their uses of particular technologies. The move to include teachers as leaders in breakout sessions reflects the administration's goal to increase collaboration and to spread digital integration and innovation via shared learning experiences across departments.

Teachers at Borealis similarly valued learning about and implementing digital technologies; when the principal asked teachers on a survey what they wanted to focus on in PLCs, faculty identified two primary concerns: meeting the needs of diverse students and digital integration. For administrators and teachers alike, finding ways to use and implement various digital technologies was a major goal. Borealis administrators therefore diversified the available options for learning and the available technologies teachers could access, and granted teachers the freedom to learn and experiment on their own and then bring their expertise into the school.

Teachers could choose, for example, whether they wanted Smart Boards or tablet computers in their classrooms. They could apply for mini-grants to gain access to technologies like ELI, a peer response software, or Spruz.com, an online social networking tool used by many members of the English department to moderate discussion forums. Teachers had the flexibility to design course websites using the school's purchased software, School Center, or to experiment with other authorship platforms such as WordPress or Google Sites. They were encouraged to find and experiment with educational apps, and a few teachers even maintained partnerships with local software companies or university research teams dedicated to developing educational programs and resources for teachers. These connections resulted in a variety of available web and software programs, apps, and hardware to which Borealis teachers had regular access and exposure. Such access indicated the importance Borealis faculty placed on not only digital integration, but also *digital experimentation,* diversifying the possibilities for instruction in teachers' classrooms and encouraging varied use of technologies within and across disciplines. Digital experimentation is not always an included component of moves to integrate digital technologies in schools; many studies have examined schools in which teachers are presented with a single platform or tool that they must use (e.g. Keengwe, Schnellert, & Mills, 2012; McGrail, 2006), instead of systems in which teachers are exposed to multiple technologies and are given the freedom to choose which tools and platforms work best. Borealis's approach, in contrast, gave teachers the agency to make decisions about what technologies might best fit within their existing pedagogical practices, which McGrail (2006) argues is one necessary element of successful technology initiatives.

Beyond access to and knowledge of various apps, web programs, and software programs, Borealis teachers also had a diversity of learning options available to them when it came to professional development. Teachers could request a day with the district technology coordinator

to learn about a particular technology and how others were using it in their classrooms, as a few English teachers did to learn more about Camtasia and Edmodo. Teachers were also given the option, on a PD day in November and another in February, to attend one of many "breakout sessions" on particular technologies. Teachers were provided with a list of options in an email from the principal, from screen capture software such as Camtasia to online assessment tools like Quia, notetaking and annotation tools such as Evernote, polling sites like PollEverywhere, as well as the various options available in Google's Apps for Education. Borealis teachers and administrators led these sessions. Teachers from multiple disciplines attended single sessions, learning how blogs might be applicable in the mathematics classroom or social studies classroom or how Google Docs might streamline their course organization. This approach to professional learning had the potential to diversify teacher pedagogy by encouraging teachers to reimagine how they approached, for example, their assessment of student writing through the use of digital tools. It also brought together teachers from multiple disciplines and social subgroups in a single learning space, unlike PLCs, which were discipline-, and in some cases course-, specific.

Because PD related to digital technologies was organized as a space in which teachers acted as peer leaders and teachers attended sessions with individuals from multiple disciplines, these PD sessions had a "bridging effect" on teacher relationships throughout the school. By this I mean, teachers were more likely to reach outside their existing friend networks and typical collaborations with colleagues when it came to using digital technologies. This diversifying effect was evident in teachers' social networks, which indicated that while teachers most often collaborated with colleagues in their academic departments when it came to curriculum, they were just as likely to reach outside their departments to consult about digital technologies as they were to consult with someone within their department (See Table 1).

Table 3.1: Distribution of Nominations Made Within and Outside Departments Across Borealis Social Networks

Network Type	Nominations made within departments	Nominations made outside departments
Technological Consultation	53.4%	47.6%
Curricular Consultation	61.1%	38.9%
Close Colleagues	52.5%	47.5%

Breakdown of the percentage of colleague nominations made within and outside of Borealis teachers' core academic departments. Curricular consultation happened largely within departments, while digital and close colleague consultation spanned departments.

That teachers were more willing to cross disciplinary boundaries to consult about digital technologies is not surprising, because full-faculty professional development sessions at the high school encouraged such interactions across departments. The diversity of available options and the structure of learning opportunities on PD days communicated to teachers that digital technologies were not necessarily discipline-specific and that which technologies to implement and how to implement them was largely a matter of teacher choice and creativity, again positioning digital and pedagogical experimentation as an institutional value of the school and reflecting Principal Jameson's desire to "spread" the knowledge of tech-heavy "pockets" of teachers.

However, despite the value teachers and administrators alike placed on digital experimentation, survey results indicated that many teachers at Borealis remained resistant to digital integration or struggled to understand how digital tools might support their curricula (see Table 3.2). As the teacher who opens this chapter notes, many teachers at Borealis found it difficult to "make a space" for critical conversations about and varied approaches to integrating digital technologies, in part because they felt that time did not allow for such conversations in the midst of other responsibilities.

Table 3.2: Average Frequency of Reported in-Class Use of Web Technologies

Digital Technology	Average Frequency of Use among Borealis Teachers
Blog Platforms	1.5, never-rarely
File Sharing	2.3, rarely
Web Design	1.9, rarely
Social Media	1.5, never-rarely
Video/Photo Sharing	2.8, sometimes
Web Assessment	2.5, rarely-sometimes
Online Presentation	2.1, rarely
Screen Capture Technologies	1.8, rarely
Digital Notetaking	1.5, never-rarely
Drive Backup Services	1.7, rarely
Course Management Systems	1.5, never-rarely

Average reported use of web technologies across Borealis High School indicates relatively infrequent use of most digital technologies. Numbers and text represent the extent to which Borealis teachers reported using web technologies from (1) never to (5) always.

I will argue that this tension between what teachers wanted to do with digital technologies and their actual reported uses of those technologies may have been the result of conflicting demands on Borealis teachers and administrators. However, I first want to take a moment to trouble what might be a too-simple representation of the Borealis mission to diversify and expand teachers' experimentation with digital technologies. It is perhaps tempting to interpret this diversification of digital tools and digital PD opportunities as wholly positive for Borealis teachers; it is hard to imagine how discussing and sharing resources across disciplines might be a "bad" thing. However, at times, this diversity of available options for digital integration was overwhelming or downright frustrating for Borealis faculty. The rate at which new technologies were offered up as possibilities for teaching sometimes left Borealis teachers feeling as though they would never catch up. One teacher wrote in her survey, "I end up feeling anxiety because there is so much new technology coming at me with little time to incorporate it with a level of knowledge and confidence." Other teachers lamented the number of passwords and logins students needed to

keep track of as they navigated from one course to another, like this teacher, who struggled with the diversity of options and wished for a more "streamlined" system:

> I really just wish the district would mandate something. I'm really frustrated when it's left up to us because then a kid has six different logins and passwords every day, or twelve, and that's what sort of frustrates me about the technologies being used right now: it needs to be streamlined. And I'm sort of afraid to jump on any one bandwagon because I know that in a couple years it's going to shake out, and they will mandate it. I mean maybe I sound wrong for hoping that, but I really do. I want every kid to have the same sort of system that they're using. If it's Google Docs, great, just tell me.

This teacher's frustration was echoed by focal participants and by survey responses, where teachers reported struggling to find the time to learn how to work with the myriad options available to them. Many teachers indicated being "interested" in particular technologies – in particular Blogger and Camtasia – but were worried about the time it would take to learn how to use and set up these technologies with no guarantee that the tool would ultimately integrate well into their existing practice. This is all to say that though a "diversity of resources" might sound like a "good thing" for teachers, it has the potential to be very overwhelming and even anxiety-inducing.

Furthermore, as I have noted, just because teachers at Borealis were encouraged to experiment with new technologies in their pedagogy did not mean that conversations in PLCs promoted this diversification of teacher practice or teachers' digital learning. In fact, most DigLit PLC sessions focused primarily on tasks teachers needed to complete for bureaucratic or course-management reasons, such as developing course websites to disseminate information to students and parents or completing forms for teacher evaluation and end-of-year reflections. I observed

three meetings of the Digital Literacies PLC during my semester at BHS, and each of these PLC sessions had a different focus: none of the sessions directly focused on sharing data from teachers' classrooms or analyzing such data in order to change practice (the stated expectations of the principal). Furthermore, these sessions tended to silence the "critical conversations" mentioned by the teacher who opens this chapter. For instance, in the first DigLit PLC session I observed, one teacher shared a course website she had developed that integrated student blogs, discussion forums, course readings, and class announcements. As she spoke and shared the features of the site, most teachers sat silently, while others asked questions about how she had incorporated certain features and/or worked on composing or changing their own course website. The primary focus of this PLC session was on the development of a few teachers' functional knowledge of Google Sites[3]. In the following exchange, which I choose as a representative example typical of sessions in which teachers discussed digital tools, three teachers in the DigLit PLC share different approaches to organizing student response forums:

Allison: Sarah, I have a question. Did you have them respond directly—you created the topic and they just replied to it?

Sarah: Mmm-hmm

Allison: I found that more difficult to keep track of.

Sarah: How did you do it?

Allison: That's how I did it but what I think I might do in the future is put the topics at the top because you know that's a regular page. You can put in your own text and then have them create a new topic on their own so that

[3]During the session I observed, three teachers dominated most of the conversation, accounting for about 95% of transcript speech, while other teachers remained silent. While the quieter PLC participants may have been engaged in the larger discussion, this was difficult for me to ascertain without disturbing the space of the PLC. The other three participants in this PLC session worked on their laptops around the room and occasionally entered the discussion.

their name is their response. And then you can search by student because you asked them to put their name as the subject.

Sarah: The problem is that—like, right now, these four—oh, I'm moving my cursor like that so I can do something up there. These four run simultaneously, so I don't know how—

Allison: I don't know.

Michelle: Oh, I see what you're saying, yeah.

Allison: I know, but I think I would just say—I think I would just have them at the top—

Here, Allison, Sarah, and Michelle are sharing different ways of organizing a digital space (Google Groups) in order to streamline student assessment within the site. However, their conversation does not revolve around those issues the principal expects PLCs to focus on – student data and pedagogical strategies. Echoing the teacher who opens this chapter, this conversation also does not focus on critical issues surrounding use of the Google space or of the forums themselves – how these forums will benefit or enhance student learning, how forum spaces will transform students' or teachers' engagement with ELA curriculum, or why "streamlining" forums with class blogs and websites is important for student achievement. Further, recalling the framework I presented in Chapter 1, the digital technology in this case acts as a facilitator of teacher tasks, allowing teachers to assess students in an online space.

In subsequent PLC sessions I observed, discussions like these decreased in frequency as teachers worked in the second session to complete paperwork for their final evaluations and in the third session to complete end-of-year group reflections on the work they had completed in the PLC throughout the year. I will explore further examples from the DigLit PLC in Chapter 4;

here, I wish to emphasize that even those PD spaces most dedicated to furthering the school's goal for teachers to experiment with and integrate digital technologies did not always allow for such experimentation or innovation. DigLit PLC members, identified as a "pocket" of digital innovation by the principal, mostly spent PLC time focusing on how digital technologies might facilitate the work of teaching. Under pressure to complete many of the tasks associated with teaching, more difficult conversations about what a particular technology contributed to student learning, or what successes and failures teachers were encountering when using the technologies with their students in their classes, were pushed aside during the very time set aside for such conversations.

This is not to say some teachers did not crave such conversations, or that teachers were not considering some of the ethical and pedagogical consequences of using digital technologies in their classrooms. However, teachers who had reservations about particular technologies and their use did not raise these concerns in professional development sessions or PLCs (that I observed). In fact, critical conversations about which technologies to use, why, or whether single technologies should be "endorsed" by either departments or the school as a whole were described by some teachers as unwelcome, or at least unencouraged, such as when the teacher who opens this chapter said "there's not a space for it." Another teacher expressed trepidation about using Google Docs, unsure where students' information "went," or who had ownership of it, once it was stored in "the cloud." However, these concerns were voiced to me in the context of one-on-one confidential interviews, not in public sessions with other teachers, where one teacher worried she would be considered a "nuisance" if she troubled the use of particular technologies. Anxiety and hesitation is expected in situations where professionals encounter new possibilities for practice, and these reactions can even be productive when they become the focal point for

conversations and teacher learning (Horn & Little, 2010). However, this was not the case at Borealis during my time there. Although Borealis teachers and administrators as a whole valued experimentation and diversification of technologies, they struggled to engage in difficult conversations about the consequences of digital integration for teachers' day-to-day interactions with students, for teacher learning, or for student privacy. While diversification, experimentation, and innovation were certainly valued at Borealis, the more difficult issues surrounding shifting teacher practice with new digital tools largely went unspoken in formal interactions, and were instead relegated to private interpersonal conversations with close colleagues, as I will explore further in Chapter 4.

Such conversations, however, were highly associated with and valued by those teachers who engaged in integrative digital practices – those practices that engaged students in conversations about and experiences with digital tools and technologies and integrated digital technologies into the content and pedagogy of the course. Those teachers who engaged in integrative digital pedagogies, as I will discuss further in Chapter 5, regularly sought out spaces where such critical conversations could be found. These spaces, as I will describe in Chapter 4, were mostly located outside of school, in institutions (like higher education) that did not place the same emphasis on student achievement and "seeing results." These teachers looked for spaces in which they could discuss innovative new ways of structuring their courses using technology. For math teacher Amanda, this included flipping the classroom; for social studies teacher Donna, creating a class blog on which students could post about current events and news stories they encountered tied to the content of the course. They also craved conversations about digital ethics and citizenship; one such ongoing conversation among Borealis faculty involved ownership and student intellectual property in Google Drive.

If Borealis teachers were interested in critical conversations about digital technologies, why were these conversations relegated to one-on-one conversations in the hallways or to outside learning spaces? Digital engagement was often positioned as "separate from" the work of teaching for Borealis educators, and this separation of digital conversations may have kept some teachers from having a space to voice their concerns to their colleagues. Donna, who was not a member of the DigLit PLC, raised this concern in one of her interviews:

> I think I'm concerned that there's a PLC for just digital literacy. I feel like that needs to be something that is across the board, and not just one group focusing on it. Like I really, I'm concerned that, I think it needs to be a little part of all of our classes. And so that there's just one group kind of dealing with it concerns me.

Donna articulated the need for digital technologies to be an *integrated* component of not only all teachers' classes, but all teachers' learning experiences within their PLCs. As I will argue further in Chapter 5, such separation of digital learning from conversations about pedagogy and content is problematic, because it positions digital technologies not as integrated components of the content-area classroom but as "extra tools" you might use to convey existing content. Thus, the very structuring of PLCs within Borealis High School suggested to teachers that engagement with digital technologies was "optional," "extra," and "separate" from their day-to-day work.

For many Borealis teachers, digital integration added "one more thing," to quote one survey respondent, to think about in the midst of planning, developing curriculum and assessments, and gathering data for end-of-the-year evaluations of their performance. It therefore became easy for Borealis teachers to focus primarily on those tasks they could use digital technologies to complete more quickly, as opposed to examining how digital technologies might transform students' understanding of and engagement with content. Additionally, as I will

discuss in the next section, the value administrators and teachers at Borealis placed on teacher experimentation and diversification of pedagogy was at times undermined by competing expectations that teachers align their goals within PLCs in order to collect and analyze student achievement data, which could have also contributed to the silencing of critical conversations even in those spaces most dedicated to digital integration. These trends suggest that even in schools where teacher exploration and action research is highly valued, conflicting institutional norms passed down by the state and integrated into school politics and culture have the potential to restructure and even confuse professional development goals related to pedagogical learning and innovation, for teachers and administrators alike.

Curricular Alignment at Borealis High School

Though Borealis teachers and administrators valued teacher leadership, experimentation, and innovation – which studies have shown increase both teacher efficacy and teacher learning (Ghamrawi, 2013; Hipp et. al., 2008) – teachers and administrators at Borealis also sought to tie teacher learning to student achievement data and teacher evaluation, which undermined teachers' abilities to challenge their existing classroom practices and instead emphasized facilitative uses of technologies. According to recent legislation from the state, Borealis and other public schools were required as of the 2011-2012 school year to evaluate educators based "in significant part" on student growth (Keesler & Howe, 2012). Schools were allowed to develop local models for measuring student growth, but this new law required schools to collect achievement data of some kind and to use this data to evaluate teacher performance. Principal Jameson's response to this legislation was to integrate data analysis of student progress into the work teachers did in their PLCs and to tie PLC SMART goals – which were used to evaluate teachers at the end of the school year – to this data collection. This meant that within PLCs, members were expected to

articulate the same goal, return to their classrooms to administer pre- and post-instructional assessments[4], share assessment data and student progress with their colleagues, and collaboratively analyze how they might change or adjust their practices to meet the needs of students. Because I was only able to observe the Digital Literacies PLC in the English department, I cannot speak to the extent to which these practices occurred throughout the school's PLCs. However, as I have noted DigLit PLC teachers often spent time either developing digital resources or working independently to complete necessary paperwork and evaluation forms.

Though Borealis teachers did not talk specifically about "standardizing" or "aligning" their curricula in interviews or on surveys, the goals teachers articulated for their PLCs at times revealed a tendency towards curricular alignment[5]. For example, in the biology PLC, one goal was to "increase scores on common semester evaluations." Common semester finals would require Biology teachers to teach similar or the same content. They could perhaps teach this content using different activities or assignments, but students would need to have had exposure to the same content over the course of the semester in order to succeed on the semester exams. The English Writing Team PLC also used a standardized assessment tool – a rubric – but the writing rubric did not necessarily require students to have engaged with the same content (the goal mentioned "various genres," not specifying a particular genre). Similarly, the

[4] These assessments took different forms across departments; for example, in the English department DigLit PLC, teachers shared qualitative rubrics that they used to assess the rhetorical effectiveness of student blog posts. In various other PLCs, such as a few math PLCs and one social studies PLC, assessments took the form of end-of-semester exams, which were largely (if not fully) multiple-choice.

[5] By "curricular alignment," I am referring to recent trends in secondary schools in which teachers who teach the same or similar courses develop a schedule for what content will be taught at what point during the school year, often with standardized assessments following each unit of study that are identical across teachers and classes. "Alignment" can happen in to varying degrees depending on the reasons for alignment; for example, in the case of purchased scripted curricula, the most extreme form of alignment, the autonomy of the teacher is void as the teacher reads a lesson from a script and uses only approved curricular materials. In less extreme forms of alignment, teachers might agree to teach similar content in different ways, to use similar assessments throughout or at the end of a unit, or to teach similar lesson plans at certain points in a unit.

Government/Economics PLC's goal to raise struggling students' grades in their courses did not necessarily require an alignment of curriculum or assessments.

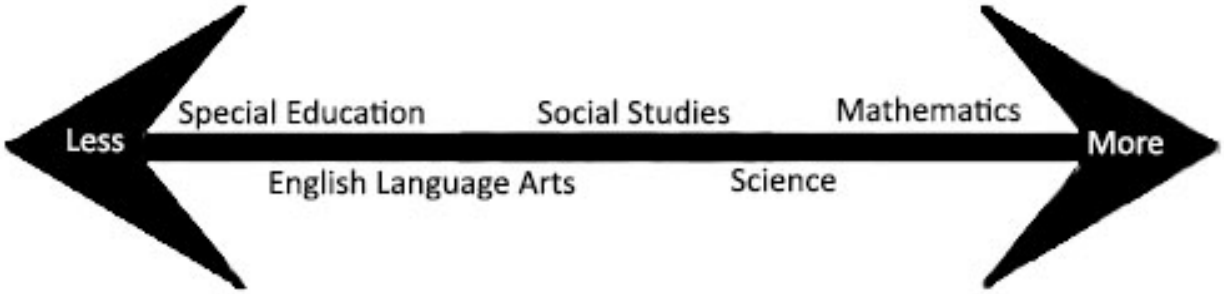
These distinctions between PLC SMART goals are subtle but important, because they carry implications for how PLC time will be spent – in those PLCs with the goal to increase scores on identical course finals, more alignment was necessary throughout the semester, requiring significant collaboration and frequent check-ins among PLC members. In those situations where common assessment tools, such as a rubric, were used in different units at different points in the semester, as was the case in the English department, teachers had more choice about when and how to collect data and did not need to "check in" with colleagues about where they were in the curriculum. This suggests that teachers in PLCs focused on alignment would need to form close ties with members of their PLCs and might be less inclined to reach beyond PLC members for resources, which indeed was the case at Borealis. During PLC time, teachers seeking to align curricula and assessments might be more likely to spend time discussing lesson plans for particular simultaneously-occurring units; conversely, teachers in PLCs focused on a pedagogical theme might share examples from diverse units and discuss ways to adapt those methods to different content. Take, for example, Donna's description of her PLC time with two other U.S. History teachers in a PLC dedicated to alignment and student achievement data analysis:

> I'm in the U.S. History PLC, so we're… Our SMART goal is we just created common assessments. Last year that was the goal, and this year we are working on looking at the data from those to see what sorts of items kids are having trouble with and what we can do as a team to help kids. So it's assessment driven.

She spoke multiple times of needing to "get to a certain place" in history classes, which drove the curriculum forward in a particular order, aligned with other U.S. History teachers. Such a focus on "end goals" is common in today's educational climate, where standardized test scores carry significant weight and teacher quality evaluations rely to some extent on student performance on these or other assessments. Borealis' structuring of PLC time drew on this "assessment driven" approach by tying PLCs to student achievement, potentially eclipsing – even in the DigLit PLC – the theoretical value of such communities: to learn about practice through experimentation, reflection, action research, and data analysis (DuFour et. al., 2010; Lee & Shaari, 2012).

In order to examine which PLCs were most likely to focus on alignment versus to allow for curricular diversification, I turned to the faculy's SMART goals. I coded goals based on the extent to which they appeared to focus on curricular alignment by looking for keywords that indicated whether teachers were collecting data from standardized assessments used across multiple courses. In some cases, PLC goals reflected a desire to raise scores on highly standardized tests, such as AP exams or state assessments, as in the AP Statistics PLC. In others, PLC goals revolved around common semester evaluations, such as in the US History and Geometry Honors PLCs. In yet other PLCs, goals relied not on exams, but on raising student grades in the course as a whole. And finally, other PLC goals reflected student demonstration of success at a certain disciplinary skill, such as blogging or integrating evidence into writing (as in the English department PLCs). It became apparent during coding that departments as a whole tended either to move towards or away from curricular alignment in their articulations of PLC goals; I therefore placed departments along a continuum from "less aligned" to "more aligned" (See Figure 3.1).

Figure 3.1: Departmental Tendencies Towards or Away from Curricular Alignment



As Figure 3.1 illustrates and as I will examine further in the following section, STEM discipline PLCs tended to rely more heavily on standardized exams for student achievement data in their articulation of PLC SMART goals, while ELA and Special Education teachers articulated goals tied to specific tasks or to particular student populations that did not require content-based coordination of curriculum.

Teachers' choices of digital media to use in their classrooms in some ways reflected their department's tendency towards or away from curricular alignment, and also reflected the extent to which technologies that aid in completing teaching tasks were most popular among Borealis teachers. In each department, one or two digital technologies were more popular than others – that is, teachers reported using them more often than other technologies (See Table 3.3). In the STEM disciplines, these most popular sites were online assessment sites in science and video capture sites in mathematics. Math teacher Amanda used screen capture to record lessons which students then watched at home; science teacher Ken used online assessment sites for regular quizzes. Both social studies and ELA teachers preferred media sharing sites, which they used to share videos and photos of historical events or other content with students, and which teachers felt made class more "engaging" for students. The special education department overall used very few digital technologies frequently; however, their favorites were the same quiz sites as the

science teachers, who used such sites for "data collection" and "planning future lessons," according to their survey responses. In the special education department, these sites were used to give students feedback on their progress or to help them study. Indeed, more than *which* technologies teachers chose, the ways in which and reasons why teachers used them varied across classes and disciplines.

Table 3.3: Average Department Reported Use of Popular Technologies

Content Area	Most Popular Technology	Ave. Reported Use within Department
Science	Online Assessment Sites (such as Quizlet, Quia)	3.2
Mathematics	Video Screen Capture Sites (such as Jing, Camtasia)	2.4
Social Studies	Media Sharing Sites (such as YouTube, Flickr)	3.4
English Language Arts	Media Sharing Sites (such as YouTube, Flickr)	3.5
Special Education	Online Assessment Sites (such as Quizlet, Quia)	2.8

Average departmental use of certain web technologies illustrates which technologies were most popular within academic departments, and the average reported frequency of use within that department from (1) never to (5) always.

Regardless of which technologies different teachers and departments reported using more often, all of these technologies were used primarily to do things teachers could have done in other media, but these particular applications made these tasks more efficient. For example, online assessment sites enabled science and special education teachers to access quantitative data on student progress quickly, without needing to calculate student test scores. Video and media sharing sites allowed English and Social studies teachers to access video clips quickly via the web. Rarely did teachers report using these media to engage in digital literacy instruction or to

explicitly draw students' attention to these media, though exceptions to this trend did exist, which I will describe in more detail in Chapter 5.

As many researchers have argued, the integration of new technologies and literacies is sometimes in conflict with moves towards standardization, which have the potential to limit teachers' freedom to experiment or to deviate from an established curriculum (Hicks, 2013; Homan & Reed, 2014; The National Writing Project, 2009). Though Borealis teachers were interested in integrating technology, valued the role of technology in their curricula, and were provided ample resources to diversify their approaches to curriculum through digital integration, teachers at Borealis still struggled to do so, and turned primarily to digital technologies that helped them do their jobs – which included collecting student data for PLCs – more efficiently.

Applying a Network Perspective: Networks and PLCs at Borealis High School

Borealis teachers were not told that they needed to "align their curricula," nor were they told that they needed to "experiment with new technologies" (that I observed). Instead, as I have described, these institutional expectations were implicitly communicated and were evident in the ways in which teachers organized their PLCs and articulated their SMART goals. In this section, I analyze Borealis PLC structures alongside Borealis teachers' close colleague networks in order to make the argument that institutional values, teacher collegial networks, and disciplinary epistemologies are mutually informative and intertwined within the space of professional development, and that understanding them as such has implications for how PLCs or similar teacher learning approaches are organized and theorized in schools as well as how professional learning for digital integration is conceptualized and designed.

For many Borealis departments and PLCs, monitoring student growth was accomplished by developing common assessments, as in Donna's U.S. History PLC. In order to successfully

align any curriculum to a single assessment, teachers must work closely with one another, synchronize their units and final assessments, and check in with one another regularly to ensure alignment is maintained temporally and substantively. My analysis of network dynamics across Borealis suggested that this was exactly what happened in departments where curricular alignment was common; teachers in these departments (math and science in particular) worked closely with a few colleagues in their departments. When PLC goals reflected a need to align curricula in order to accomplish the goals, teachers in those PLCs pulled together to align their curricula and assessments and maintained a high degree of overlap between their social subgroups and members of their PLCs. These network patterns suggest that in schools where "alignment" is a central goal, teachers may be less inclined to (or at least have less reason to) reach across disciplines to collaborate or share resources.

As I mentioned at the start of this chapter, academic departments at Borealis were free to choose how they would break up into PLCs. In larger departments[6], teachers had the freedom to decide how to divide themselves into PLCs, and this division took different forms. This section will describe the network effects of two different approaches to organizing PLCs in core content areas at Borealis: (1) a "bonding" effect, in which teachers shared curricular resources within small groups (often their PLCs, or their PLC and one other PLC) and fostered tight social and professional ties, and (2) a "bridging" effect, which was more common when teachers joined PLCs based on pedagogical interests and maintained more diverse ties throughout their department and the school. "Bridging" also reflected the model for PD breakout sessions, in which teachers chose which sessions to attend based on interests instead of discipline or courses

[6] In this chapter, I focus on these larger departments, or departments that had between 9 and 14 teachers. These departments included the special education/resource, social studies, mathematics, English language arts, and science departments. These departments were large enough to show significant associations between PLC organizational structures, network ties, and curricular alignment.

taught. Neither of these models is particularly "favorable" compared to another; the goal of this section is not to argue for one structure over the other. However, as I will argue in Chapter 4 and as I have argued elsewhere, teachers who regularly integrate technology into their content and instruction are often "bridgers;" they seek out resources from multiple disciplines and maintain networks across face-to-face and digital spaces (Homan, 2014). As such, schools that hope to foster digital integration might look to models that promote more "bridging" than "bonding" and "aligning" within teacher learning communities.

Notions of "bridging" and "bonding" are not new to social network analysts, who have developed specific metrics to measure such phenomena (Wasserman & Faust, 1994). To some extent, both bridging and bonding are to be expected in any network, and the extent to which networks "bridge" or "bond" can be informative for interpreting network dynamics (Granovetter, 1973). At Borealis, departments created curricular PLCs in one of two ways: (1) based on what courses they were teaching, and (2) based on common pedagogical themes, regardless of grade level or course content taught. For example, PLCs in the mathematics department focused on Geometry, Algebra, AP Geometry, AP Statistics, and Adaptive Algebra 2. In contrast, English department PLCs focused on specific themes and literacy practices in the ELA classroom. One PLC focused on the implementation of ReadOn eBooks, another on writing pedagogy, and another on digital literacies (the DigLit PLC). Within PLCs organized around literacy themes, the potential range of student abilities and literacies was broad, because teachers in the PLC taught freshmen through seniors. Similarly, conversations in themed PLCs are unlikely to revolve around a specific curricular unit or lesson; in course-focused PLCs, this might be more common, as teachers can share lesson plans or assessments for teaching specific course content,

enabling less “bridging” and more “bonding” in departments where teachers sought curricular alignment.

Network analyses across PLCs support my interpretation of some PLCs as more prone to “bonding” versus “bridging” when their goals revolved around alignment. Teachers in the math department were close with those colleagues who taught similar classes, they were in PLCs with those same individuals, and they shared more similar friendships, or “close colleague” relationships, with individuals in their PLCs. Certainly, some social overlap occurred between PLCs – especially between teachers who taught multiple courses – but math teachers’ PLCs contained primarily members of their “close colleagues” subgroups (see Figure 3.2). In contrast, English teachers engaged in more social “bridging” between PLCs as they borrowed assignments and curricular content from teachers who taught varying content and grade levels. The mathematics and English departments contained distinct distributions of social subgroup memberships across PLCs (indicated by node colors in Figure 3.2, below). There were two major social subgroups in the English department, and though each subgroup tended to have stronger representation in one or another English department PLC, members of each subgroup appeared in each PLC, as well. In other words, English teachers – unlike most of the math teachers – were not necessarily surrounded by their closest colleagues on PLC days. There were therefore more social ties between the PLCs in the English department (eight reciprocal ties between the Writing Team and the DigLit Group) than there were in the Math department (five reciprocal ties between two math PLCs).

Figure 3.2: Comparison of Math and English Department PLC Network Dynamics

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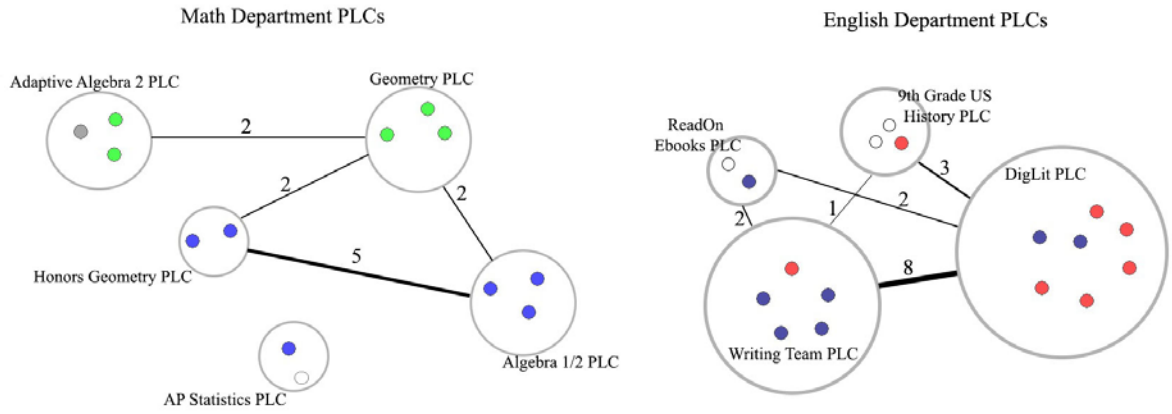


Math and English Department PLC Comparison. Node colors represent Close Colleagues Group Membership. Lines connecting PLCs represent reciprocal close colleague connections between members of PLCs (numbers indicate number of reciprocal connections). White nodes represent non-respondents or members of other departments who were part of the network. Grey nodes represent individuals who were not identified as part of the network and not participants in the study. Image created using Kliquefinder (Frank, 1999) and Netdraw (Borgatti, 2002).

This difference in social distribution did not seem to have an effect on teachers' satisfaction with their PLC time; teachers across both departments reported high satisfaction with their PLCs in survey responses. However, the spread of cohesive close colleague subgroups across PLCs in the English department indicates a distribution of pedagogical or other viewpoints, opinions, and beliefs across professional communities. Scholars have argued that such diversified access to resources and differing perspectives is more conducive to fostering learning experiences that challenge teachers' existing beliefs and practices (Dooner et. al., 2008), which is necessary if they are to take up unfamiliar technologies in ways that build students' digital literacies (Frank et. al., 2011; Homan & Reed, 2014).

Data from observations and interviews support this network-based inference; "friend groups" in the English department were split across PLCs. Within PLCs, this sometimes meant

frustration as different perspectives collided. One teacher in the DigLit PLC – the one whose sentiments open this chapter – struggled to feel as though she could challenge and question her colleagues. As I will discuss further in Chapter 4, another teacher in the Writing PLC took on an "anti-tech" identity, even though she experimented with digital technologies in her own classroom. Such interpersonal clashes, though potentially problematic for teacher efficacy, challenged teachers in the English department to reflectively consider their beliefs about the roles of particular technologies in the classroom. For example, in one interview, Allison recalled conversations with colleagues about Google and intellectual property:

> I disagree with, and I don't quite disagree, but both Abby and Linda have pointed out the idea that Google owns students' writing. And yes, I don't disagree with that, yes they do, but they've had a serious problem with Google having students' intellectual property. And I don't have that big of a problem with it. […] I can see that but it's not something I lose sleep over. I feel like the benefits of using it outweigh the possibility that Google's going to commandeer all the personal anthologies and run off with them.

Here, Allison grapples with a problem on the minds of many English teachers and others at Borealis High School, including Donna, who voiced concern about Google's ownership of student writing, but whose opposition to Google was not strong enough to eliminate it from her classroom practice. Allison attributed Abby's hesitation to use Google to what she knew about Abby's work as a published writer, but offered an explanation for why she used Google Apps anyway, even though she understood other teachers' critiques of the platform:

> Well, what's gonna happen? What's the risk? That's what I think outweighs. I think we're playing a "what-if" game, which if we continue to play the "what-if" game, we are impeding progress we can make with regards to digital literacy with these kids. When I

first got here, these kids didn't even know where to go in Microsoft Word to change the font. I mean it was like, “are you kidding? How did you get this far? You're a digital native.” So it's very clear that we need to teach them how to use tools like Google.

Whether cross-PLC conversations and close colleague relationships contributed to this ongoing discussion and reflection in the English department is difficult to say without observing other departments; however, the social structure of PLCs in the English department certainly enabled such conversations to take place. These conversations challenged teachers to question their underlying assumptions about the technologies they use, and to reflect on their rationales for the decisions they make in the classroom. However, such conversations took place not during the PLC time I observed, but in hallway conversations or one-on-one interactions, as I will analyze further in Chapter 4.

In order to further understand the network-PLC “bridging” and “bonding” trends I discovered during qualitative analysis, I turned to statistical social network modeling to determine whether teachers’ PLC memberships were correlated with their network ties. In models of network selection (p1, p2, and p* models), researchers use a logistic regression modeling approach to predict network connections based on actor attributes (Crosnoe et. al., 2008). Such techniques can be used to ascertain what actor attributes – from gender to teaching beliefs to favorite colors – are most important in the formation of network ties, or how individuals select others within a network based on particular characteristics. In an effort to understand whether PLCs were a predictor of teachers’ close-colleague relationships, I developed a model to predict the Borealis close colleague network based on teachers’ memberships in both the same PLCs and the same departments. Further, I included gender,

teachers' uses of web-based technologies, and whether or not participants took the survey as controls in the model (see Figure 2.2).

On a theoretical level, this model assumes that teachers' close colleague relationships were shaped by their membership in PLCs – that membership in the same PLC predicts (or influences) one's close collegial networks. However, my goal in estimating this model was not to predict or even to suggest a direction in this relationship, since teachers' close colleagues could easily have shaped the formation of PLCs (especially considering PLC organization was left up to teachers). Instead, this model allows me to compare *how much of a relationship exists* between particular PLCs and teacher networks. Indeed, this model showed that teachers in some PLCs maintained "tighter" relationships than did teachers in other PLCs (or at least, relationships that were more reflective of their PLC memberships). In PLCs where alignment and standardization was more common, same-PLC membership was a stronger predictor of close colleague ties, and in departments where diversification or cross-disciplinary collaboration was more common, same-PLC membership was a weaker predictor, though still a significant predictor, of close colleague ties (see Table 3.4).

Table 3.4: Results of Multilevel Model

	Logistic Coefficient (SE)
Actor Attributes	
Web Technology Use (Ave)	-.01 (.06)
Gender	-.54 (.10)***
Same-PLC Memberships	
Special Education	1.21 (.28)***
English	2.26 (.32)***
Social Studies	3.36 (.52)***
Science	3.50 (.43)***
Mathematics	3.80 (.65)***
Nominator-level Attributes	
Study Participant Y/N	3.91 (.50)***
Nominator-level Variance	1.45 (.29)***
Nominee-level Attributes	
Nominee-level Variance	.60 (.12)***
n (*teachers*) = 80	
n (*pairs*) = 6,320	
* p< .05 **p< .01 ***p< .001	

This model illustrates that all PLCs were predictive of close colleague memberships – as Figure 3.2 illustrates, most mathematics and English teachers were in PLCs with individuals who were also members of their close colleague subgroups. Further, gender was a predictor of close colleague relationships at Borealis, though not as strong of a predictor as PLC membership (possibly because such a large proportion of the BHS faculty was female). However, some PLCs were stronger predictors of close colleague relationships than were others. In fact, the strength with which PLC membership predicted close colleague ties across departments confirmed my qualitative assessment of which departments were more or less likely to "standardize" or align

their curricula (see Figure 3.1). These findings suggest that not only do different organizational schemes for PLCs potentially shape network dynamics within teacher colleague networks, but also that such network dynamics and PLC structures are reflections of the values and goals of the institution and of teachers' interpretations of these values. These findings further suggest that for schools hoping to promote digital integration, approaches that encourage teacher collaboration across disciplines and that promote teacher learning and time for play – which I will discuss further in Chapter 4 – might be more successful than approaches that tie teacher evaluation to time set aside for professional learning.

Any institution's approach to professional development is likely to reflect that institution's values and goals for the community as a whole. When teachers are able to organize themselves into professional communities, they may rely on what they have done in the past to help them conceive of how to organize, or they may organize based on what they perceive to be the goals of the larger community – the school, or the district, or even the state. However, large communities often hold multiple, and sometimes conflicting, values, as was the case at Borealis. This requires teachers to sort out which values "matter most," either in the larger community or within their smaller departments or PLCs. At Borealis, English teachers articulated values that aligned with integrative digital pedagogies: they wanted to improve literacy instruction and, in some cases, to critically consider what it means to be literate in the 21st century. These teachers collaborated beyond their PLCs and departments and held ongoing conversations about which technologies were most effective and ethical. However, during PLC time, such conversations were silenced, and the need to finish tasks tied to evaluation and course management dominated a space that otherwise held potential for innovation and critical pedagogical conversation.

PLCs and Conflicting Goals: "Time to Learn" v. "Time to Get Stuff Done"

At Borealis, differing PLC structures and network dynamics may have been a reflection of the implicit and at times conflicting goals inherent in Borealis approaches to PLCs and PD – goals that valued both digital innovation/experimentation and alignment of assessments and curriculum for collection of student achievement data. The English department organized itself around diversification and experimentation, though much of their experimentation and critical conversations about digital technologies happened outside of the space of their PLCs. The mathematics and science departments, in contrast, divided into groups based on courses taught, setting goals related to developing similar or identical summative assessments and aligning their curricula to meet the needs of students based on assessment data. Even in a school and in departments dedicated to transforming teacher practice through digital integration, action research, data collection, data analysis, and meaningful intervention, conflicting messages about the role of PLCs (to promote teacher learning or to evaluate teacher success based on student achievement) made it unclear how PLC time should be spent, what the ultimate outcome of PLCs should be, or how PLC time contributed to achieving the larger goals of the school or district, especially as those goals related to digital integration.

During my time at Borealis, I sat in on four professional development sessions over four months, and observed dissonance between what teachers spent PLC time doing and how Principal Jameson described – and articulated to teachers – her understanding of how PLC time might ideally be spent (see Table 3.5).

Table 3.5: PD and PLC Sessions, February-May

	Format	Activity Description
February	2-hour All-faculty technology breakout sessions	In Google Drive and Blogger session, Allison and Sarah describe how they use these technologies to teachers and ways to use them across disciplines. Teachers are given about an hour of time after each of them talks to set up accounts and "play" with the technologies.
March	2-hour DigLit PLC meeting	Sarah presents a course website she has designed for the following school year to her PLC, and she and two other PLC members discuss how to link courses and classes in what the group is calling an English department "blog ring." Teachers then work on their own course websites or on something else, quietly and independently, while Allison and Michelle work together to solve a design problem on their own course websites.
April	2-hour DigLit PLC meeting	Teachers work mostly independently, with some crosstalk, compiling data from their classrooms for their final teacher evaluations. There is some confusion about when paperwork is due, so at the end of the meeting, they call the principal.
May	1-hour DigLit PLC meeting	Teachers work together to reflect on what they have accomplished in their PLC in order to fill out a form for administration and to present to others in their department. The goal of some PLC members is to convince others in the department to join the "blog ring" they discussed in March.

Principal Jameson's hope was that PLCs would be a space for teachers to collectively analyze student data and discuss pedagogical interventions for students in need. Instead, most of the DigLit PLC sessions were spent clarifying what was "required" – what teachers needed to submit to administrators for their final evaluations – with large segments of time spent in a quiet classroom as teachers completed and compiled their individual paperwork. At one point, in an attempt to clarify when their evaluation materials were due and which forms needed to be included, DigLit teachers called the principal, who attempted via speakerphone to clarify what she hoped teachers would focus on during PLC time:

Michelle: Well, we are working on our SMART goals and then we are trying to figure out what the other things we have to do, whatever you need from us in terms of our SMART goal.

Principal Jameson[on the phone]: It's just a suggestion because then you can work on it as a team. And, it's time dedicated and really – PLCs aren't supposed to be focused on doing things that relate to increasing student achievement, so it's a solid fit but know that your PLC work does not need to reflect your teacher evaluation, summative evaluation.

Michelle: Okay, so what you're telling me then, in addition to doing the SMART goal thing, what other forms do we have to do?

As the principal attempts to steer Michelle and her colleagues away from a focus on "what they need to turn in," her assertion that PLCs "aren't supposed to be focused on doing things that relate to increasing student achievement" directly conflicts with what she said to me in an interview – that PLCs were a space for teachers "to collaborate, and the collaboration is not supposed to be focused on activities but really focusing on results and looking at student achievement." I mention this contradiction not to critique the BHS principal, but to argue that in much the same way PLC goals and purposes were unclear to Borealis teachers, the role of PLCs in teacher learning and evaluation were still evolving for all Borealis educators. Faced with little time to engage teachers in professional development, Principal Jameson's approach to PLCs brought multiple institutional demands into contact with one another (the demand to increase student achievement and provide evidentiary data, and the demand to engage teachers in meaningful and reflective learning), highlighting the ways in which they failed to complement one another. Principal Jameson even acknowledged a tension between goals related to teacher

learning and reflection for PLCs and the need for administrators to evaluate teachers based on student data:

> There's two camps, really. There's the teacher evaluation, [and] there's the PLC. The PLC is focused, like we said, the collaboration, the professional development, the student achievement, and kind of outline the evaluation, how they can mesh, but how they also can be different.

She noted a distinction in her interview, the same distinction she expressed to the DigLit PLC in their phone call, between "professional learning" and "student achievement/teacher evaluations," hoping teachers would focus on the former during their PLCs while they have the opportunity to reflect on and discuss their practice. However, Michelle's need to complete necessary paperwork – which involved compiling student data, but not necessarily discussing it – drew the phone conversation with the principal back to the "necessary forms" and upcoming due dates, and resulted in PLC time spent primarily completing paperwork. This manifested itself in the phone call as confusion about what "PLC time" is "meant for:" for the principal, for teachers to discuss and analyze student data in an effort to learn and adjust practice; for the teachers, to take advantage of the time granted them to accomplish required tasks.

Teachers, however, did not necessarily want to spend their time in PLCs "getting stuff done." They craved the opportunity to learn from one another, to engage in collaboration and to share one another's practice. An exchange at the end of one PLC session – the one in which teachers spent much of their time compiling student data for their evaluation paperwork – the following exchange illustrated two teachers' frustration:

> **Teacher 1[7]:** This whole thing has made me so anxious right now. I am.

[7] I anonymize these teachers here to further protect their confidentiality.

Teacher 2: Do you realize that we just wasted two solid hours of our lives when we could've been teaching each other cool stuff.

Teacher 1: Yeah.

In my field notes on this day, I note that "Teacher 1" appears frustrated during the phone call with Principal Jameson – she gets up, stretches, shakes her head, places her head in her hands, and exchanges an eye-roll with "Teacher 2" as the phone call takes place. Also during the phone call, another teacher enters the room and says "This is still going on?" However, these teachers, despite a mutual interest in digital literacies and encouragement from their principal to *not* focus solely on digital literacies during PLC time, were under pressure to complete necessary paperwork (and to know the deadlines for these tasks).

These teachers craved time for learning and reflection, and many reported that their PLCs had enabled them to try a new pedagogical technique in their classroom or to reflect on their classroom practice on the survey. However, as one teacher noted, even with the extra efforts by administrators to diversify teacher learning opportunities, teachers struggled to find the time to innovate and experiment:

> The PD, it's definitely changed in a good way to try to support us being able to do things more that we're interested in, and trying to give us time to apply them in our classrooms. So the intentions are good behind it, but at the same time other things have changed in the school where we have less time in our classrooms, additional responsibilities, fewer people getting the same amount of work done, and so there are more expectations in the classroom that we have to meet. So it's like, even though they're setting us up to be able to do more, we're limited on our time. So you still can't get it done. We're definitely

> exposed to more things, I think, that we want to try in the classroom, and more things that are useful to us, but the timing is just the big problem.

Some of these additional responsibilities included attempts to bring teachers into the fold of teacher leadership, as I noted at the start of this chapter. Serving on committees and advising administrators had become a major component of BHS teachers' jobs in recent years. Teachers in the DigLit PLC would therefore use some of their PLC time to address the "things that pile up" in an attempt to "catch up."

Not only were DigLit teachers unclear on how PLC time should be spent, and therefore more likely to spend it dealing with those "things that pile up," but Principal Jameson was, herself, still developing what PLC time should look like given the school's desires to honor teacher professionalism and leadership, to encourage experimentation with digital technologies, and to meet the requirements of the state when it came to teacher evaluation. The principal believed these goals could complement one another, but struggled to articulate how they came together in PLCs. Borealis teachers, both in how they organized their PLCs and in how they navigated their social connections within them, reflected within their departments a focus on one or another of the institution's values; the English and arts departments reflected the institutional desire for digital diversification, speaking to teachers across PLCs and departments about the role of digital technologies in schools and reflecting – though largely outside of PLC time and in outside networks – on the ethical ramifications of using particular technologies in classrooms. The STEM departments and some groups in the social studies department reflected the institutional value of alignment, creating tightly-knit PLCs and departments where teachers designed standardized summative assessments. Across departments, critical conversations about digital technologies that challenged teacher beliefs were silenced in PLCs and PD sessions as

teachers used digital tools primarily to "get stuff done" in the classroom, and as PD sessions focused on *how to use* various technologies and not necessarily how the technologies contributed to student literacies and learning in professional development sessions.

Conclusion: Values, Networks, and Development in a Digital Era

The link between institutional values and professional development I have discussed in this chapter carries many implications for schools hoping to encourage digital integration. To begin with, institutional values at state, district, and school levels shape the professional learning that goes on within schools. At Borealis, the implicit school-wide goal to develop teachers' experimentation with and implementation of digital tools fostered much teacher choice and flexible models for learning, in which teachers were able to span disciplinary boundaries in order to access one another's resources and knowledge. However, the value the state placed on tracking student achievement via assessment data and tying that data to teacher evaluation, as well as the product-focused value Borealis administrators (and the current educational political climate) placed on data-driven collaboration and standardized teacher goals within PLCs, resulted in confusing messages about the role of PLCs in teacher learning at Borealis: were PLCs a means to evaluate teachers, or were PLCs a means through which teachers could learn and experiment with new pedagogical techniques?

In a review of the literature on digital integration, Hew and Brush (2006) argued that professional development is necessary to foster integration, and the most successful models involved (1) attention to "how to" use digital technologies alongside attention to content-specific pedagogical development, (2) time for teachers to "play" with and manipulate technologies, and (3) well-timed PD that spoke to what a teacher needed to do *right then*, not at some indeterminate point in the future (p. 238). Borealis administrators met the first criteria with

workshops designed to expose teachers to new and different technologies, and tried to respond to the second, but often met with frustration from teachers who felt as though there was never enough time to experiment and innovate. Borealis educators were unable to realize the third criteria in PLCs focused on student achievement data, where the opportunity to engage in professional learning "just in time," (Granger, Morbey, Lotherington, Owston, & Wideman, 2002), was overshadowed by professional development that occurred only once a month. With many of the criteria met for integrating digital technologies, including access and opportunities for obtaining functional digital literacies (Selber, 2004), teachers and administrators may have benefitted from explicit articulation of how best to use PLC time and how to keep this time flexible such that teachers' needs might be met "just in time" instead of "just in case" (Hew & Brush, 2006). Further, as I will argue in Chapter 5, in order for PLCs to truly change teacher practice with technologies, they must also challenge teacher beliefs about the role of digital technologies in the classroom and in student learning. While these conversations did take place in the English department, they did not take place in the very space designed for such conversations – teacher PLCs and PD. As I will discuss in Chapter 4, these conversations were relegated to teachers' interpersonal networks.

When it comes to changing teacher pedagogy, one-shot workshops and access to hardware is not enough to change beliefs and practices that a teacher has built over years to decades of professional experience (Ertmer, 2005; Hughes, 2005; Mishra & Koehler, 2006). Other studies have acknowledged the role of professional development (Hughes, 2005; Zhao, Pugh, Sheldon, & Byers, 2002) and institutional context (Coburn & Russell, 2008; Lawson & Comber, 1999; Zhao et. al., 2002; Zhao & Frank, 2003) on technology integration, but no studies to date have examined these factors alongside teachers' existing and dynamic social networks,

and only a few have examined digital integration in teacher practice from a network perspective (e.g. Frank et. al., 2013; Zhao & Frank, 2003). My analysis of network dynamics at Borealis High School and how these corresponded with teachers' PLC membership and organization suggests the need for more comprehensive studies examining how institutional contexts shapes both institutionally-defined "formal" networks and teacher-defined "informal" social networks. Further, this study indicates the importance of analysis of networks *alongside* analysis of teachers' talk about and uses of technology, gained in observations of professional development and teacher practice and in interviews with educators. The limitations of this study did not allow me to qualitatively compare conversations across PLCs in the English department with cross-subgroup conversations in the mathematics department. Larger studies can expand on the findings of this one to examine how trends related to network structures, formal institutional communities, and teachers' digital practice are similar to or different from the trends I identified at Borealis.

Furthermore, the findings in this chapter highlight that even in schools where teachers are pleased with their professional development opportunities and feel that they are given adequate choices and freedom when it comes to their own pedagogy, and where teacher innovation with digital technologies is highly valued and even encouraged, teachers and administrators struggle to understand how to develop spaces for complex conversations about what technologies to use, why, and to what ends. Recalling the framework I presented in Chapter 1, though Borealis certainly contained "pockets" of digital practice, such pockets were for the most part only able to inspire facilitative digital pedagogies, in which technologies were used to streamline or aid the work of teaching existing content. For those teachers who used digital technologies to support the development of students' digital literacies, integrating digital tools into the content of their

courses in transformative ways, outside networks and interpersonal connections largely fostered their ongoing learning and reflection. These teachers failed to find a "space for" the "challenging conversations" about digital technologies in PLCs.

In the following chapter, I focus on those interpersonal interactions and networks that shaped digital practice for Borealis English teachers; such interpersonal networks provided numerous resources for some teachers while others struggled to feel efficacious with digital technologies, despite their interests in digital integration. In Chapter 4, I turn my attention to those day-to-day social interactions that frustrated, inspired, angered, and elated Borealis teachers as they interacted with colleagues and implemented new technologies. With so much emphasis on professional development models that encourage collaboration, such as those I have discussed in this chapter, it is necessary to question the varied ways in which collaboration can enhance or inform teacher learning about different aspects of their practice – from managing large classes of students to shifting entire pedagogical approaches. Drawing on the findings of this chapter, which suggest that even the most digitally advanced teachers struggled at times to collaborate in ways that challenged their beliefs and practices, I closely analyze how a few teachers' interpersonal relationships shaped their pedagogy. I argue for an approach to collaborative digital learning that acknowledges the inherent social difficulties of attaining and gaining confidence with new literacy practices.

Chapter 4: "A group of buds to make mistakes with:" The Role of Teachers' Interpersonal Networks in the Development of Digital Pedagogies

If you've never used technology before, then you've got to get yourself a group of buds that you can make mistakes with. – Allison, March 2013

This chapter reaches to the core of English teachers' interpersonal relationships with one another at Borealis High School by analyzing the interactions that took place as Borealis teachers borrowed activities and lesson plans from one another or stopped by one another's classrooms to share stories or ask for advice. It "zooms in" from the larger institutional structure of the school to focus on a single academic department and to question how teachers' individual connections, in the institutional context discussed in the previous chapter, shaped their digital beliefs and practices surrounding digital technologies in the classroom. From my own years as a teacher, I know how much a five-minute conversation can shape a teacher's thinking and planning, potentially challenging her perspectives or reshaping her practice. I recall how crippling the requirements to use particular software packages felt as I attempted to teach diverse students how to engage as writers. I also remember how disheartening it was when my colleagues did not support my integration of new technologies, and how complex human relationships can often make for difficult or tension-filled professional interactions. Just as these interactions shaped my thinking about teaching, learning, and literacy, these interpersonal relationships mattered deeply when it came to digital pedagogy at Borealis High School. When PLCs failed to engage teachers

in critical conversations about their beliefs and practices, teachers turned to the teacher next door, down the hall, or across the country, relying on their professional networks, or "buds to make mistakes with," as they grappled with which technologies to use with students, and how and why to integrate them.

Network scientists have argued that while institutional hierarchies and social organizations certainly play a role in teacher practice, teachers' more "informal" friendships and day-to-day interactions can reveal much about how teachers' colleagues shape their professional experiences and behaviors (Frank, 1995; Frank et. al., 2011; Penuel et. al., 2009). My goal during my semester at BHS was not to capture all of these relationship dynamics – this would have been impossible. However, in my short time at Borealis, I aimed to learn how a few teachers' social connections might have played a role in shaping and re-shaping their pedagogical approaches to integrating digital technologies. In this chapter, I will discuss teachers' interpersonal connections, specifically within the English department, and how these connections corresponded with teacher's digital pedagogical practices and with the institutional values and professional learning structures I analyzed in Chapter 3. As in that chapter, I draw on quantitative social network data alongside moments from interviews and observations, combining qualitative and quantitative evidence to provide a thorough analysis of teachers' social ties and how they shaped digital pedagogy at BHS. Of course, teacher relationships are constantly shifting; as is true for any professionals, teachers' priorities, interests, and obligations change, leading relationships to grow and dissolve throughout a teacher's career. As such, the relationships I analyze in this chapter represent only a short period in time, and they have likely shifted since my semester at BHS. This chapter argues that teachers' interpersonal networks shape teachers' digital learning and digital integration in diverse ways, providing not only spaces

for the exchange of resources and ongoing conversations, but also spaces that might prove problematic for teacher efficacy and digital learning. In professional consultations about digital technologies and in out-of-school professional learning networks, teachers develop spaces where their beliefs and practices surrounding the use of technology might be challenged and developed; a need that PD at Borealis was unable to fulfill for some teachers.

In the first section of this chapter, I focus on the interpersonal networks of a few Borealis English teachers. First, I tie teachers' interpersonal relationships with one another to professional development structures at Borealis, comparing teachers' learning experiences in multiple social contexts. I then expand on this by analyzing the role of "technology consultation networks" at Borealis as sites of resource exchange, and make the argument that Borealis teachers' learning about digital pedagogies often occurred in outside learning spaces, with digital tools as "learning mediators," suggesting that collaborative approaches to literacy learning may serve as supports, but not primary means, of developing teachers' digital skills – at least initially. Finally, I turn to the role of power dynamics and intimidation in the English department, which isolated some Borealis teachers from consultation networks, making it difficult – both emotionally and socially – for some teachers to access digital tools (and, by extension, access to learning opportunities). Finally, I turn to teachers who successfully integrated digital technologies into their teaching practice, analyzing how their out-of-school networks played significant roles in shaping their digital learning and overarching beliefs about teaching, learning, and literacy, which in turn enabled these teachers to develop integrative digital pedagogies. This chapter acknowledges the *materiality* of digital tools and devices in classroom spaces – the "stuff-ness" of digital technologies, which is often overlooked in a digital age characterized by invisible movement of data, documents, and media in "clouds" and other forms of seemingly "unmediated" digital

interaction. Just as other scholars have argued that adolescents attain digital literacies through engagement in spaces of play and creation (e.g. Gee, 2000; Ito et. al., 2009; Lankshear & Knobel, 2011), so too do teachers require time for play and creation, often in spaces where they feel safe with "buds" they can "make mistakes with," if they are to gain confidence and facility with digital technologies. This chapter upholds arguments that digital teachers must also be digital writers (or scientists, or historians) themselves (Grabill & Hicks, 2005; National Writing Project, 2010), and asks how schools might harness teachers' existing networked learning practices in order to reshape or reconsider approaches to professional development in the digital age.

Further, via a close analysis of the interpersonal dynamics of the "DigLit" group of English teachers, this chapter reinforces Dooner et. al.'s (2008) findings that teacher learning groups are subject to complex and difficult-to-negotiate interpersonal conflict, and that this is an integral (even productive) element of the collaborative process. Borealis English teachers articulated insecurities related to digital integration and professional collaboration, disagreements tied to their personal beliefs about how particular technologies should or should not be used, and frustrations with how conversations and activities in PLCs unfolded. Far from being indicators of PLC or interpersonal failure, these group dynamics point to the social difficulties inherent in any major pedagogical shift, especially one that requires significant new learning for teachers prior to or alongside implementation. It also complicates the simple narrative of PLCs as sites of collegial data analysis and action research by exploring how the DigLit PLC fostered digital exploration and play for some teachers while proving either inadequate or intimidating for others.

"Tech Consultation" as Resource Exchange

In Borealis teachers' technology consultation networks, experimentation and innovation took the form of exchanging tools, resources, ideas, and assignments in characteristically brief interactions that would occur multiple times throughout the school year, as elements of ongoing conversations about technology and pedagogy. My survey of Borealis teachers included a section in which teachers identified other teachers in the school with whom they "consulted about digital technologies." As I noted in Chapter 2, this is a departure from trends in former studies of teacher networks, which have focused on "advice networks," analyzing how what researchers presume is "knowledge" and "expertise" flows through these types of networks as teachers provide help to one another[1] (e.g. Frank et. al., 2011; Penuel et. al., 2012). However, I wanted to examine the *collegial relationships* of teachers at Borealis, as distinct from those relationships in which one person identifies another for advice. It was my belief that this relationship – *consultation* – would reflect the "back-and-forth" relationship between colleagues that is not captured in the theoretical construct of "advice" or "help," in which one individual has expertise or resources that another seeks[2]. Further, it might enable me to trace *what is exchanged* in consultative relationships between teachers. Advice networks may obscure the complexity of

[1] These studies make the assumption that "knowledge" and "expertise" are part of what moves from one teacher to another when a teacher asks for help. For example, Frank et. al. (2011) offers the following definition of how teachers gain access to knowledge: "We defined a teacher's access to knowledge through interaction as the sum of the knowledge of the others with whom she talked or from whom she received help regarding use of technology in the classroom" (p. 144). However, I argue here (and my qualitative analysis illustrates) that though such relationships *might* indicate an exchange of knowledge, they could also indicate an exchange of materials or even an exchange that results in frustration or intimidation (as I will explore later in this chapter, in my analysis of Kristin's experiences). Network studies that examine how and when teachers exchange knowledge may need a more robust measure – or an approach that includes qualitative data collection and analysis – to study flows of teacher knowledge and expertise than current "advice" or in my case "consultation" network studies offer.

[2] "Consultation networks" are not new to the social network analysis community, but tend to be employed primarily in studies of medical professionals (Anderson, 2002; Anderson & Jay, 1985) and or business settings (Chow, 2012; Toker & Gray, 2007). These studies ask participants with whom they consult in their workplaces, instead of asking from whom they obtain "help" or seek "advice." The theoretical constructs of "advice" versus "consultation" in social network studies has not been extensively examined; a gap in the field that could be addressed in future studies of teachers' (or other) professional networks.

teachers' ties to one another through a simple assumption that "advice" is just that: one teacher "giving advice" or "instruction" to another teacher. As I found in my examination of Borealis networks, more was moving through the networks than knowledge or advice – tangible digital and curricular resources were moving through these networks, as well.

"Consultation" at Borealis was primarily a reflection of the movement of curricular resources that had something to do with technology – rubrics, lesson plans, ideas, hardware, or assignments. "Consultation" did not seem to *directly* reflect the movement or co-construction of knowledge or expertise about digital pedagogies or digital literacies. In other words, when teachers at Borealis "consulted," they did not necessarily reflect on a pedagogical approach or work with a colleague to develop a new practice and debrief it together. These interactions instead were characterized by an exchange of some*thing*, often physical (or, over email, digital) – a lesson plan for introducing discussion forums to students, or examples of student work to be used in another teacher's classroom as examples. Studying *consultation* networks may therefore provide an indirect way to analyze the movement of curricular resources between teachers. It also suggests that in quick informal consultations (e.g. in the hallway or copy room, before school or between classes), teachers are more likely to share "things" – lesson plans, assignment concepts, or assessment tools – than to engage in critique or reflection together, though this learning and pedagogical reflection may happen indirectly over time, or on one's own after a lesson or unit, as teachers share ideas and try out other teachers' lessons and assignments in their own classrooms.

Allison articulated this combination of resource exchange and learning over time in one of our early interviews. As she noted in the quote that prefaced this chapter, Allison's colleagues encouraged her to experiment with digital technologies in ways she might not have risked

without having a “group of buds to make mistakes with.” For Allison, this “group of buds” happened to align strongly with her PLC co-members, as I will discuss later in this chapter. Initially, it seemed as though Allison had done a great deal of reflection and direct literacy learning in interactions with her colleagues. For example, in her first interview, Allison identified a particular colleague, Sarah, who had helped Allison become, in her own words, “technologically literate:”

> Sarah, I feel like Sarah has been the one to pave the way for digital. I mean she's solely responsible; I would give her the credit. *She helped me initially to become technologically literate.* I didn't even know how to do anything. And then, sometimes I'll ask her, before I introduced blogs with my students, *she gave me resources and told me what she does with the blogs, and things to consider, and so that was really helpful. I don't think I would have introduced blogging if she weren't a resource I could go to.* [my emphases]

As I spent more time at Borealis, I wondered what Allison meant by “technologically literate” and what it was her colleagues helped her gain as she attained these “literacies.” I Adapting Selber’s (2004) definition of digital literacies, this sort of digital literacy learning and instruction might have included conversations in PLCs or between colleagues about the functional and structural characteristics of digital spaces, the sociocultural and ethical implications of using particular technologies in the classroom, or the rhetorical situatedness and purposes behind using digital technologies. However, I did not witness conversations like this happening between Allison and her colleagues during my time at Borealis. Instead, conversations about what teachers were already doing in their classrooms were more common; teachers regularly swapped stories about particular lessons, shared a resource they had created such as a class blog or course

website, or traded information about a student's struggles or successes. Teacher exchanges were just that – *exchanges,* in which teachers swapped stories, ideas, or materials. Perhaps Allison and I were defining "technologically literate" in different ways, or perhaps the development of these "technological literacies" were bound up in the exchanges I was observing.

Returning to Allison, when she gave an example of how Sarah had helped her become "technologically literate," she mentioned Sarah sharing her resources and explaining her curriculum ("what she does with blogs"). Wrapped up in this interaction with Sarah was an *exchange of curricular resources,* in addition to intangible resources, such as *things to consider.* Though it is certainly possible that Allison had gleaned digital literacy knowledge from her interactions with Sarah, it is not digital literacy knowledge that she focuses on as a takeaway in her description, but "resources." This was further supported in observations of Sarah and Allison during their PLC time: during PLC, I observed Allison and her colleagues sharing "stuff" they had created, such as rubrics, course websites, or assignment guidelines. This is not to say that Allison's interactions with Sarah did not lead to literacy learning, or even pedagogical learning, but that Allison attained her "technological literacy" in exchanges with Sarah indirectly, through attaining and potentially experimenting with or adapting digital teaching resources designed by another teacher.

Whenever Borealis teachers met to "consult" about technology, it was often surrounding a particular digital tool (such as blogs or a computer cart) or a concept they needed to teach for which they needed teaching ideas (such as themes or literary criticism). The resultant consultation often involved the sharing of stories about what a teacher had done in her own classroom, including testimonials of student success or motivation to communicate the strategy's

/ unit's / activity's / assignment's success, like this exchange about a research archiving tool, Diigo, during PLC time between Anne, Allison, and Michelle:

Anne: My sophomores are just finishing research projects. They didn't all use Google, it was an option, but the ones that did loved it. Love it.

Allison: You mean Diigo?

Anne: Diigo, yeah. I had some kids—I mean, some kids did it on cards, because I'm trying to give them what will work for them, you know what I mean, so for them, it might be more of a jump for next year, but they—I've told them that. I was like, "that's great that system works for you but next year you might want to try Diigo."

Michelle: I think kids, well my kids, are impatient in learning Diigo and so they just use Google Drive. And, you know, Google Drive, that works well, but I don't know how much I should push them to use Diigo.

Allison: I made my freshmen use it. I just told them I wanted them to see what it has to offer for them. And they love it. I said—I taught it to them and they were attentive and they were like "oh great."

Here, Anne and Laura offered success stories about their use of a particular digital tool to Michelle, who was not sure whether to integrate Diigo into her approach with her students who struggle with writing[3]. Anne offered a strategy that includes student choice, while Allison noted that she required her freshman to use it. This exchange emphasized how teachers' conversations

[3] In another part of the exchange, Michelle mentions that she is talking about a specific course in which students who require additional assistance and smaller class sizes are often placed. Borealis teachers and administrators avoided using the term "tracking," but these classes were qualitatively similar to lower-track courses found at many secondary schools.

about digital technologies often revolved around *a specific technology*, and included *stories* and *ideas* for using the technology – such interactions may have prompted Michelle to reconsider her perception that students are impatient with the technology, or have given her ideas for integrating it into her classroom later. Similarly, in a visit to Kristin's British Literature class, I noticed student-generated literary criticism posters in Kristin's room that were similar to posters I had seen in Allison's room earlier in the semester. Upon inquiring, I learned that Kristin had borrowed the assignment concept from Allison, along with a few example posters to show her students. Similar exchanges related to digital assignments were common; Borealis English teachers regularly shared blog prompts, instructions, assignments, and assessments with one another.

Teachers also tracked the movement of their resources through interactions with colleagues; Allison described how a resource she had created – a website about using Google Drive in the classroom – had been shared with a professor at the local university, who was at that time using Google Drive in his own practice. As teachers became "known for" their resources, as Sarah was "known for" her blogging assignments in the English classroom and Allison was "known for" her digital writing skills because of the blog she maintained on her own time, they would be sought out by their colleagues, building their own resource exchange networks and access to resources as they disseminated their resources across networks within, and outside of, the school. The more "stuff" a teacher was "known for" – the more visible her digital practice in social media, friend networks, or within the exchange networks of the school – the more resources became available to her, and the more "buds" she would have to "make mistakes with," without fear of judgment or consequences to her self-efficacy.

That teacher consultation revolves around an exchange of "stuff" – of materials, of examples, of lesson plans or activity concepts – may surprise some, because it may seem as though teacher interactions boil down to a meaningless exchange of materials instead of in-depth "learning" and "reflection." However, pedagogical reflection can take many forms, not all of them evident to observers, especially if they are not spoken in public spaces (such as PD sessions): from written or otherwise recorded purposeful reflection to in-the-moment reflection that impacts decision-making and occurs as teachers are working with students (Shoffner, Homan, & Spanke, in press). Further, resource exchanges foster the development of ongoing conversations about digital technologies; Mary, in a conversation about resource exchange at the end of my data collection, noted "the conversations I engage in when I follow the stuff can be interesting too. For instance, [the media specialist] and I often talk about learning when engaging with technology." In "following stuff" around the school, Mary creates opportunities to engage with colleagues in ongoing conversations about students' learning (and their own pedagogy). This is reminiscent of Vygotsky's argument that tools "produce fundamentally new forms of behavior" (Vygotsky, Cole, John-Steiner, Scribner, & Souberman, 1980, p. 24) and Latour's (2005) argument that non-human entities can act as mediators and intermediaries that either transform or transfer action between individuals. Thus, the "stuff" of school – books, lessons, student posters, laptop computers – act sometimes as intermediaries, which "transport meaning or force without transformation," or as mediators, which "transform, translate, distort, and modify the meaning or the elements they are supposed to carry" (p. 39). Through the exchange of mediators like blog prompts and assessment tools, Allison's classroom "behavior" (pedagogical practice) underwent a change, resulting in pedagogical learning and reflection for Allison, for which she credits Sarah. Exchange of tangible and intangible resources within

interpersonal networks therefore mediated (or had the potential to mediate) Michelle's, Mary's, or Allison's pedagogical beliefs and practices.

Certainly, Allison and her colleagues had learned much in the years preceding my study about how to integrate blogging and other digital technologies in the high school English classroom. Allison frequently credited her PLC with helping her learn how to work with new digital technologies, suggesting that it was in these interactions with colleagues that she engaged in "technological literacy learning." However, my analysis in Chapter 3 reveals the extent to which PLCs emphasized skills-oriented approaches to digital learning (as opposed to a practice-based, strategic literacies approach), and Allison's practice (as I will discuss in Chapter 5) extended beyond facilitative uses of digital technologies with her students. If, as I am arguing here, Allison's learning was happening implicitly over time and via her interaction with digital tools, and if I did not observe direct or overt "learning" or "reflection" in Allison's or her colleagues' exchanges with one another or in their PLC time, then *where, when, and how was teacher learning and reflection about digital technologies happening?* Where had Allison developed her beliefs and practices surrounding her use of Google Drive with her students? How did Mary develop her approach to integrating digital storytelling and podcasts into her creative writing curriculum?

A closer analysis of Allison's descriptions of her digital learning indicated that much of this more critical learning and reflection was taking place in contexts I was not observing, as teachers completed assignments for master's courses or spent time "playing with" digital technologies. Take, for example, Allison's description of how she learned how to blog:

> I just wrote something because I was upset with the governor one time and I was like "what is this blog thing? I think I've seen it." Like literally, I didn't know what blog platforms were. Like "I think it's called blogger or something, blog spot or something," because I had seen somebody use it. And I published something, and then I liked it, and so *I just taught myself*. […] I just kinda got in there and *played with it over the summer*, and with my blogging, it helped with that, personally. I was taking master's classes and *I taught myself Google Docs*. [my emphases]

This description of digital literacies as self-taught was echoed by other teachers who acknowledged the importance of "time to play" on one's own, experimenting with the technology and "teaching oneself." Donna, for instance, expressed the need for time to learn on her own in response to a PD session in which she and a few of her colleagues in the English department were introduced to Camtasia, a screen-capture video software:

> …I kind of wanted to get more time, get into it a little bit more, so it felt kind of like, well, I *could have done this on my own*. It's nice to have the time, but I think I would have been more productive in here *playing around with it*. [my emphases]

BHS teachers' talk about their digital learning often involved descriptions of times when they "taught themselves" and "played around," and echo Frank et al.'s (2011) findings that teachers at intermediate levels of implementation rely mostly on their own "fiddling" to sustain their interest in and uses of digital technologies. Thus, it was through time to interact with digital technology *combined with* interpersonal resource exchanges that exposed teachers to new technologies that teachers attained digital literacy skills they could then transfer into their pedagogical practice. Interactions with colleagues provided social spaces – sometimes transient, other times lasting

and ongoing – where teachers obtained either the necessary tool (a device), technology (software / apps), or curricular ideas, which they then had the ability to adapt, implement, reflect upon, and "play with" in their own classrooms.

Learning through play and experimentation is not a novel concept, and underscores even more strongly the role of "mediating" digital tools in teachers' lives; many scholars have argued that individuals learn rhetorical, social, and literacy norms in digital environments through a process of strategic trial and error – through *playing* and *making* in a digital environment. As Gee (2000) and Lankshear & Knoebel (2011) have noted, students often learn how to engage in digital environments by creating artifacts within them, especially in affinity spaces like fanfiction sites where learning and improving is tied to desirable feedback and a positive reputation among others who share the space. Why should this be different for teachers, who might be exposed to Remind101 during a PD session, try using it with her students, and reflect on the experience later – maybe switching tools, maybe finding a new way to integrate Remind101 into her future classes, maybe sharing how she used the tool with another teacher? Vygotsky's theory of language learning applies here as well; though his work was done primarily with very young children, his argument that language develops alongside the use of tools and within the context of social interactions was also true for teachers at Borealis, who were learning how to engage new literacy practices by both playing with the tools and interacting with their colleagues. Like children who learn how to draw and write by first scribbling with a crayon, and who then test the limits of when, where, and on what one should draw by creating a mural on the dining room walls, adults similarly learn through experimentation and interaction with new literacy tools and technologies.

However, unlike infants and young children for whom time to play with the tools of literacy is often intentionally provided in our society, adults at Borealis found themselves struggling to make the time for learning "play" as they negotiated other personal and professional responsibilities. For many Borealis teachers, this "time to play" with digital tools and technologies was scarce, and without it, they struggled to integrate new digital tools and technologies into their teaching. Take, for example, this teacher's survey response, when asked why she didn't implement certain technologies: "Time is the biggest factor. I learn about them at PD, but then a month goes by before the next PLC day and I forget and have to relearn, so I don't get to spend time actually setting it up for my class to use." Vannatta & Fordham (2004) found that a major factor that influences teacher uptake of digital technologies is the teacher's willingness to spend time beyond contract hours learning about and engaging with digital technologies; this was also the case at Borealis, where teachers cited obstacles to working beyond contract time to learn new web technologies ("three small children" for one participant) or an unwillingness to give up valuable time for family, friends, and personal health. As was the case for one English teacher, Kristin, lack of time to "play" meant lack of sufficient knowledge and confidence to implement technologies into her curriculum. This is consistent with my findings that those teachers who reported using more digital technologies in their daily lives also used digital devices and web technologies in the classroom at a significantly higher rate (see Table 4.1).

Table 4.1: Teacher Device and Web Tech use in the Classroom versus Daily Life

	Average web technology use in the classroom	Average device use in the classroom
Low web technology use out of school (<2.0 average)	1.53**	2.82*
High web technology use out of school (>2.0 average)	2.56**	3.60*

Table 1: Device and technology use in the classroom based on web technology use outside of school, in teachers' daily lives. *p< .01, ** p< .001 using Student's Type 2 T-Test

This finding suggests that teachers who made time for "digital play" in their personal were more able to integrate these technologies in their work as teachers. In one interview, Kristin said "You know, I used to [give up time after school], and with having [my daughter] and giving up so many of my summers for yearbook I'm just like 'nope, that's my time.'" I will discuss Kristin's experience with digital integration in the following section and again in Chapter 5. Her statement here, however, indicates the need for a more nuanced understanding of teachers who seem "resistant" to engaging with digital technology, or "unwilling" to change their practice, as these teachers may not be afforded the appropriate resources and opportunities for digital learning and engagement. For Borealis teachers, "time to play" was a scarce, but necessary, requirement for learning about and with technologies for pedagogical purposes. The need for play time with the tools of teaching is not something that has been a concern for professional development initiatives in the past: a teacher could quickly learn how to use an overhead projector, a classroom TV, or even an Elmo device. Today's web technologies require significantly more

experimentation and setup[4] that Borealis's professional development proved unable to support for some teachers, like Kristin.

Digital tools were ubiquitous in Borealis teachers' lives, changed constantly, and required varied and flexible literacy practices in order to be used quickly and with facility and confidence. Certainly, the technological tools teachers use in classrooms have constantly shifted; from the slate and chalkboard to the overhead projector. However, I would argue that in today's classrooms, the tools available to teachers are changing at a much faster rate than in previous decades, requiring different approaches to teacher learning and development that previous tools did not. Teachers – like students – must learn not *how to use a particular tool*, but must instead develop *digital literacy practices* that are flexible and allow them to apply what they know about blogging (for example) across multiple platforms and media. Just as literacies are strategic in nature, pedagogies similarly require teachers to be armed not with tools, but with strategies for implementing those tools – Borealis teachers developed these strategies by, in Allison's words, "making mistakes," or playing with digital tech, with their "buds," or interpersonal connections.

Borealis teachers have experienced an influx of new Smart Boards, classroom LCD projectors, tablet computers, laptop computer carts, and recording devices in their classrooms in the past decade, alongside new software applications that they are either required to use (PowerSchool and SchoolCenter) or encouraged to use (Google Drive, Blogger, Remind101, Camtasia, Evernote, Prezi, Quia, Quizlet, Dropbox, and PollEverywhere). Shortly after the

[44] For example, many English teachers at Borealis used Google Drive as a resource and assignment management space with their students. In these instances, students each had folders with specific sharing settings, sometimes organized into workshop groups or peer review teams. Teachers organized classes into class folders, for which they altered sharing settings. Before the school switched to a Google email server, this involved creating individual folders for each of their students in all classes, then setting sharing preferences for all students. Spending so much time on set-up felt both intimidating and risky for teachers who had never used Google Drive in their own classrooms.

conclusion of my study, a local law was passed allocating more funds to schools in Borealis Township for the purchase of even more hardware. If the tools teachers take up and use in the classroom mediate their pedagogical thinking and learning, more attention must be given to *how teachers learn with and through* these tools (via "play" and exchange of resources with colleagues, as well as in outside learning spaces) and *how schools can best facilitate meaningful and lasting learning experiences for teachers* that take into account the demands placed on teachers' lives beyond their contracted work time. At Borealis, PLCs and PD sessions inspired teachers' curiosity when it came to digital technologies, but various obstacles – some related to network and social dynamics, others to personal obligations – acted as barriers to implementation. In the following section, I will analyze how even these interpersonal learning opportunities were not easily accessible to some teachers, while others enjoyed robust in- and out-of-school interpersonal networks that provided resources and opportunities for digital learning.

Social Capital within Borealis Interpersonal Networks

In an effort to better understand how teachers' social relationships might play a role in their digital learning and digital pedagogies, I closely analyzed the social interactions, perceptions, and networks of those teachers who were willing to let me observe and interview them, particularly the four focal participants in the English department. Some Borealis teachers maintained consultation networks – or, networks of teachers from whom they could glean assignment ideas, lesson plans, or other resources, digital or analog – that spanned disciplines and spaces within and outside the school, whereas other teachers maintained smaller networks of a select few "close colleagues." In this section, I will focus specifically on the English department and the social ties of two teachers, Allison and Kristin. Allison, a regular user of

digital web technologies in her classroom, also maintained an extensive network of colleagues with whom she consulted about digital technologies and classroom practice. In addition to the resources Allison drew from her relationships with Sarah and other English teachers, Allison maintained social ties with teachers throughout BHS. Figure 4.1 shows Allison's "technological consultation ego network," or her self-reported consultation connections to teachers throughout the school, and their self-reported connections to one another

Figure 4.1: Allison's Technology Consultation Network

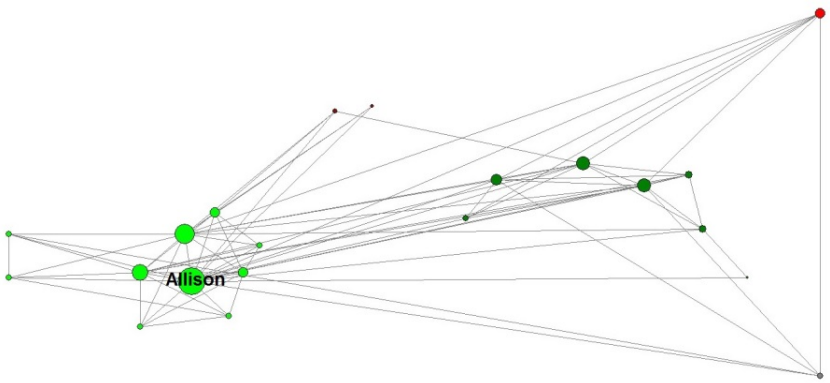


Figure 4.1: Allison's "Tech Consultation" Ego Network from sociocentric graph, showing Allison's consultation ties with individuals in the English department (left), special education department (center), science department (top right), and math department (bottom right), and library (top center). Graph created using MDS force-directed algorithm for node placement, nodes sized by in-degree (or number of nominations) and colored by departmental affiliation.

If "tech consultation," as I discussed in the previous section, also reflects the movement of digital or tech integration resources (and by extension, potential reflection and pedagogical learning), Allison had access to many digital resources within the school via her social ties, granting her substantial social capital within the school's digital tool and resource distribution network. Compared to other teachers in her department and throughout the school, Allison's ego network within the school is relatively extensive. Because Allison was recognized as an expert at

her school, she was called upon as a "digital leader" by administrators when a few teachers were asked to present to the school board about their uses of technology in the classroom. Allison's colleagues in the English department also spoke of her expertise and how she was positioned in the department as an expert:

> "I will seem woefully inept in comparison to Allison and Michelle."
>
> "I would like to spend more time maybe talking to Allison about how she uses technology."
>
> "I just kind of see [Allison, Michelle, and Sarah] as the technology experts. Um, you know, Allison does the blogging and the, all the Google Docs stuff."
>
> "[Allison, Michelle, and Sarah] are all much more advanced than I am."
>
> "Because Allison, Allison's a big blogger, she's awesome, so, it would be silly for me not to use her as a resource."

Allison had easy access to resources related to digital technologies – whether those were tools or curricular concepts and materials – in part because of how she was positioned by colleagues as someone with the expertise necessary to use such technologies and tools. This access not only provided Allison with the hardware necessary for digital integration – I did not observe a single class in which Allison's students did not access the web from the school's laptops or on their own digital devices – but also provided her with multiple and varied resource connections on which she could draw regularly.

Allison's social capital within the Borealis tech consultation network indirectly entitled[5] her to digital tools that were shared by teachers throughout the high school. During my time at Borealis, the computer cart on the second floor (where seven English teachers' classrooms were located, including five of the seven DigLit PLC members) was almost always either in Sarah's, Michelle's, or Allison's classroom. I only saw the computer cart (or COW) in Kristin's classroom on one occasion when I visited for an interview, and I never saw one in Donna's classroom, though Donna frequently visited the computer lab with her students. Kristin noted that because Sarah, Allison, and Michelle were such frequent users of the computers, it was sometimes difficult to obtain access to the computers or to feel confident enough to ask to use them:

> I've scheduled a few projects in the last month or two where I've wanted them for a couple days and, just to go on our calendar and see it for the rest of the month blocked off, every day fifth hour, every day fourth and sixth hour or whatever it is frustrating. It feels like they're not available.

As I argued in the previous section, access to technology was integral to integration – without the opportunity to experiment with new tools and the technologies they housed in their classrooms, teachers were less likely to take risks or try something new with their students. Kristin described how an occasional "lack of access" discouraged her from using digital tools in the classroom at all:

[5] I say *indirectly entitled* here because her entitlement, or "right," to digital tools was not explicitly stated, nor would teachers at Borealis (including Allison) be likely to say that Allison (or Michelle) had any more "right" to digital tools than any other teacher. I use this language to indicate that via her social capital, teachers in Allison's department were more likely to defer to her when it came to where digital tools were kept, and if Allison wanted to use a particular hardware tool, her "right" to it was unlikely to be challenged. In contrast, some teachers described in interviews feeling as though their "rights" to the computers were challenged when students from other teachers' classrooms would interrupt class to borrow computers from the cart, or when teachers would sign out computer labs or carts for large blocks of time well in advance.

> With my literature class, I want to do college essays, and I was thinking, I'll just come up with things like "oh, well you know, I want to come up with a survey that I'd like them to fill out," and "oh wouldn't that be great if they could just type it" but look [the COWs] are used, "oh, well, I might have them write it out or I might just not do it."

For teachers like Kristin who are beginning the process of integrating digital tools into the classroom[6], the frustrating inability to obtain access to physical resources like the COWs is enough to cause her to give up on an experimental idea or a new approach to engaging students with a curricular concept. Furthermore, for Kristin, "access" is less about *actual physical access* and more about *access via social capital.* Kristin technically has as much of a "right" to the computer carts as any other teacher on her floor; however, because her colleagues frequently have them signed out and are, from Kristin's point of view, more advanced users of digital technologies, Kristin says "oh well" and leaves the tools to the "tech experts" (her words). Many studies have noted the importance of *physical access* to hardware when it comes to digital integration (e.g. Warschauer et. al., 2009) and have lamented that despite an increase in access to hardware, integration is surprisingly low (Ertmer, 2005). Many studies have posited that teachers' pedagogical beliefs and attitudes about technology are responsible for this persistent gap (Belland, 2009; Ertmer, 2005; Hew & Brush, 2007). However, Kristin's experiences indicate that *social access* and *social power* within teachers' social networks may also play a strong role. Such power struggles have the potential to enter into and shape teachers' experiences in PLCs, where Kristin remained largely silent, which may contribute to the tension described in Chapter

[6] I will discuss Kristin's pedagogy more in Chapter 5, where I analyze her approach to digital integration as one that primarily uses technologies to achieve existing goals in her classroom. For Kristin, who is beginning to imagine how digital technologies might fit into her classroom, technologies offer a way to do something that she could otherwise do in analog or face-to-face environments online, extending the reach of her classroom and giving her another way to assess her students' thinking.

3 as teachers defaulted to completing paperwork and dealing with bureaucratic concerns instead of collaboratively analyzing classroom data.

In many ways, Donna's, Allison's, Mary's, and Kristin's technological consultation networks corresponded with their degree of integration of digital technologies: those teachers who used digital technologies most often (Allison and Mary), and who integrated digital technologies to transform the content of the ELA classroom (Mary, Allison, and their colleague Amanda, as I will explain further in Chapter 5), maintained the most extensive technological consultation networks. If "tech consultation" reflected a movement of resources between teachers, some teachers therefore had more access to digital resources than their colleagues, and thus had the most opportunity to "play" and experiment with new technologies in the classroom, with students (see Figure 4.2). The more "connected" a teacher was to others in the school via her "tech consultation" ties, the more likely she was to reconceptualize the content of the English classroom in a digital world, and the more likely she was to engage in integrative digital pedagogies.

Figure 4.2: Comparison of Focal Participants' Technology Consultation Networks

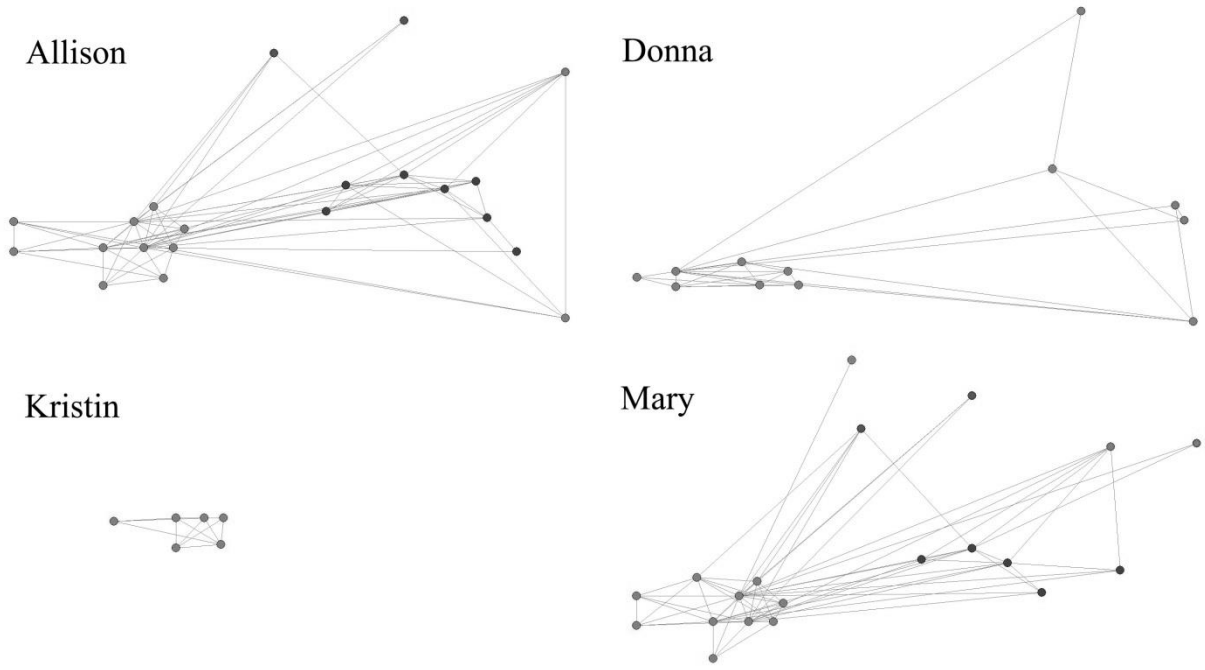


Figure 4.2: Focal participants' technology consultation ego networks. Graphs created using MDS force-directed algorithm for node placement in NetDraw (Borgatti, 2002) and Kliquefinder (Frank, 1998). Shade differences of nodes reflects membership in different cohesive subgroups; lower left subgroup in all graphs (and entire graph in Kristin's case) represents members of the English Department.

Across disciplines, those teachers identified as "tech experts" and those identified by the principal as having the most innovative practices also had the most extensive connections in the school's technology consultation network. For example, math teacher Amanda's and science teacher Ken's consultation networks similarly included individuals across departments and dense connections within their own departments. Teachers who, like Kristin, used very few digital technologies in the classroom or who lamented lack of time to play with new tools or maintained smaller tech consultation networks, turning to a few close colleagues or nearby teachers for resources. This is not necessarily surprising; those teachers who use digital technologies more often would logically maintain more extensive networks of individuals with whom they might consult when developing digital resources or assignments for their classes. What is problematic,

however, is that teachers like Kristin – teachers who value the use of digital technologies and who want to learn more about integrating them into instruction – might linger on the fringes of resource-based networks like these, making it difficult for them to build their skill bases, challenge their current approach to integration, or "break into" a network of experts – especially if such a network, as I will argue here, feels inaccessible or unattainable. This could create a dynamic in which the "rich get richer" when it comes to digital literacy knowledge and opportunities to learn and experiment in collaborative spaces. As teachers like Allison or Amanda gain increased access to digital technologies and tools for their classrooms, they also gain more time to experiment with these technologies in their pedagogy, more resources to share, and more network connections from which to gain resources. As their colleagues become more adept with the words and skills associated with online authorship, digital integration, and paperless teaching, teachers like Kristin might throw their hands up in frustration, questioning their own capacity for and interest in digital learning, not sure how they will ever catch up.

Unlike Allison's ties, which span multiple departments in the school, Kristin's technological consultation ties are restricted to the English department, and primarily to individuals within her PLC. Kristin's deference to the "experts" or frequent users of digital technologies is a reflection of Kristin's perception of herself as "not as advanced" as her colleagues, a sentiment she expressed to me on a regular basis in interviews or as I observed her teaching. In one interview, Kristin noted that she would often not speak up during PLC time because much of what the other teachers discussed felt "over her head." Kristin regularly reported a lack of confidence when it came to the use of digital technologies in her teaching. This lack of confidence led Kristin to play it safe when it came to digital integration, choosing those technologies that were easiest for her to implement based on her existing knowledge and goals

and avoiding practices that felt risky. For example, when Kristin's colleagues developed a "blog ring" that would ideally connect all Borealis ELA teachers' course websites in a single, interconnected online space, Kristin hesitated to join them, saying in an interview: "I would like to, it's just that issue of time." Lacking the efficacy and requisite time to learn how to use more complex digital technologies and integrate them into her practice, Kristin tended to use technologies in ways that facilitated her work as a teacher without necessarily engaging students in digital literacy practices, as I will describe in-depth in Chapter 5.

Developing social ties that would help her expand her access to digital resources was a particularly fraught process for Kristin. In some moments, Kristin expressed feeling inspired by her colleagues' uses of technology and drawing upon their materials as resources for her own classroom. However, Kristin also reported feeling intimidated by colleagues' "more advanced" knowledge and capacity to easily navigate digital environments and expressed frustration over their "hogging" (her term) of digital resources. She reported liking the ability to "learn" and "try new stuff:"

> The PLCs, the only thing I like is being able to learn, being with our group. You know I listen to them and learn and they can help me with trying this new stuff and it gives us time to work on our goals that are for our evaluation. That's why I like it.

But she also described feeling "intimidated" and inadequate compared to her colleagues:

> I like that they're very helpful, they're very approachable, we all share a lot, work really well together… [pause] I mean, and this is just my issue with myself, is it makes me feel very inadequate when I, so I have to try not to compare myself to them. Because I am

> intimidated by the technology. It makes me feel bad about myself, about how awesome they are.

Here, Kristin expressed feeling intimidated *by the technology*, and identified her lack of confidence as primarily personal, but her statement indicates an extent to which these feelings are also interpersonal, linked to her interactions with the colleagues with whom she tries not to compare herself. When I asked Kristin to elaborate on these feelings of intimidation, she went on:

> I think it's just uncomfortable for me to be in a situation where I don't, I don't know what I'm doing. […] Well I mean all the stuff they're doing with the blogs is very foreign to me. And I read, I read their blogs, but the way that they're talking about using it for the classroom is, and just all the add-ons they have, and how to link it to the Google Docs because I haven't even done that yet. It just feels so overwhelming to me.

For Kristin, interactions surrounding digital technologies were emotionally taxing, leading her to occasionally "feel bad" or feel like conversations during PLCs or in PD sessions were "over her head." It makes sense, then, that Kristin often avoided such interpersonal technology-related interactions, confining her tech consultation network to a select few individuals with whom she felt the closest and most comfortable[7].

Kristin was likely not the only teacher who dealt with intimidation when it came to digital integration, though she was the only one who directly admitted feeling intimidated in

[7] With the exception of one individual in Kristin's "technological consultation" network who had nominated Kristin, all of the individuals in Kristin's "technological consultation" network also appear in her "close colleagues" network, as individuals with whom Kristin reported having a close collegial relationship. Thus, Kristin's tech consultation was restricted to those with whom she shared a close collegial relationship, akin to friendship, already. This was not the case for other teachers, whose tech consultations might have included a few members of their close colleague networks, but also included individuals with whom they did not necessarily consider themselves "close."

interviews. Another teacher, Tracy, was described by her colleagues as being "anti-tech." One teacher[8] described Tracy in an interview in the following way:

> Tracy's, she's famous for making it known that she's actively not trying technology. But she does try technology. So, she's a little bit of a puzzle for me. […] She gets help from colleagues and she does try stuff. I just wonder why she makes this big stand against it, but then she still on her own, tries it. I think she's probably intimidated.

In my own interview and interactions with Tracy[9], she did not report feeling intimidated by her colleagues. She did, however, note that she did not want to use the technologies (specifically, Google technologies) that her colleagues Allison and Sarah were using. However, as the teacher above observed, Tracy was not "non-digital," despite her proclamations in some faculty meetings that she did not want to do "all that digital stuff." For example, Tracy had recently identified an online learning management platform, Edmodo, which enabled her to maintain student confidentiality while still allowing students to send work and collaborate online:

> It allows the kids to upload their usage reports that I used to have them present on paper, now they upload it to Edmodo, it allows the kids to see each other's [writing] without exposing their own email address, and nobody else can look at it. It's a completely closed system. It's not like Google Docs, there are no links involved. It's just Edmodo. It's fantastic, it works perfectly for the application I need it for.

[8] In the interest of maintaining confidentiality when teachers talk about their colleagues, I have chosen to keep teachers' comments about their colleagues completely anonymous when the statement might compromise the colleagues' relationships with one another.
[9] I conducted one interview with Tracy at the start of the study.

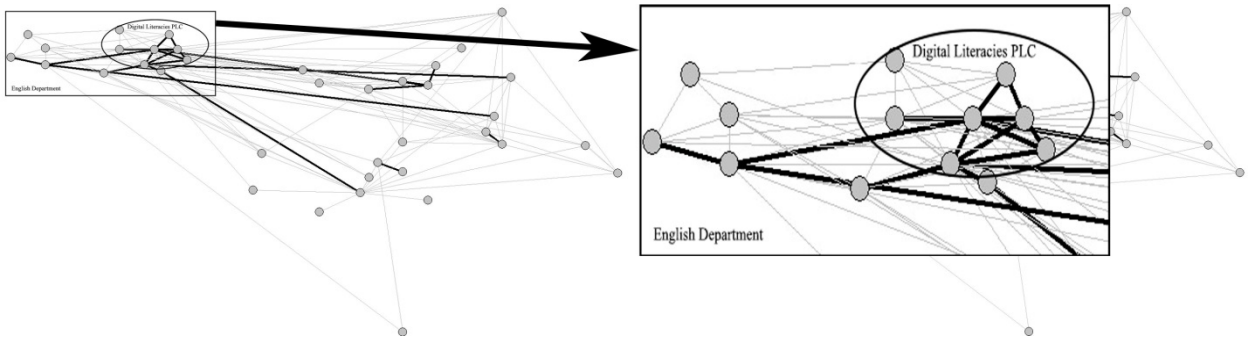
Here, Tracy described how Edmodo acted as a pedagogical facilitator[10] in which students shared their work with her and with one another in a closed online space, not unlike how Kristin used Spruz to assess students' literary discussion skills, as I will discuss in Chapter 5. Tracy's pedagogies, despite her colleagues' descriptions of her as anti-tech, are neither "anti-tech" nor non-digital. Why, then, was Tracy's practice critiqued by her colleagues as largely "anti-tech" or "non-digital?" These dynamics seemed to be dictated as much by social norms and identities in the English department as by actual observed practice. For some teachers, identifying as "anti-tech" meant *dis-identifying* with the DigLit group, or with particular members of it. As Dooner et. al. (2008) note in their study of teacher learning communities, "some individuals eventually react to the group's incessant demands for conformity by adopting idiosyncratic behavior in the hope of reasserting their uniqueness" (p. 567). This appeared to be the case in the Borealis English department, where teachers like Tracy vocally opposed identification with the DigLit group even though she was engaging in digital experimentation herself.

Further analysis of the interpersonal connections within the Borealis English department offer insight about why teachers like Kristin, and potentially Tracy, might feel "intimidated by," or isolated from some of their "more advanced" colleagues. Like Kristin's technology consultation network, Tracy's was fairly small and consisted mostly of her closest colleagues – those individuals she also considered close colleagues. But perhaps even more telling is the structure of tech consultation ties within the English department: members of the Digital Literacies (or DigLit) PLC shared digital resources with one another regularly. Members of this PLC included Kristin, Allison, Mary, Sarah, Michelle, Christina, and one other teacher in the

[10] I discuss this term in more depth in Chapter 5, where I distinguish between *facilitative pedagogies* in which digital technologies act as facilitators for activities that could otherwise be done in analog environments and *integrative pedagogies* in which digital technologies shift and alter the content of the ELA classroom.

department. Within the PLC, technology consultation ties were "tight," in that they were mostly reciprocal (if one teacher nominated another, that nomination was likely reciprocated) (See Figure 4.4)[11]. The newest members of the PLC were most peripheral to the social network of the PLC – the two newest members (who had joined at the start of that academic year) had either zero or one reciprocal tie within the PLC. Outside of the PLC, reciprocated *technology consultation* ties were rare across the English department. This is a notable difference from the *close colleagues* connections in the English department, which as I noted in Chapter 3, commonly crossed over PLC boundaries. Thus, though English teachers consulted with one another regularly about more general disciplinary or curricular concerns and maintained friendships across PLCs, consultation about digital technologies took place mostly within, and rarely outside of, the DigLit PLC. This suggests that within the DigLit PLC, knowledge and resources tended to be either "walled off" or "walled in," depending on one's perspective, creating a "digital split" despite close relationships and regular curricular consultation among English teachers.

Figure 4.4: Reciprocal Technology Consultation Ties within and outside DigLit PLC



[11] One teacher in the DigLit PLC made many nominations but had no reciprocal ties (depicted at the top left of the DigLit PLC circle in Figure 4.4). This teacher was a long-term substitute for one of the teachers in the English department, who was on maternity leave. Because she was not a permanent member of the faculty, she was not on the faculty roster provided by the principal, and so her name was left off of the first network survey administered in January.

Network representation of ties within and outside of the Borealis English Department. Reciprocal ties indicated by dark lines. Density and reciprocity within the Digital Literacies PLC illustrates the presence of strong ties among a few members of the PLC and the existence of a "clique," in social network terms.

Two teachers in the DigLit PLC and one outside of the PLC acknowledged such an interpersonal "split" in the department. One teacher (a DigLit member) described an end-of-year department meeting in which a few members of the DigLit PLC shared what the group had been working on that year. She placed herself in the positions of others in the department, saying "If I was somebody who was sitting on that other side, I would think man, this sounds like Greek to me. I have no idea what's going on, this is overwhelming." Another teacher noted in a passing comment to me between classes that the department "felt divided" when it came to technology integration. This division was further manifest in English department teachers' interactions with their colleagues in other academic disciplines; the DigLit PLC maintained most of the reciprocal consultation ties with individuals in other departments throughout the school, which meant many of the digital resources flowing through the school via interpersonal networks arrived in the English Department via DigLit PLC members. Within the DigLit PLC, one "clique[12]" of four individuals maintained most of the reciprocal "tech consultation" ties with other teachers in the school (see Figure 4.4). Certainly, as Kristin noted, members of the DigLit PLC served as interpersonal supports when it came to digital integration. However, this clique also had the potential to generate a center of social capital within the English department; social capital that it was difficult for other teachers to "tap into," especially if they did not feel they possessed the

[12] In social network analysis, a "clique" is formed when three or more individuals share reciprocal ties with one another. They are fairly rare in social networks and tend to indicate tight groupings of individuals. Taken alone, the presence of a "clique" does not reveal much besides a mutual tie shared between three or more individuals; however, paired with qualitative or attribute data cliques can guide further inquiry within a network.

technical expertise necessary to ask questions and engage with individuals whose knowledge and confidence intimidated them.

Individuals Kristin identified when she said, “the way that they're talking about using [technology] for the classroom is way over my head” were also members of this DigLit clique. Donna similarly identified that members of this clique had a tendency to “speak for the department” when she expressed her frustration that she had been left out of departmental decision-making: “I think the DigLit group seems to be sort of dictating, or maybe think they're supposed to be dictating what the department does?” Though members of this interpersonal “tech consultation” clique may not have *meant* to alienate their fellow English department members, interviews with some members of the English department suggested that the DigLit “clique” may have operated as an “intimidating” and at times alienating force, both for other members of the PLC (like Kristin) and for department members outside the PLC (like Tracy). The presence of this clique and the interpersonal social dynamics in the English department may have discouraged some teachers from engaging with digital technologies in their own classrooms; as I noted in Chapter 3, some teachers did not feel as welcome to voice opposition to the use of particular technologies (like Google), to share their own experiences with new technologies (like Edmodo), or to ask questions that would advance their own learning for fear of comparison to “more advanced” colleagues. Though they voiced some of these concerns to me or in conversations with a few of their close colleagues, teachers either voiced a reluctance to speak up to groups of colleagues for fear of being perceived as a “nuisance” (one teacher’s term) or did not do so during PD and PLC sessions I observed. Because the “DigLit” group was recognized as a space where digital experts “belonged,” certain members of the DigLit PLC had social status that often went unchecked or unquestioned, as Dooner et. al. (2008) note can often happen in

teacher learning communities: “as members work more closely with each other to develop their shared practice, fewer assumptions are left unchallenged” (p. 566).

However, a tension rests in the space between my argument from Chapter 3 and the argument I am making here. I described in Chapter 3 how the English department, unlike other departments at Borealis, shared many resources between PLCs and had more reciprocal close collegial relationships between PLCs than other departments. These findings may seem as though they clash with my description of the English department in this chapter: how could the English department simultaneously engage in more consultation and resource exchange *and* have such fraught and “divided” fault lines within the department when it came to digital integration? I would argue that these dynamics are not mutually exclusive, but are instead mutually constitutive and potentially productive for English department members’ digital learning and integration, but that for many Borealis teachers, PLCs did not engage these dynamics in ways that gave teachers a space for critical reflection and engagement with their concerns and beliefs surrounding digital integration. The shared investment in digital integration across the English department – even for those teachers who are identified or identify themselves as “anti-tech” or not into “all that digital stuff” – reflects teachers’ passionate opinions about their digital and pedagogical practices. Sometimes, “diverse means” and “diverse ends” cause these beliefs to clash within group settings (Weick, 1995), but such clashes can spark reflection and revision of teachers’ ideas. Other research has argued that “the features that are essential to a strong community, such as a shared identity and perspective, and meaningful relationships, eventually become sources of tension for its members” (Dooner et. al., 2008). Though certainly problematic for reasons I have described in this chapter, English teachers at Borealis used more digital

technologies in their classrooms on average than teachers in other academic departments[13], and teachers reported in interviews using more digital technologies than they ever had before. BHS English teachers also rated their satisfaction with PLCs very highly[14], and reported positive relationships with PLC members. Thus, "tension" and "conflict" need not be synonymous with "failure;" in a professional environment, these interpersonal dynamics may very well spark change, reflection, and challenges to the pedagogical "status quo."

Digital Learning in Robust Out-of-School Networks

For some Borealis teachers, digital integration had been occurring behind the doors of their classrooms for years. They did not need to know "how to," nor were they usually on the lookout for technologies that could streamline their teaching. They had been using various Google Apps for Education since their inception and marketing to educators, which began in 2006. Their digital literacy skills had been honed over years of experience working in multiple online platforms, and they perceived literacies as multiple and changing. These teachers, whose practice I will discuss in more detail in Chapter 5, regularly reflected on how their teaching prepared students for the literacy tasks they would encounter in college and the workplace. To reference the framework I introduced in Chapter 1, these teachers' practices were frequently *integrated* into the content of their courses. Their digital learning networks were robust within Borealis, but also extended far beyond the walls of the high school. For these teachers, digital learning and digital integration was a necessary component of teaching in the 21st century; students in their classrooms were frequently engaging with digital devices, articulating their reasons for using particular technologies, or discussing the role of technology in their lives.

[13] Borealis English teachers reported using digital web technologies in the classroom at an average rate of 2.48, compared to an average of 1.78 across other departments ($p<.001$ in assumed equal variance T-test).
[14] 4.18 average on a scale of 1-5, compared with a 3.80 average throughout the rest of the school, though this difference was not significant.

Mary, who had been teaching English for eight years when I met her, was one of these teachers for whom digital technologies were a regular and integrated component of her pedagogical beliefs and practices. When I talked to Mary about her social networks, she certainly named a few teachers within Borealis, but she more frequently spoke of her colleagues outside of the school who had helped her shape her thinking about and engagement with digital technologies. Mary's extended, out-of-school networks included the following groups, which she identified and helped me to define in one of our interviews:

1. Former colleagues from her previous job in a neighboring town;
2. **Former mentors and friends affiliated with the local university, where she earned her master's degree;**
3. **Former and current teacher consultants from Blue Hill Writing Project (BHWP), for which she was co-director;**
4. **National Council of Teachers of English (NCTE) and National Writing Project (NWP) connections throughout the country;**
5. **Borealis High School colleagues in the English department and throughout the school;**
6. District leaders at the Intermediate School in the Borealis district;
7. Friends she met during her master's and undergraduate programs at the local university;
8. Members of her book club; and
9. Friends and family.

Mary also listed other individuals and groups who she considered integral to her personal networks, but who did not necessarily contribute to her professional identity, learning, or

pedagogy. The groups I have bolded above indicate the communities in which Mary recalled regularly engaging in what she called "critical conversations" about technology and pedagogy that challenged her thinking or shaped her practice.

For Mary, these out-of-school networks were important for her pedagogical learning and reflection. She expressed, in one interview, how her connections with individuals outside of school offered different possibilities compared to her in-school networks:

> In many ways, some of the people that I work with outside of school, I have honed the craft of teaching with more than people [at Borealis]. There are some people here that I have worked on that with. But in many ways, in terms of my thinking as a teacher, and in terms of what I do in the classroom, they know me more in that way than some of my colleagues here [at Borealis].

In the same interview, I asked Mary to elaborate and reflect on the differences between her in-school learning networks and the out-of-school networks she had fostered over nearly a decade. Mary noted that at her previous school, she had needed to turn to outside networks in order to maintain a love of teaching; those connections have strengthened over time as Mary has become a leader in many of these outside networks, including the Blue Hill Writing Project, where Mary helps the writing project director conduct professional development in accordance with the National Writing Project's mission – to honor teachers as learners and writers, and to challenge traditional notions of pedagogy and literacy in the 21st century (National Writing Project, 2010). Mary said of her connections with individuals in these networks:

> They make work not feel like work when I collaborate with them. We come toge--, we already have come together over a common discussion and philosophies, but are willing

> to challenge each other. That's one thing in common, history with people in terms of commonality and philosophy. But also, they care a great deal about my success, I care about their success, there's a strong appreciation for each other as individuals and people and also scholars. And again, those things, it's not that it's not [at Borealis], I just have a stronger relationship with them.

Mary's participation in these out-of-school networks was difficult to capture using traditional network methods; because I had placed admittedly arbitrary (but necessary for analysis) limits around "Borealis High School teachers" as my network unit of analysis, I was unable to capture these network connections statistically or visually. However, interviews with Mary and with other teachers revealed the extent to which external interpersonal networks played a significant role in teachers' digital and pedagogical learning at Borealis. For instance, Allison, who was a newer user of digital technologies, similarly maintained external networks of individuals who contributed to or fostered her digital literacy learning; these included connections with individuals at her master's institution, where she learned how to use Google Drive and online forums for the first time, and connections with other bloggers and blog readers. For Amanda, a teacher in the mathematics department, friends and colleagues at local educational technology companies along with classmates and professors from her educational technology master's program enabled her to engage in ongoing digital learning and experimentation in her classroom. These outside networks provided not only learning support; they also supplied actual hardware for Amanda to use to pilot learning apps with her students.

For those Borealis teachers whose beliefs and practices included uses of digital technologies that were *integrated,* interpersonal networks included both extensive connections with teachers across Borealis departments and connections with external communities and

individuals who provided digital resources or learning opportunities beyond what teachers could access at Borealis. This was true for Mary and her colleague Allison, whose digital learning networks reached far beyond the walls of Borealis into their surrounding communities, personal writing experiences, and university coursework. These teachers were often identified as leaders by their colleagues, and would occasionally bring resources they gained in their external networks into their interactions with their Borealis colleagues, as Mary did when she piloted ELI, a peer-review software developed by her colleagues from the local university. Conversely, for teachers whose professional networks did not extend far beyond Borealis, the extent of their opportunities to learn about and with digital technologies happened primarily within PD and PLC sessions at the high school, and digital consultation networks were limited to a select few colleagues with whom a teacher felt most comfortable, as was the case for Kristin. These teachers were more likely to use technology facilitate existing goals consistent with existing content curriculum; as I will argue in Chapter 5, such practices are common for all teachers, but do not necessarily require *students* to critically engage with digital technologies.

That some of the most advanced digital experts at Borealis turned to external networks and learning spaces for support might be disheartening to those responsible for designing and implementing professional development, especially when so many school resources go into planning these learning opportunities for teachers. Certainly, it would seem as though some teachers at Borealis *needed* to turn to external networks in order to continue challenging themselves and growing as teachers. However, I would argue that these findings need not be discouraging, but instead informative, for scholars or administrators looking to create effective PD for teachers that will inspire digital integration in the interest of improving literacy instruction. Successful models of professional development such as those espoused by the

National Writing Project value teachers as learners and conceptualize teachers as individuals who must *engage with* their disciplines through experiential learning. My findings in this chapter show that like students, teachers learn how to use new tools and technologies (and concepts) through experience and "play," through access to digital technologies, and through experimentation and mistake-making. Much of this "play" and exchange of resources at Borealis occurred not during PLCs or PD time, but via teachers' interpersonal connections within and outside of Borealis, as digital expertise in the form of resources and ideas navigated across the teaching faculty. Today's professional development experts, then, might look to such interpersonal networks to examine how learning occurs within them and how PD might draw on the knowledge and practices that are common in these networks.

Conclusion: Interpersonal Networks and Mediated Teacher Learning in the Digital Age

When it came to digital learning and pedagogical change at Borealis, teachers needed a "group of buds to make mistakes with," as Allison's opening quote suggests. Some teachers, like Kristin, struggled to locate such a group, grappling with low self-efficacy when it came to digital integration; other teachers turned to network connections outside of school, developing their digital pedagogies with colleagues in The National Writing Project or from the local university. For some teachers, PLC time enabled them to meet with their "buds" and to develop digital resources, but such time was rarely spent engaging in digital "play" or discussing how digital technologies might advance student learning. For some of the most advanced users of digital technologies, PLC and PD time did not meet their needs, and so they turned to out-of-school learning spaces and professional networks in order to challenge themselves.

When it came to digital learning, access to resources and to the networks through which those resources flowed was important for Borealis teachers. Today, the movement of the "stuff of teaching" is harder to trace, as teachers email digital copies of assignments back and forth (as Mary did when she sent a copy of her independent reading assignment to Donna), develop websites as guides for other teachers, with example assignments and student work (as both Allison and Sarah did for teachers across, and outside of, Borealis), or solicit advice from one another on Facebook (as Allison did on multiple occasions throughout the study). With all this movement of digital resources, the new "stuff" of teaching and learning, it is easy to lose sight of the ways the devices and technologies of the classroom mediate both students' and teachers' literacy practices. In Chapter 5, I will explore how Kristin's use of technologies with students largely separated such technologies from the space of the classroom, maintaining traditional curricula with occasional uses of technology to streamline or facilitate tasks. In contrast, Allison's and Mary's practices often brought digital technologies into the classroom, along with conversations about the genres, literacies, and capabilities of those technologies. I will highlight how in classrooms where students were most likely to make rhetorical decisions about when, how, and why to use digital technologies, their teachers were regularly integrating digital tools into both conversations and classroom practice. Such integrated approaches require teachers to have regular access to hardware, regular opportunities to "play" and "experiment" in new digital spaces, and the ability to confidently acquire and distribute resources across professional networks, as I have shown here.

For teachers at Borealis, time to engage with tools and technology was an integral part of the learning process. Whether or not a teacher reliably and lastingly took up a new technology in his or her pedagogy relied largely on the teacher's willingness and ability to engage, or "play,"

with that technology on his or her own time. It also depended on whether or not the teacher's life outside of school allowed for, or encouraged, digital experimentation through master's coursework or a teacher's own interest and motivation to compose or engage with digital spaces. These findings challenge calls for increased collaborative learning time for teachers, despite the growing popularity of PLC and CoP models for teacher professional development (Lee & Shaari, 2012; Stoll, Bolam, McMahon, Wallace, & Thomas, 2006). While such professional learning models have been shown to increase student achievement (DuFour et. al., 2010; Williams, 2013), studies have not examined such models alongside teacher networks and digital literacies; in contrast, network studies have suggested that when it comes to digital tech, many teachers require focused instruction followed by time to "fiddle," and only at the most advanced stages does regular collaboration enable meaningful digital integration (Frank et. al., 2011). In schools where such models do exist, this chapter and Chapter 3 suggest the need for focused attention to the goals of teacher learning communities: how time should be spent within them, how they draw on the existing resources and networks in the school, and how they address the needs of teachers at varying levels of implementation. In the digital age, more attention might be given to hybrid models of professional development that fuse collaborative learning time in small communities with individualized learning in blended online and face-to-face environments, where teachers might pursue their own questions or pedagogical challenges with coaches or mentors.

As Dooner et. al. (2008) argue, communities are drawn together by both individual and mutual motivators. With one common goal to work towards, groups of teachers cohere around their desire to achieve that goal – however, they do not sacrifice their own agendas and desires for their classrooms or their own learning in the process. At Borealis, teachers pursued their individualized goals in external networks and within their interpersonal networks. Within the

DigLit PLC, individual goals were sometimes eclipsed as teachers articulated standard goals and then spent PLC time attending to administrative tasks. Unlike other professions (such as medicine or business), teaching practice is often and persistently isolated. Despite recent calls for teachers to regularly engage in shared practice and collaboration, the physical and social space of the school places teachers in classrooms with four walls and a door; teachers therefore come to any collaborative environment with their "own classroom" and "own students" in mind. In PLCs where teachers are grouped as they are at Borealis, teachers do not even share the same students (as they might in a middle school "team model"). In these settings, teachers inevitably develop their own goals for themselves and their teaching. The articulation of individualized goals may help teachers like Kristin identify successes within their practice, whereas sharing a single SMART goal with other more tech-savvy teachers may make it easier for Kristin to see how her attempts at implementation fall short.

Though Borealis PLCs and PD promoted an approach to teacher learning and development focused on giving teachers the choices and space they needed to be innovators in the classroom, state requirements for teacher evaluations and unclear purposes for PLCs led professional development at Borealis to promote uses of digital technologies that did not necessarily promote students' digital literacies, as I discussed in Chapter 3. However, this did not keep teachers from finding social spaces in which to learn about and integrate digital technologies in critical and innovative ways – some teachers turned to their interpersonal networks within and outside of the school, their "buds to make mistakes with," with whom they maintained ongoing conversations about the role of Google in the writing classroom or accessed new digital tools, technologies, and resources. It was in these interpersonal networks that teachers' most powerful learning occurred – or where teachers struggled with feelings of

inadequacy or low self-efficacy. For those teachers who struggled, consultation networks were small, confined to only a few close colleagues, restricting their access to resources and spaces for digital learning. In the chapter that follows, I analyze the pedagogical differences between those teachers with robust digital learning networks and those teachers who struggled to find a space to reflect on and challenge their beliefs about and practices with digital technologies. I provide examples for the conceptual distinction I presented in Chapter 1 between *facilitative digital pedagogies* and *integrative digital pedagogies,* and make the argument that this subtle distinction carries important implications for student learning and teacher practice in the 21st century.

Chapter 5: Differentiating Digital Pedagogies: Facilitative and Integrative Approaches to Using Technologies in the Classroom

> *Let's say they're writing about freedom or patriotism in a particular text for their personal anthology and they need a little help. …I can see them reading those critical essays by scholars, and they can find it right in Google Drive. […] So I think that broadens the critical thinking piece, because if they were doing traditional paper and pencil they wouldn't have that mechanism to extend their thinking.*
>
> *–Allison, March 2013*

In our second interview on a chilly March afternoon, sipping coffee in her dimly-lit classroom, Allison described her reasons for using Google Drive to assist students in their composition of research papers. Allison's comments here reflect her pedagogical beliefs about technologies (or at least, about Google Drive) and what they can do for her and her students in the classroom – online technologies streamline, enable students to do things such as access academic references more quickly, and in the process allow students to "extend their thinking" or engage in "immediate and meaningful" learning. Allison's approach to digital integration is in some ways similar to and in other ways distinct from the approaches of her colleagues in the English department and throughout Borealis High School. This chapter closely examines these differences in teachers' pedagogical practices at Borealis, focusing on the details of teachers' beliefs about both ELA content and the role of technology in shaping that content, and how those beliefs manifested themselves in teachers' approaches to integrating technologies into their

instruction. This chapter also draws on data from the previous two chapters, building connections between teachers' social learning and their pedagogical practice.

In this chapter, I define two types of *digital pedagogies* based on both the literature I reviewed in Chapter 1 and on data I collected throughout the study. The findings I share in this chapter allow me to discuss the implications of the previous chapters related to teachers' social learning, tying these social dynamics to student learning – why does it matter if Kristin felt intimidated by her colleagues' digital skills? Why does it matter if Allison obtained digital literacies through "play" with digital technologies outside of school? Ultimately, it is student learning that is the goal of any teacher learning initiative; how do such social structures at Borealis matter for student learning? Here, I explore the pedagogical implications of the social and institutional structures surrounding digital integration at BHS, and argue that these networks may either promote or limit pedagogical approaches to digital integration that engages students in digital literacy learning.

As I noted in Chapter 1, from Mishra & Koehler's technological pedagogical content knowledge (TPACK) to Hicks, Turner, and Stratton's (2013) application of Hillocks (1995) declarative and procedural knowledge, there are many ways in which scholars imagine what 21st-century pedagogy might look like, and what the role of digital technologies could (or should) be in teacher practice. This chapter draws on these studies and on the data I collected during my time at Borealis High School in order to show how Borealis English teachers' uses of digital technologies sometimes facilitated the accomplishment of existing curricular goals, and at other times fully integrated digital technologies into teachers' pedagogical practice. In this chapter, I will argue for a refined framework for conceptualizing teacher pedagogy that differentiates between those practices that are *facilitated by* digital technologies and those practices that fully

integrate digital technologies. I will explain this distinction by focusing primarily on the pedagogical beliefs and practices of two teachers – Kristin Lewis and Mary Abington. Both of these teachers used digital technologies in their English classrooms, but they did so in different ways. At the end of this chapter and in the chapter that follows, I will complicate my framework by arguing that teachers move between and within facilitative and integrative uses of digital technologies, and that while both approaches have the potential to benefit student learning, integrative approaches do more to benefit students' *digital* learning.

As I have mentioned in previous chapters, Kristin's and Mary's social networks and digital learning experiences were different in many ways. For Kristin, interpersonal interactions surrounding digital technologies were sites of tension, where she struggled with feeling both excitement and inspiration alongside inadequacy and intimidation. During her time in the DigLit PLC, Kristin remained mostly silent, and she expressed regular frustration with the lack of time to explore the possibilities and lack of ability to access available hardware. When it came to digital pedagogy, Kristin's approach to integration generally treated digital technologies as an "add on," something that she was tacking onto her existing ELA curriculum in order to accomplish long-established ELA goals, such as rich discussion of texts or literary analysis. Kristin's pedagogical approach to digital integration incorporated technology in ways that enabled her to meet existing curricular goals without needing to drastically change curricular content.

In contrast, Mary's interpersonal professional connections extended well beyond the walls of Borealis, and these networks were particularly invested in digital writing and digital literacies. Mary's digital learning occurred primarily in these outside networks, where she directed workshops and National Writing Project Summer Institutes, wrote for various blogs

about digital literacies and digital classroom practice, and collaborated with colleagues within and outside of her district to develop resources for teachers. Mary's experiences in the DigLit PLC were similar to Kristin's, in that she rarely participated in discussion; in interviews, Mary noted that challenging her colleagues' conversations in her PLC was difficult and uncomfortable, and that it was often easier to rely on her outside networks for the conversations and collaborations that felt most meaningful to her. In the classroom, digital technologies were part of the everyday routine of Mary's teaching. Mary's pedagogical belief that digital technologies should be a regular part of students' writing lives led her to integrate technologies in ways that were guided primarily by students' own writing purposes. Students were regularly called upon in Mary's classroom to make decisions about what technologies to use and why, when, and how to employ them.

In my discussion of Kristin's and Mary's digital pedagogical beliefs and practices, I will also integrate examples from their colleagues – Donna, Amanda, and Allison – to both trouble and make clearer the distinction between *facilitative digital pedagogies* and *integrative digital pedagogies*. While I do not make the argument that teachers' interpersonal networks were solely responsible for shaping their approaches to digital integration, I do trace a connection between teachers' experiences with and engagement in digital integration PD, their development of interpersonal networks for learning and engaging in conversations about digital technologies, and pedagogical practices that either did or did not use technologies to engage students in digital literacy practices. I make the argument that for Kristin and Mary, professional development structures at Borealis – in part because of their focus on student achievement and teacher evaluation – did little to help teachers use technologies in integrative ways, while interpersonal

networks and interactions played a significant role in helping teachers critique and critically reflect on their beliefs and practices surrounding digital integration.

"Digital Pedagogies" at Borealis High School

What are digital pedagogies? As Mishra and Koehler's (2006) TPCK framework argues, successful technological pedagogical practices enable students to "learn in contexts that honor the rich connections between technology, the subject matter (content), and the means of teaching it (pedagogy)" (p. 1047). In keeping with this theory, my time at Borealis High School convinced me that digital pedagogies are not necessarily distinct from other pedagogical practices or teachers' beliefs about teaching, learning, literacy, and content; rather, as Mishra and Koehler argue, digital practices combine with pedagogical beliefs and practices that are inherent to a discipline or school subject, potentially transforming the content or pedagogy itself in the process. It is therefore useful not to think of *digital pedagogies* as pedagogies that are separate or independent from other beliefs and practices about learning and teaching – such as "writing process pedagogies" or "critical pedagogies" – but instead to think of digital pedagogies as teaching beliefs and practices that include the use digital technologies as a component of other pedagogical beliefs and practices. In other words, in the 21st century classroom, *all pedagogies* could be *digital pedagogies,* if they employ digital tools and technologies as intermediaries or mediators.

In the following section, I will describe the differing practices of two teachers and a few of their colleagues – one teacher, Kristin, who primarily positioned digital technologies as "separate" or "something extra" – this teacher's pedagogies were for the most part digitally *facilitative,* because digital technologies allowed her to achieve curricular goals she had already established that were not tied to digital technologies. For Kristin, technologies acted primarily as

intermediaries, to draw on Latour (2007) – they were present as part of Kristin's practice, but did not necessarily "transform" her understanding of ELA content or her regular teaching practice. I will also analyze Mary's pedagogical approach to integrating digital technologies. For Mary, technologies were not something "separate;" they were integral to the work of her classroom. Mary's pedagogy, instead of positioning digital technologies as "aids" that "streamlined" the process of teaching English, often transformed, or mediated, the way students interacted with and conceptualized course content. Her integrative digital approaches required students to consider which digital tools they would use, why, and how these tools transformed their knowledge of writing or literature.

Digitally Facilitative Pedagogies: Kristin and Donna

A typical day in Kristin Lewis's British Literature classroom was likely to involve a lot of talking. This was because Kristin's favorite part of being an English teacher was leading and fostering intellectual conversations among her students. It was clear from our very first interview that one of Kristin's primary goals as a teacher was to help her students discuss texts in meaningful and motivating ways. She noted early in our first conversation that her favorite unit of the year was her "lit circles" unit, in which students read different novels in small groups. When asked why she enjoyed this unit, Kristin said:

> I have the students do these dialectic journals and we've been practicing them throughout the year so by the time we get to the lit circles I'm really raising the expectations, wanting detailed, thoughtful responses, so they're pretty good at them by that point […] They're just so focused on the novel, the things they talk about with each other, they're all participating.

Kristin mentioned how students' dialectic journals[1] supplemented their participation in online forums and their discussions in class, where students could reference their journals when sharing their thoughts about a text. For Kristin, students' writing in dialectic journals and in online forums allowed her to address her goal of fostering meaningful discussion about complex literary texts in her British Literature classes. She also said participation in discussions was a major goal for her Lit Comp 10 students, who she argued needed to develop discussion skills in order to be successful in their junior year:

> Definitely a goal is to get all of them involved and so in discussions I'll often have them do some writing first and then share with a person near them. The small group thing we do a lot. I'll draw names out of hats or out of an envelope because I want them to all be participating and working on that.

It was a natural fit for Kristin to work with online discussion forums when her Professional Learning Community (PLC) chose to focus on forums the previous school year – even though her PLC had chosen to focus primarily on blogs during my time at BHS, Kristin continued to focus on forums, hoping to improve her use of them. Kristin created forums on Spruz.com[2] for her 10th and 11th grade literature courses, and required students to contribute to these forums at home, both posting their own questions and responses to the text and responding to their classmates' posts.

[1] Dialectic journals were hand-written or word-processed journals in which students chose meaningful quotes and responded to them with their thoughts on the meaning or significance of the quote. Kristin required students to complete these for every novel unit throughout the school year, and students regularly referenced their dialectic journals during class discussions.

[2] Spruz.com allows organizations to create their own "social networks" that are restricted to accepted members. Through mini-grants, teachers at BHS could buy a subscription on Spruz.com for certain classes. Specifically, some British literature and American literature teachers at BHS had access to Spruz.com and used the site to create discussion forums.

Kristin was regularly concerned about needing to "do more" or "learn more" in order to integrate digital technologies. Online forums allowed Kristin to continue developing an existing pedagogical practice – fostering discussion about literary texts – which did not require her to change her goals for her course or significantly alter her curriculum. For teachers like Kristin who were concerned about the "extra" (time, planning, learning) that might accompany digital integration, approaches like this work well for integrating technologies in ways that feel less "risky" than, for example, digital storytelling or blogging. Technologies in these cases *facilitate* those content-based pedagogical practices teachers are already using, without a lot of extra time or resources required. Forums fit into Kristin's existing pedagogical goals, which included engaging students in regular discussion of literary texts, and in some cases were even able to extend and enrich Kristin's ability to foster discussion. Kristin noted that many students who would not have participated in class discussions before the introduction of forums were more likely to participate meaningfully and actively in online forum discussions, enabling her to assess discussion skills for all students more easily than she was able to without the forums. When it came to Kristin's goal to include more students in discussions about texts, the forums gave her one more way to achieve this goal. Thus, pedagogical approaches that *facilitate* pedagogical practices teachers already found important still have the potential to transform the teacher's pedagogy, allowing them to adjust their content-based goals for students.

For example, Kristin also noted how important the forums have been to improving her pedagogical approach to literature discussions, especially since she began incorporating "exit strategies," or ways for students to connect their own ideas to those of their classmates in order to further discussion, during the most recent school year. This strategy started in the forums, but extended into face-to-face class discussions:

> I've seen our class discussions improve so much as we've been doing the forums too, and I've seen the forum discussions improve. This year, when I added the exit strategy piece, versus last year when I didn't do that, it just gives them more to keep it going, but in class I'm so impressed by the kids. They use their strategies from the forums in class by saying, "I definitely agree with what so and so just said," and they'll repeat it, and then take it in their own direction, and that is something that we've practiced in their replies. So it's exciting that they're doing that on their own, they're extending that into our discussions.

Here, Kristin explained how she accomplished her pedagogical goal of engaging students in meaningful literary discussion, weaving together her pedagogy with the content of the English classroom. She used the forums to support this process, requiring students to first reply to one another in writing using "exit strategies," and then to integrate those strategies into their in-class discussions. The online forums gave Kristin a way to assess students' developing discussion skills and also gave her students a space in which to practice those skills. The online forums therefore enhanced, or facilitated, Kristin's existing ELA pedagogy. In some ways, it also transformed Kristin's pedagogy by helping her learn and reflect on new ways to improve students' face-to-face discussions.

However, despite Kristin's goal-oriented integration of discussion forums into her pedagogical practice, forums and other digital technologies remained in many ways separate from the day-to-day work of Kristin's classroom during my time at Borealis. For example, students completed their forum posts outside of school, as homework assignments. Forums were only incorporated into two units during the school year; Kristin wished she could do them more often, but cited technical and time obstacles as reasons omitting forums from some units, often

tied to the resource obstacles I noted in Chapter 4. Furthermore, forum posts presented grading obstacles for Kristin, because they took her longer to assess, and that assessment was focused primarily on examining whether or not students posted or commented on the forum by clicking through various posts. These obstacles prevented Kristin from using the forums for more than two literary units during the academic year of my study. Because Kristin had other means through which to assess students' developing discussion skills, the forums were "extra," an added on assignment students could complete in order to illustrate their thoughts about or comprehension of a text. Forums were something that could be brought into or removed from Kristin's teaching, depending on whether she had the time to integrate them.

Furthermore, as is evidenced in Kristin's quote above, the discussions that were most important to Kristin were those that took place face-to-face, in the classroom. Certainly this is true for many English teachers, who want to engage students in intellectual discussions about the complex characters, themes, and motifs of literary texts. Kristin regularly spoke about successful discussions as moments in class when students were engaged in debates and lively exchanges with one another about characters, themes, or plots. Kristin's practice with the discussion forums therefore illustrates the use of online forum technologies *not to develop digital literacies*, but to *develop discussion skills* that could be transferred into the face-to-face environment of the classroom. Kristin's goals, then, had little to do with the technology of the forums, making the forums themselves relatively "transparent" to students – students were not called upon to consider why they might write in a forum versus having a face-to-face conversation, to explicitly question how the forums contributed to their learning, or to use forums for their own rhetorical purposes. This was characteristic of pedagogies that were facilitated by digital technologies in order to complete a task or assignment in service of another curricular goal; they moved into a

digital space those tasks that were otherwise analog, and focused primarily on existing content goals that had little, if anything, to do with students' digital learning.

Is this problematic? Not necessarily. Kristin was not, after all, teaching a course on computer technologies – she was teaching British Literature. For her goals surrounding the forums to be focused primarily on the literature of the course and students' discussions and analysis of those literary texts is to be expected. Furthermore, many of Kristin's colleagues described ways in which digital technologies helped them accomplish curricular goals that they could have accomplished in analog environments, but digital environments either proved easier, more efficient, or more engaging for students. Teachers today use digital technologies to enable faster communication with parents and colleagues, to record grades and analyze trends in student data, and to present material and to collect student work, among other things. However, in the absence of integrative pedagogies – which I will describe in a later section of this chapter – approaches to digital integration that use technologies to *facilitate classroom tasks* without *transforming* curriculum or conceptions of content risk positioning technologies as "separate" from the work of school, never calling on students to be strategic users and composers in digital environments.

Kristin's colleague Donna, who is shared between the English and history departments, described her use of Quia, an online assessment system developed specifically for schools, to formatively assess her history students' understanding of the course content. Like Kristin's practice with the forums, Donna's use of Quia was primarily facilitative, in that it gave her a way to formatively assess students and to collect data about what they had learned. She talked about Quia in one interview:

> Quia is probably the best new tool I've used this year and I really am sold on it. Like I just think it makes sense. I mean again the kids are using it outside of my room, it's not happening in here, but it's just one more tool for them to get instant feedback, for me to instantly see okay they're getting it, [or if] they're not.

For Donna, as with Kristin, Quia was positioned as an add-on, "one more tool," that enabled her to keep up with students' progress in ways she might have been able to accomplish in other media. The digital space of Quia made this process easier for Donna. As with Kristin's forum discussions, students engaged with the space primarily outside of the classroom, and the digital space itself was not tied to the goals of the course – Donna's objectives were for students to display their knowledge about The Great Depression, not for them to learn how to critically engage with web assessment programs or to use them to their own ends.

In these examples, the web technologies being put to use in Kristin's and Donna's classrooms are being implemented in the service of other goals, such as formatively assessing students' understanding of class content or fostering discussion of literary texts. According to Mishra and Koehler's (2006) TPACK framework, however, teachers need to know "not just the subject matter they teach but also the manner in which the *subject matter can be changed by the application of technology*" (my emphasis, p. 1028). In these two examples from Kristin's and Donna's classrooms, the technology works alongside and in the service of teachers' existing pedagogical goals and strategies, and does not dramatically change the *subject matter* of their English or history courses. When technologies are integrated in this way, they can provide teachers with tools to streamline their assessment or planning processes or enable teachers to reach students from home, engage in assessment, or give feedback. Pedagogical applications of technologies like this, or what I am calling *facilitative digital pedagogies,* do not necessarily call

on students to think about the technologies with which they are interacting, the ways in which those technologies correspond with the content they are learning, or the reasons why they might take up a particular technology in order to accomplish a content-based goal of their own. This does not mean these pedagogies or uses of technologies are substandard or ineffective, only that such uses do not necessarily call on students to be strategic users of the devices and technologies they are encountering in school.

Kristin did not necessarily believe digital technologies were "separate" from the work of her classroom, but her practices positioned them as separate in a number of ways. In one interview, Kristin expressed a desire to experiment with blogs and to learn from what her colleagues have done. However, Kristin saw little room in her existing curriculum for teaching digital citizenship or modeling digital literacy practices. When students in Kristin's classes engaged with digital technologies beyond the forums, it was because they were offered the option to do so for particular assignments, and because they already possessed the skills necessary to develop a video or record a podcast. For example, one of Kristin's assignments for her British Literature course required students to create a modern interpretation of a scene from a Shakespeare play. Students developed a script and acted out their translated scene. In their presentations, they introduced the scene and the characters and identified major themes from the scene. Students had a choice about which technology they could use for their presentations; Kristin said many students chose to use PowerPoint, while others created videos:

> …they have to do it in two ways. So they have to do a visual and a written-out. So some of them make a playbill that they hand out to the class. Some of them do it on a PowerPoint, but then they also, when they're in character, in costumes, they have to do

> an introduction, first person, as that character too. So that's kind of what they do at the beginning of the video a lot of times.

Kristin's students were allowed to choose which media to use to present their scene from Shakespeare, but Kristin did not offer instruction on developing their "visuals:" videos, PowerPoints, or playbills – it was up to the students to draw on their existing knowledge to create these multimodal texts in multiple media (if they chose). In her own words, Kristin had "nothing to do with that," and students relied on their experiences in film or other courses or their personal lives in order to create their projects. In another assignment, Kristin engaged students with satire by inviting them to either find examples of satire or create their own satire. For this assignment, like the Shakespeare assignment, Kristin similarly gave students the option to engage with multiple media, including digital media. The assignment reads:

> Pick any topic and do it as an individual, pair, or team. Then pick a format you are most creative in to deliver your message: computer, written, song, visual, musical, live, video, animation, etc. If you write, pick a genre: poem, essay, personal narrative, etc.

Though Kristin's assignment echoes the value she places on composing in multiple media that she expressed to me in interviews, instruction related to that media was not part of the assignment; students needed to draw on their existing literacies to create their parodies. Kristin's approach to this assignment moves multimodal composing outside the space of the English classroom. Teachers who regularly used digital technologies as facilitators would ask students to engage with technologies outside of classroom time, as Kristin does here and as Donna did when she described how digital technologies allow her to assign work beyond the classroom, as something students can use at home as reviews or as they complete homework.

Assignments like these *could have* included digital literacy instruction – Kristin could have talked to students about how to compose in digital spaces like iMovie or PowerPoint, or engaged them in conversation about when and why to choose certain programs for composition. Instead, Kristin relied on students' existing digital skills and interests and, and attributed her students' digital knowledge to either other courses (like film class) or to students' hobbies and work outside of school. Kristin was well-positioned to begin integrating digital literacy instruction into her existing ELA pedagogical practices; she was interested in learning more about digital technologies and their potential for her pedagogy, and believed it was important for her students to compose in multiple modes and using various technologies. Certainly, many factors came together to shape Kristin's practice, many of which I may not have observed; however, Kristin expressed the strain of lack of time, lack of adequate access to network resources, and lack of personal knowledge about multimodal composing, and I would argue that these insecurities and obstacles played a major role in Kristin's hesitancy to pull digital composing into the space classroom. The more comfortable option, and one that served Kristin well, was to allow students to draw on what digital knowledge they already had and to give them the choice to use technologies outside of class to complete assignments.

Donna had considered how the use of particular digital technologies might transform not only her existing practice, but also how she engaged students with the content of her courses. Though I never observed Donna using blogs in the classroom, she expressed an interest in integrating blogs the following school year. In one interview, she reflected on her potential goals for a course blog and how she might integrate it into her instruction:

> We're at the Cold War right now. I want… "Oh my gosh! I saw this in the news about North Korea." I want them posting that stuff so that everybody can see it, because it's

> cool when they come and talk to me about it, but it's like, "Well, some other kid might be interested in that," or, "I heard that so and so died." So [they need] a place to share and be more curious and discover more about history that I can't possibly get to in a 55 minute class period, and taking it out of here and putting it online and giving those kids who are very quiet in class, but who may have tons of great contributions, but maybe they just aren't feeling comfortable sharing. So I see technology's role in that class in that way, as more of a… I don't know how to explain it, like a magazine of their ideas, just different things.

For Donna, her hypothetical future class blog could serve many purposes, including giving quieter students a space to contribute to the course content and expanding the reach of the classroom to include a space characterized by "sharing" and "being more curious" and "discovering more about history." In a later interview, Donna described this potential blog space as "giving students more ownership" over the course content. Donna's blog could result in *integrative digital pedagogies* that might transform the ways in which Donna's students engaged with content and would require students to consider how they share and discover information about history.

Though I was unable to witness how a course blog might have reshaped Donna's approach to teaching history, I was able to observe a select few teachers at Borealis engaging in practices that called on students to consider how digital technologies contributed to or shaped their reading and writing practices. These pedagogies were unlike the practices I described from Donna's and Kristin's classrooms, because they not only required students to *use digital technologies* to accomplish academic tasks, but they also required students to *think about how, why, and when to use technologies to accomplish their own rhetorical goals.* These pedagogical

practices integrate digital literacy instruction into content instruction, transforming teacher pedagogy to account for digital environments and how they are shaped and shaped by disciplinary content.

Digitally Integrative Pedagogies: Mary and Amanda

On a typical day in Mary's classroom, I could be sure to find students using an array of devices – or not. Students in Mary's classroom often had their own devices open or available, working on Mac laptops or grabbing a PC from the COW cart that was housed in Mary's classroom. Or they were device-free – on other days and in particular classes, devices were put away in lieu of a packet, a pencil, and a book, depending on Mary's goals for the day. On one particular day, Mary's Literature and Composition 9 students were working on argumentative essays. An excerpt from my field notes illustrates how Mary integrated functional literacy instruction into her writing instruction on this day:

> Six students choose to use Google Drive, while the others opt for Microsoft Word, and Mary circulates to help students with their essays. One set of students -- two girls -- are struggling to get started, and she encourages them not to start at the beginning, but to start in the middle, or with a body paragraph, because "that's what writers do" and "lots of writers do that." She refers frequently to the practices of writers as she talks with students. […] She helps students open their Google accounts, teaches them about "hot keys" for copy/pasting, and allows them to make their own decisions about whether and when to listen to music as they compose.

For Mary, composing an essay included not only writing, but learning how to write strategically using technologies and strategies that aided the writing process, such as Google Drive, Microsoft

Word, or even iTunes. She took a brief moment as students were writing to explain how to use "hot keys,[3]" reminding students that they could revise by copy/pasting former versions of their text into new documents so that earlier versions would not get lost in the revision process. In this lesson, Mary illustrated how technologies have the potential to not only give students a place to type their papers, but to transform how students write and think about writing. The content of Mary's English classroom is transformed as students learn different ways to revise and compose using hot keys and think about which technologies will best fit their writing purposes and aid their writing processes.

Mary also focused on developing students' rhetorical and critical digital literacies in her instruction, encouraging them to consider the consequences of digital engagement. For example, in one interview, Mary described a "teachable moment" she experienced with a student's controversial post on Facebook. When she spoke with this student, she described herself as being the "argument teacher," and applied her goals for writing to this situation in a digital space – here, Mary's description of her pedagogical approach to teaching effective argument is intertwined with her desire to help students think critically about their engagement in digital environments:

> When I met with him, I took the Facebook page that he created and marked all the logical… [laughter] I was the argument teacher and I was like, "This is a logical fallacy. I think we've talked about this. This is what this means. Here is where this argument is not supported by evidence," and so we talked about that.

[3] "hot keys" refer to keystrokes on a computer that command particular functions, such as "control-c" for "copy" or "control-a" for "select all." Mary's instruction about how to use hot keys here teaches students not only a very functional computer literacy – how the hardware of a computer works in multiple ways to allow you to accomplish tasks – but also a rhetorical literacy. Mary mentions how to use the hot keys, and then explains the value of copy/pasting large portions of text into other places during the revision process so they are not lost to the writer.

She then reflected on this moment, noting that she had wanted to not only challenge the student's argument, but also to inspire him to be a critical consumer in digital environments, as he might be in other environments:

> I think Facebook is a great tool and there are great things that you can do with it, but you have to be a smart and critical thinker or a critical consumer of your society to know what's okay and what's not okay, and there are plenty of people that aren't. So my ultimate exit goal is [for students] to be critical readers and writers who read and write [their] world.

In this interview, Mary reflected on the student's use of Facebook and her goal for students to be "critical readers and writers." Mary acknowledged the role digital technologies like Facebook play in students "worlds;" her goal was for students to be critical in online spaces as well as offline ones, and to realize that even digital environments that are somewhat ubiquitous in her students' lives (like Facebook) include rhetorical situations, arguments, audiences, and purposes. "Argument," then, was not confined to the academic space of Mary's classroom, but extended into those writing spaces – digital or analog – of students' daily lives. Mary's approach to teaching English shows how the pedagogical integration of technologies can not only enable teachers to accomplish existing goals in new ways, but can also transform the subject matter of the classroom. For Mary, ELA content includes conversations about novels and rhetorical argumentation, as ELA content has for decades. However, it also includes conversations about how arguments play out in digital environments such as Facebook, how the themes of novels like *The Adventures of Huckleberry Finn* apply to today's digital world, and how one chooses to write for particular audiences in both digital and analog ways – all conversations I observed Mary having with her students throughout the semester.

Mary's colleague in the mathematics department, Amanda, similarly reconceptualized what it meant to do and teach mathematics in the digital age by helping her students think about how they learn from various media, such as videos. Amanda's classroom was "flipped," meaning students learned new mathematical concepts at home as homework and then completed problem-solving tasks in the classroom the following day[4]. As their "homework," Amanda's students watched videos Amanda had created using screen capture software, took notes, and brought their new knowledge to class the next day along with any questions they might have. In class, engaging students in discussions and differentiated problem solving was Amanda's primary focus. In our interview, Amanda described her approach to helping students think about how they "learn from videos" compared to learning in face-to-face environments:

> They have two or three videos to choose from, depending on their familiarity with the topic from Algebra 1, and I run around and I note what I see. Do I see them pausing? Do I see them fast forwarding? Do I see them taking notes? If so, what's the quality of their notes? Do I see them pausing and trying the problem or are they just watching me do the problem? Are they writing anything at all? Do they look at the worksheet first and then determine what they need to watch in the video or are they watching it and then doing the worksheet? All of these things.

Amanda thought about how her students would learn from the video, which impacted both where she posted the videos (she began posting on YouTube to allow students to access videos from wherever they were), and how she composed the videos. Here, just as Kristin did, Amanda

[4] "Flipped classrooms" take the more typical classroom structure in which students learn new content in the classroom and then engage in "practice" at home and "flips" it, engaging students with new content at home via videos or other means and doing practice problems with the guidance of the teacher during class time. Scholars have argued that this model places students in more control of their own learning (Ullman, 2013) and providing more time for "hands-on learning" (Bull, Ferster, & Kjellstrom, 2010). It is being adopted primarily in science and mathematics disciplines, where lecture followed by practice problems has long dominated pedagogical approaches.

described how she integrated pedagogy with content by observing how students interact with the content of the mathematics through the video she created. She took notes for herself, as well, on how students were using the digital technology, which gave her the potential to alter her practice if she noticed something she wanted to change. However, Amanda took one step further when she asked students to think about the technology themselves:

> And then that opens up a time for discussion about how you learned from the video versus a real person. How do you ask questions when it's a video verses having a real person in front of you?

Amanda's practice in this example was *integrative* because it required students to think about the technology they were using and how it shaped their learning. Amanda could have stopped at her observations of students, altering her composition of the videos or giving students instructions for watching the videos. This would have been a more *facilitative* approach to integration, in which Amanda's students would have used the videos in order to learn the mathematics content in a space outside of class, but would not necessarily have reflected on why and how they engaged in particular learning practices while watching the video. Instead, Amanda described the importance of asking students to think about how they learned from video versus in face-to-face environments, integrating their use of the technology with their learning of mathematics content by articulating their digital learning practices in Amanda's class.

The Common Core State Standards call on educators across disciplines to engage in literacy instruction; though these standards do not explicitly include literacy standards for mathematics teachers, they do call on teachers of "science and technical subjects" to engage students in literacies that "integrate and evaluate multiple sources of information presented in

diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem (National Governor's Association, 2010; CCSS.ELA-Literacy.RST.11-12.7). Amanda engages students in these practices using digital technologies, integrating both the learning videos for her flipped classroom and the TI Inspire Graphing Calculator into her content instruction. At one point in our interview, as Amanda was showing me the app that syncs with the Inspire calculator, she paused to say "I tend to think that if we have computers that will do these things for us, then why aren't we doing something else with our time?" Intrigued, I asked how she would spend her time if all of her students had access to the Inspire – how the technology would shift the content or focus of her course. She responded:

> I would say you have to spend a lot of time doing computing or graphing by hand when now I can take a quadratic equation — I can take a graph and calculator. We can look at the graph and now we analyze what's going on with the data values. What's causing the values to grow so quickly or decay so quickly or what's happening with the zeroes? How does that relate to the equation? All of these things would have taken a ton more time to do, pre-calculator. Same with constructions. Students would have to have a compass and a protractor and you're trying to draw all those with "I messed up with my art!" where you won't have that problem if you're doing that on the calculator and you can explore the mathematics verses being bogged down by the algorithm.

For Amanda, as for Mary in her ELA classroom, engagement with digital technologies allows Amanda to re-think not only her pedagogical approach, but also how she engages students with content. In many ways, Amanda's use of the calculators *facilitates* her ability to teach students about quadratic equations or constructions more "efficiently," because "all of these things would have taken a ton more time to do, pre-calculator." However, the graphing calculator also changes

students' engagement with the course content, because it allows them to visualize mathematical concepts in order to "explore the mathematics," by analyzing "what's going on with the data values." I draw more attention to how pedagogical practices can be both facilitative and integrative in Chapter 6.

As Mishra & Koehler's (2006) TPCK framework posits, technological knowledge, content knowledge, and pedagogical knowledge are in constant nuanced contact with one another in many of today's classrooms. At times, teachers may use technologies to facilitate the accomplishment of not-inherently-digital goals; at other times, they may use digital technologies to communicate in new ways with students and parents, to transform their approach to organizing course content, or to challenge students' notions of "composition" as primarily text-based and individualized. However, the integration of technology, content, and pedagogy looked different in Mary's and Amanda's classrooms than in those of many of their colleagues. Mary's and Amanda's students, like the students in Donna's and Kristin's classrooms, interacted with digital devices and web platforms on a regular basis. In Donna's and Kristin's classrooms, students used technologies to engage in discussion of texts, to reinforce their knowledge of historical events, or to compose independent reading projects. However, in Mary's classroom, students set goals for their compositions and chose the technologies that would best suit their rhetorical goals, articulating those decisions as they went and receiving mentorship, models, and assistance within the space of Mary's classroom. In Amanda's classroom, students were similarly required to think about how technology and content interact as they articulated how they learned from a digital video or as they analyzed a graph to develop theoretical knowledge about mathematics during class.

Integrative digital pedagogies often make strategic use of student choice in the design of assignments and lessons; this is because integrative pedagogies require students to become strategic users of digital technologies, and this is often easiest to accomplish when students set their own goals and teachers facilitate student accomplishment of those goals. In a major project Mary implemented at the end of the school year entitled "This I Wish to Change," students chose a social issue that they would like to address and developed plans for combatting the problem. They identified a target audience and chose the media in which they would compose, creating advertisements, developing websites, or maintaining social media groups to address their topic/issue. Mary described the variety of modes in which students composed for this assignment, depending on each student's project goals:

> I've had some people who have started their own Facebook group to promote whatever material they have created. I have had some people present somewhere else and then share a link to something they've done that is technology-related. Since we're close to [the university], I've had a lot of cross-over ties. […] I had a student who presented to a class there, so I have had some students give URLs to things or promote material that way. I have had some people that have done grass-roots kind of work and given flyers to their communities and spread it out that way, so they like that too, and that could be technology related or otherwise, in terms of what they're trying to do.

I had the opportunity to observe students working on their "This I Wish to Change" projects at the end of the school year. Throughout the process, Mary met with groups and challenged their ideas, material design, compositions, or research approaches, depending on the group. For example, one group wanted to address student drinking during the summer. When I visited, this group had designed five posters to place throughout the school, written a letter to the principal to

gain permission to advertise their initiative, and was working on composing a memo to teachers about the dangers of drinking that teachers could share with their students. Mary encouraged this group to consider the constraints on teachers' time at the end of the school year and which teachers and school leaders would be a most receptive audience to their cause. She also helped them draft copies of their memo with attention towards word choice, rhetorical situation, and the space of the email as a means for disseminating their message and purpose.

This example shows the importance Mary placed not simply on students' engagement with technologies, but on student engagement with multimodal texts that may or may not be written and composed using digital technologies. Mary's pedagogical beliefs reflect what Lankshear & Knoebel (2011) refer to as a "new ethos" of literacy in the digital age; this new ethos recognizes literate practice as traversing multiple modes of communication (visual/aural/textual) as well as multiple communicative media (paper/ink/digital device), and foregrounds the role of collective generation of texts – writing that is co-authored and collaborative instead of solitary and individual. Digital pedagogies that respond to this new ethos therefore need not revolve around digital technology, but around the types of literate practice that might take place in either digital or analog environments – in multiple modes or media. Integrative digital pedagogies acknowledge the diversity of textual types and modalities with which students engage on a regular basis and require students to make rhetorical choices about which types of text might work best for a specific rhetorical purpose.

Mary's beliefs about what defined a "text" have shaped her pedagogical approach to teaching students how to compose and engage with texts in multiple modes:

> When I talk about texts I don't just mean print texts, I mean, do they read the world around them? Are they able to look and say, "There's an argument structured here," and it doesn't have to be print text, but they're reading a scenario or a situation, or they're thinking about interview questions on the news, can they read critically in order to analyze it? Then, also, can they write critically, in order to be thoughtful composers in society?

Mary's statement here has little to do with technology – and yet, in Mary's classroom, identification and development of arguments in both digital and print spaces is common. Here, Mary articulates her understanding of literacy as reaching beyond reading and writing linear texts.

The difference I am highlighting here between these teachers' pedagogical uses of technologies – the difference between *digitally facilitative pedagogical practices* and *digitally integrative pedagogical practices* – is a subtle but important one. Kristin's hesitancy with digital technologies led her to integrate only those technologies that she could either (1) rely on students to work with themselves, and/or (2) enabled her to accomplish those goals which she already had in place. These goals revolved primarily around non-digital tasks, such as literary discussion and literary analysis. Mary, in contrast, engaged students in conversations about digital technologies on a regular basis, integrating conversations about digital technologies into her everyday instruction of major ELA concepts, such as rhetorical argument. The examples of her pedagogical practice that I include here were more than simply *facilitated,* or boosted, enhanced, or conducted with digital technologies; instead, her practices *integrated* digital technologies, encouraging students to think about what technologies they would use, why, and to what ends. Like Mishra & Koehler's (2006) argument about technological pedagogical content knowledge

enabling a pedagogical approach that "transforms" the content through the use of technology, the examples of Mary's and Amanda's teaching that I provide here allowed students to "do writing" or "do math" in ways that wove content and technology together.

To Borealis administrators, Mary's and Kristin's technological integration likely look very similar, and yet my observations of these teachers show the many ways in which their practices have different implications for student learning and digital engagement. As I have noted, teachers at BHS were required to submit yearly SMART Goals[5] to administrators, and were evaluated based on their submission of data to support student achievement. Because Mary and Kristin were in the same PLC, which focused on digital literacies and called itself the "DigLit Group," their SMART goals for the 2012-2013 school year were the same:

> By April of 2013, 95% of our students will demonstrate success in using forums. "Success" will be defined as:
>
> - Following directions regarding the use of the forum and its sections
> - Contributing thoughtful posts that respond accurately to the given prompt
> - Responding to peers' posts in academically appropriate ways that further the discussion

However, when asked in my survey to "Describe a specific episode where you effectively demonstrated or modeled combining content, technologies and teaching approaches in a

[5] According to the BHS principal, BHS's professional learning communities are modeled off of Richard DuFour's et. al.'s (2010) approach to professional development. Models like DuFour's draw on Lave and Wenger's (1991) conceptualization of PLCs. However, unlike Lave and Wenger's model, which focuses primarily on teacher learning, DuFour's model places at the center the design of interventions to boost student achievement. As such, DuFour's program has been widely adopted by administrators nation-wide who hope to integrate "professional learning communities" into their professional development models, because it enables administrators and teachers to tie professional learning to student outcomes.

classroom lesson[6]," Kristin's and Mary's responses further reflected how they think about combining content and technology differently (Table 1).

Table 5.1: Mary and Kristin Responses to TPACK Survey Open-Ended Question

Kristin's Response	The other day my students finished a novel and I wanted them to focus on themes. I had done some preliminary research on Glogster and felt that it would be a good way for them to share their understanding of themes. I also chose it because it was intuitive; I knew I wouldn't have to spend much time teaching them HOW to use the technology – they could get in there and start manipulating things right away. This gave them a way to respond to their themes and share their work with others all in one class period. Had I done this in a traditional poster/presentation format, it could have taken multiple days.
Mary's Response	For a close reading of *To Kill a Mockingbird* my students were recently analyzing the text for common motifs. Once students understood motifs and selecting concepts from the text that demonstrate the motif, they brought in copies of the text via either a piece they wrote down, a screenshot from an excerpt from the internet or by taking a picture of the text. They then worked in collaborative groups on a Google presentation and added their quotes to a collaborative piece and then they wrote about how the quote reflected the motif and why that was important to the novel and our critical thinking about the novel. So, we focused on content of the novel, using collaborative technologies in Google drive and students worked in a collaborative learning environment to analyze the text.

In Kristin's response, she emphasized how her use of Glogster allowed her to students to "respond to their themes and share their work with others" in a single class period, citing as an advantage the fact that students would not need to learn "how to use" Glogster. Kristin's students did not need to think about the technology or why they were using it – instead, they "get in there and start manipulating things right away." As a result, Kristin was able to assess their understanding of the themes of the novel without needing to give much attention to digital literacy instruction and without calling students' attention to the capabilities and rhetorical

[6] This question comes from Schmidt, D., Baran, E., Thompson, A., Koehler, M.J., Mishra, P., & Shin, T. (2009) survey which was designed to evaluate teachers' self-reported technological pedagogical content knowledge, based on Mishra & Koehler's original TPACK framework.

possibilities of an application like Glogster. Students were able to compose in an easy-to-use multimodal environment, and Kristin was spared some of the time constraints of "a traditional poster/presentation format."

In contrast, Mary's approach integrated the collaborative technology of Google presentations with the task of literary analysis, encouraging students to gather textual artifacts (screenshots, pictures, or excerpts) and combine them in a collaborative space. Mary's students needed to make decisions about how they would capture their thinking or a moment from the text, and then how they would combine multiple students' images and quotes from the text into a single presentation that synthesized their ideas. Like Kristin's students, Mary's students were working with media originally designed for presenting information (Glogster/Google Presentations). In Kristin's classroom, this provided a streamlined way to assess individual student understanding. In Mary's, students were engaged in collaborative thinking and analysis as they combined their ideas and collected artifacts into single Google Presentations. Instead of conducting their analysis on their own, students were encouraged to combine their ideas in digital spaces that allowed for synchronous collaborative composition.

Complicating Matters: Facilitating Integrative pedagogies

It is important for me to pause a moment, to trouble what might be this chapter's too-simple narrative. It may seem as though teachers like Mary and Amanda, who were in command of many and varied digital literacies, were naturally "more able" to integrate digital technologies into the content and pedagogies of their classrooms. Or it may seem that teachers whose digital learning networks were sparse or who faced obstacles tied to digital integration, like Kristin, could not teach digitally literate ways of thinking and composing in the ELA classroom. In other words, this chapter may suggest a problematic dichotomy between those digital pedagogies that

are *facilitated by* digital technologies and those that *integrate* them, as though teachers' beliefs and practices are one or the other, or as though teachers move through *facilitative pedagogies* on their way towards *integrative pedagogies.*

This narrative is too simple – and is potentially dangerous, as it assumes that with digital literacy knowledge comes integrative pedagogy, or that there is some sort of linear progression towards *integrative pedagogies,* when in fact this is not the case. As many scholars have argued, *knowing something* and *knowing how to teach it* are far different things, and the former certainly does not beget the latter (Shulman, 1986; Mishra & Koehler, 2006). Thus, *being digitally literate* does not necessarily mean one can *teach digital literacies.* Furthermore, scholars have noted that some of the most successful digital teaching practices emerge when teachers "take risks" with their students by learning alongside them, instead of mastering digital literacies beforehand (Kajder, 2010; Herrington et. al., 2009). Troy Hicks (2013) argues that in the digital age, pedagogical approaches to teaching writing craft should teach students *how to struggle* with their craft through modeling that struggle, as Mary did when she talked about "what writers do" with her students and told stories about her own writing. Kristin, though she certainly encountered digital literacy learning struggles and triumphs, did not share these experiences with her students during my observations. This study suggests that teacher practice may be simultaneously, or intermittently, *facilitated by* and *integrating* digital technologies; simultaneously using technologies to enable particular classroom tasks (such as presenting content in a PowerPoint) and using technologies to develop students' digital literacies (by requiring them to choose a presentational tool to convey their own knowledge and to articulate the reasons for their choice). As an example of this "middle ground" between facilitative and integrative pedagogies, I turn to Allison, whose practice complicates the notion of a linear progression or hierarchical relationship

between enabled and integrative digital pedagogies. In the following chapter, I continue to disrupt my *facilitative-integrative* framework, explaining how it might be used as an analytic for thinking about teachers' many and varied digital practices.

Allison: Enabled-Integrative digital pedagogies

Allison, as I noted in Chapter 4, was considered a digital expert among her colleagues, and had significant access to digital pedagogical resources. However, when I met Allison, she had only spent about three years learning how, why, and when to use digital technologies in her life as an online writer and in her teaching. By her own admission, Allison was a relatively new user of digital technologies when I first met her. In our first interview, she said:

> I, um, was afraid of technology. That's always been a professional goal of mine, to become technologically literate. Like I really thought that I was technologically disabled. For a long time, that's how I would have described myself. Until three years ago.

In many ways, Allison was still learning about digital composing and about the role of digital technologies in both her own life and in her English classroom. However, she was perceived and positioned as a technological expert by many of her colleagues, who named her on their surveys as a knowledgeable colleague with whom they would consult when using digital technologies in their own classrooms. Despite her position as a digital expert among a number of her colleagues, Allison was still finding ways to integrate digital technologies with her students in ways that required her students to consider not only the course content – in her case, American Literature – but also the digital technologies with which they engaged inside and outside of class time.

In one lesson I observed, Allison was following up with her 11th grade American Literature students after they had submitted their first posts to a class blog on *The Adventures of*

Huckleberry Finn. Allison spent the first few minutes of the lesson giving general feedback to the class and providing a few examples from students' work. In this lesson, Allison shared with her students some of the social conventions of blogging. Allison emphasized that blogs are "published" spaces[7], and the rhetorical demands of such spaces necessitated some attention to grammar and mechanics. She said to her students:

> Don't forget that blog writing falls somewhere between forum posts and term papers, in terms of how formal they are. Forum posts are for you to discuss, so things like grammar and mechanics are less important in the forum, but blogs are published pieces of writing. And so, while they're not as formal as a research paper or a term paper, they still should incorporate things like proper grammar and mechanics. Good organization of ideas. And so, that's important to remember. The focus is on your published ideas.

Here, Allison helped her students consider the appropriate tone and style for blogging by comparing blog writing to forum post writing and to research paper writing. In explaining these expectations to students, Allison demonstrated her own knowledge about digital spaces, particularly blogs, and the rhetorical demands of those spaces. She drew on her own experience as a blogger when she created an instructional website for students that included example comments and instructional videos on "how to create a blog post" or "how to embed images in a blog post."

It might appear as though Allison's approach to incorporating blogs was much like Mary's approach to engaging students with multiple media. However, Allison's pedagogical approach to digital integration was different from Mary's in a few key ways. Though Allison

[7] I place "published" in quotes because Allison's class blog was ultimately private, visible only to her and her students. However, one year after the conclusion of data collection, Allison has paired with teachers from across the state and country to give her students (and other teachers' students) an online audience for their blog posts.

encouraged students to think about the expectations of their audiences, her students were not developing strategies for using blogging spaces to engage in rhetorical action *of their own*, which Selber (2004) argues is a critical component of developing lasting digital literacies. Students also were not necessarily required to learn about the rhetorical situatedness of blogging technologies and how they might use blogs to achieve goals and purposes for specific audiences they defined themselves. The goal of Allison's class blog for *Huckleberry Finn* was to allow students to analyze the text in a space that would facilitate literary analysis for an audience of their peers – not necessarily for students to critique and consider the blogs as compositional tools that they might use in their lives beyond the novel unit. As such, the digital literacy learning students were doing in Allison's classroom was in some ways like the digital literacy learning of students in Kristin's classroom; students used the blogs to engage in discussion about a text (*Huckleberry Finn)* and to practice with literary analysis. The blog facilitated Allison's assessment of students' literary analysis skills and comprehension of the text while providing students with a broader audience than simply their teacher – an approach Hicks (2013) labels "digitally convenient" (as opposed to digitally enhanced) (p. 35).

However, Allison's use of the class blog also transforms the content of her English classes to some extent: it draws students' attention to digital compositional spaces and at times requires them to consider how to pull various modes of communication (visual/textual/hypertextual/audio) together in a digital space to form an argument. Allison gave students many tips about "how to blog" in this lesson: the rhetorical features of blogs and how one might go about adding those features. At one point, she urged students to include hyperlinks in their posts, telling them:

> Hyperlink to related info on the web. If you need help remembering how to hyperlink, see me. I don't think I have an instructional video on that. Always credit outside sources. When you cut it from the book, your minimum of one textural reference, you are crediting it using MLA; which means you have to have parenthetical citation of the page numbers. So, you might mention Mark Twain and you might mention the *Adventures of Huckleberry Finn*, directly in the text of your post, but you still have to cite the page numbers, so don't forget that.

These blogging requirements combined "literary analysis" as a genre with "blogs" as a genre. Allison noted the expectations of blog readers (their presumed audience), but students here were performing literary analysis in the blog space for their peers and their teacher, which conflated the genre of "blogs" with the genre of "literary analysis." The assignment began to engage students rhetorically and certainly built students' functional literacy with blogging technologies such as Blogger (which they could potentially use later if they chose to create a blog on their own), but the writing assignment itself blended two very different – and not easily blendable – genres of writing, with different rhetorical purposes, audiences, and textual structures. However, Allison's approach here is also integrating blog writing into the content of her literature course: Allison urged students to consider blog audiences with particular expectations related to grammar and structure. Though she dictated the circumstances in which (and, to some extent, the content about which) students would blog, students were left to make authorship choices within the blog, which in later lessons Allison guided with examples of successful and less successful posts. As was the case in Mary's classroom, students were required to think about the space of the blog and about what writing moves are appropriate within a blog, even if they were not employing blogs for their own rhetorical purposes and goals.

Allison did much of her learning about online writing by engaging with communities of writers online, via BlogHer.com and followers of her blog's Facebook page. She learned what was acceptable, unacceptable, well-received, and expected in blogging environments by reading the comments she received on her blog and by interacting with publishing intermediaries at *Yahoo!*. Allison acquired her own digital literacies through purposeful and goal-oriented engagement with digital media and through self-initiated personal instruction (such as when, in her PLC, she looked for an instructional video for developing sub-navigational menus in Blogger). When Allison taught her students, her pedagogy in some cases drew upon these experiences and in other cases used technologies to facilitate more traditional ELA objectives. Allison focused primarily on a genre that is familiar to ELA curricula nationwide – literary analysis – and used blogs to facilitate assessment of and students' facility with that genre, while simultaneously introducing students to some of the rhetorical norms and expectations of blogging communities. Allison's pedagogy was therefore simultaneously *digitally facilitated* and worked to *integrate* digital technologies into the content of the course and into students' writing experiences and literacies.

Integrative digital pedagogical practices – practices that reimagined curricular content and moved technology into the core of classroom activity – remained elusive or fleeting for many teachers at Borealis. They were, based on my limited observations and conversations, very limited within the school, and much educational technology literature still laments a lack of meaningful engagement with digital technologies (e.g. Greenhow, Robelia, & Hughes, 2009; Hew & Brush, 2006; Singh, 2013). Of the four teachers I observed, only Mary regularly engaged her students in critical and rhetorical decision-making about which digital tools they would or could use in their writing, as well as why and how they would use those technologies to

accomplish their writing goals. Of the nine teachers I interviewed, only three described digital classroom practices that could be considered fully integrated and attentional to students' digital literacies. However, the implications for student learning in classrooms where integrative pedagogies were occasionally or frequently employed are many. Teachers who integrated multiple digital platforms into their work with students – and explicitly engaged students in conversations about digital tools, digital citizenship, and digital writing – simultaneously taught and modeled disciplinary thinking and writing and disciplinary digital literacy skills and practices. For students in these classrooms, "creative writing" might include digital storytelling in online video editing spaces and "argumentative writing" might include designing posters and Facebook pages to address a problem within the school. In classrooms where integrative digital pedagogies were more common, students were more often engaging with multiple modes and media, making decisions about how text and image combine to create meaning, or analyzing artwork or websites alongside novels or essays. In classrooms where primarily facilitative or non-digital pedagogies were the norm, students were more likely to engage with primarily printed text, rarely required to discuss or make decisions about what technologies to use and when, and less likely to engage digital writing spaces for their own rhetorical purposes and goals.

I am not arguing that the former genres and content of the ELA (or mathematics, or science) classroom need to be "thrown out;" literary analysis, for example, requires students to consider the messages that authors convey about life, grief, relationships, and other human experiences. It requires students to dig deeply into texts to uncover the nuances and strategies authors employ to convey messages tied to race, justice, gender, or identity. Writing argumentative essays teaches students how to construct and maintain complex arguments; practices they will be asked to repeat in workplace presentations or college coursework.

However, as engagement with texts in the professional, collegiate, and public spheres changes to include website development, social media management, and visual composition, so must composition and reading instruction shift in the secondary classroom to include these literacies.

A Winding Path: Developing Integrative digital pedagogies

Teachers at BHS experienced different demands on their time, thinking, and development during my time at BHS, and all responded to these demands differently and with their goals for their students in mind. Their goals for students, as well as their means of assessing students' progress towards these goals, differed in significant ways: for Kristin, goals revolved around promoting discussion of texts – Kristin used students' discussions, online and in class, to assess their understanding and analysis of literary texts. For Allison, a major goal was for students to improve their writing about literary texts in multiple platforms and for real-life audiences of their classmates. The course blog enabled her to engage students with multiple writing modes and to assess their written analyses of *Huckleberry Finn.* For Donna, digital technologies enabled formative assessment of students' knowledge of history content, allowing her to address gaps in student understanding during class. And in Mary's classroom, where the major pedagogical goal was for students to be able to "read and write their worlds," Mary guided students as they chose the media that would work best to reach their audiences and meet their own, or a group's, rhetorical goals.

As I described in Chapters 3 and 4, teachers arrived at their differing pedagogical approaches via digital learning experiences of their own – for Allison, writing and engaging in digital environments where she engaged with networks of other bloggers prompted her to reflect on her teaching and to begin incorporating those technologies that had proven meaningful to her as a writer. Experiences presenting to her colleagues and sharing resources with interested

professionals helped her gain confidence and passion for the possibilities educational technologies offered. For Kristin, inspiring colleagues and an interest in engaging students with multiple media prompted her to incorporate digital media that would allow her to assess one of her major goals for her classroom; however, feelings of intimidation or inadequacy sometimes left Kristin unwilling or unable to access digital resources for play or experimentation in the classroom. And for Mary, engagement and leadership in professional learning spaces outside of BHS expanded her definition of texts and provided a space for critical conversation about the role of digital technologies and literacies in the ELA classroom. For all of these teachers, interpersonal networks shaped their experiences with digital technologies and classroom teaching, whether these networks served to boost confidence, to provide resources, or to foster insecurity or confusion.

Also integral to teachers' integration of digital technologies was their access to resources, from physical hardware and Internet access to intangibles such as time for digital "play" and access to colleagues' stories and experiences with digital technologies. PLCs offered one such space in which teachers might have been able to share such experiences, to raise questions about the role of technologies or other factors in the design and implementation of content, or to reflect on their practice in a space that was simultaneously "safe" and "challenging;" where teachers could engage in the "critical conversations" Mary experienced in her National Writing Project work or the reflection that Allison engaged in on her blog and in social media conversations about teaching. However, in part because PLCs were tied to teacher evaluation and student achievement and in part because of how teachers interpreted the goals and purposes of PLCs, such conversations were supplanted by "how to" technology tutorials in the DigLit PLC and full-faculty PD breakout sessions. The experiences of Borealis teachers featured in this dissertation

illustrate that the integration of technology is not a straightforward or simple process that can be addressed with short-term in-school PD, the purchase of new devices, or even community-based models of PD (at least in the absence of models and examples of how such community learning time might be maximized). These teachers' stories and experiences exemplify the wandering – and often bumpy – path teachers navigate as they work to integrate new and rapidly-changing tools and technologies into their teaching, from the desktop to the smartphone, from the web app to the weblog.

Chapter 6: Conclusions and Implications

Though the experiences of Borealis teachers may be in some ways unique, they are in other ways representative of the experiences of many of today's teachers, who must share and swap hardware across classrooms and departments; must balance the multiple demands of leadership responsibilities, performance evaluations, and professional learning; and must always keep the learning needs of their students at the front of their minds as they design lessons, assignments, and assessments. Though the teachers in this dissertation provide only a snapshot of the complex ways in which network engagement and professional learning have the potential to shape teachers' classroom practice, their experiences speak to the complexity of a task like "integrating technology" into today's schools. Although many have argued that simply placing hardware in a teacher's hand and holding a single PD workshop is not enough to inspire meaningful digital integration, only a few studies have sought to define what "meaningful integration" might look like (Hicks, 2013; Hicks, Turner, & Stratton, 2013; Koehler & Mishra, 2005; Mishra & Koehler, 2006), and even fewer have examined how teacher networks play a role in shaping digital integration (Frank et. al., 2011; Zhao & Frank, 2003). This study builds upon these, showing that in one school, teachers' different social experiences with learning about and using digital technologies played a role in shaping not only *whether or not* they used digital technologies, but also *how* they used technologies to either facilitate existing curricula and pedagogies or to engage students in digital literacy learning.

All teachers at Borealis "used technologies in the classroom." At the very least, teachers were required to use the school's student information system (SIS) to take attendance and report grades and to create a classroom website with contact information and general course descriptions. But most Borealis teachers did much more with digital tools: they accessed the computer labs or used the laptop carts, used online sharing sites to access and present content via YouTube or Flickr, taught students how to operate graphing calculators or audio recorders, and encouraged students to use their own devices to plan group projects or record and submit their assignments. Kristin's students could regularly be seen taking a quick snapshot of the homework board or using their phone's calendar apps to plan group projects; I observed Donna's students composing newspaper copy in Microsoft Word and Google Drive; Mary's and Donna's students would grab their phones to quickly "Google" something during class discussions; Mary's and Allison's students regularly developed or participated in individual or full-class blogs; and Allison's students could be found listening to podcasts of novels on their iPhones as they read along in their paper books. Borealis teachers did not necessarily need help getting technologies into their classrooms. They did not even always need to be told "how to use" a technology, as Donna noted when she expressed frustration with a too-long "how to" tutorial during one professional development session.

Borealis teachers' experiences can tell us much about how some teachers learn about and with new technologies, how particular approaches to professional development can simultaneously foster and limit digital integration, and how different approaches to integration carry implications for student learning. Their practices illustrate the diversity of ways in which teachers have responded to the nearly limitless (and perpetually growing) number of digital tools and technologies available to them, prompting scholars to consider which uses of digital

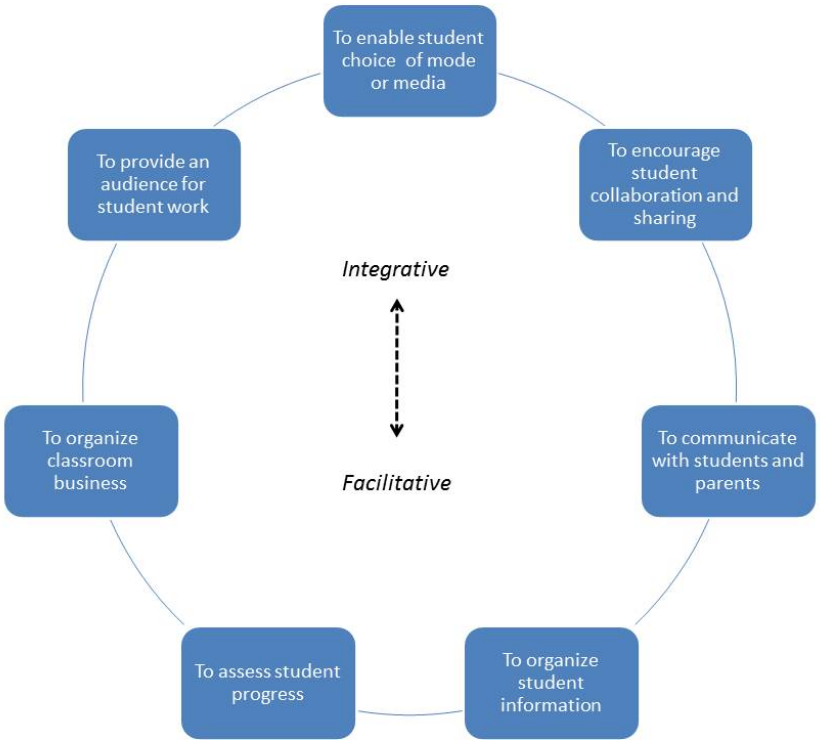
technologies actually contribute to student learning in the digital age, and which uses simply enhance or add digital components to the existing curriculum. In the sections that follow, I first examine how the findings of this dissertation inform a framework for thinking about teacher practices with digital technologies, both justifying and complicating the framework I present in Chapter 1. I then explore how the experiences of teachers in this study can inform the design and implementation of teacher professional development. Finally, I turn to the research implications of this study, charting possible future directions for my own work and the work of others interested in teacher networks, teacher learning, and digital integration.

Facilitative and Integrative Pedagogies: Complicating the Framework

The framework I present in Chapter 1 and will expand upon here offers a way of thinking about teachers' uses of digital technologies in the classroom as either *facilitative* or *integrative.* I make the argument throughout this dissertation and most strongly in Chapter 5 that Borealis teachers used digital technologies for one of two primary purposes – to streamline those teaching tasks that dominated their lives (facilitative pedagogies), and to advance and enhance students' knowledge of and facility with digital technologies (integrative pedagogies). However, while this framework is useful in that it clarifies and highlights the ways in which technologies can be used to advance and further student learning about and with digital tools, it is also potentially problematic in that it fails to capture the complexities present in the beliefs and practices of teachers like Mary, Kristin, Donna, and Allison. While Chapter 5 positions a few Borealis teachers' practice as primarily *facilitative* or *integrative* for the sake of clarity and example, this framework is most helpful when examining teachers' diverse and frequently changing practices, not as a heuristic for categorizing a teacher's whole approach to teaching with technologies.

As such, it is important to highlight the ways in which Borealis teachers' digital pedagogies were diverse, multiple, and shifting. While the distinction between *facilitative* uses of digital technologies and *integrative* uses of digital technologies provides a useful heuristic for observing and analyzing teacher practice, it is also important to understand how teachers used technologies in diverse ways in response to various social pressures and learning experiences. For example, I observed teachers using digital technologies to organize and analyze student data, to organize assignments and student submissions of writing, to encourage student collaboration and co-authorship, to provide an authentic audience for student writing, to assess student progress on benchmarks, to provide students with choices when it came to their mode and presentation of knowledge, and the list goes on. Some of these uses of technologies were more often *integrative*, in that they reflected the teacher's desire to help students become purposeful and reflective users of digital tools. Other practices were primarily *facilitative*, in that they streamlined or made more effective a necessary component of teachers' day-to-day teaching (see Figure 6.1).

Figure 6.1: Borealis Teachers' Multiple and Varied Uses of Digital Technologies



This revision of the framework presented in Chapter 1 emphasizes how *facilitative* and *integrative* uses of technologies correspond with teacher practices, which teachers cycle through and which might be more or less facilitative or integrative depending on the teacher's goals in a particular lesson, assignment, or unit.

Borealis teachers engaged in many of these practices, moving between facilitative uses of technologies and integrative uses that challenged students to make strategic choices about and to articulate their learning within digital spaces. Sometimes, teachers' uses of a single technology even spanned integrative and facilitative purposes, blurring my distinction between *facilitative* and *integrative* approaches. For example, Kristin used online forums to both assess student progress in an effort to meet the demands of her PLC SMART goal – a primarily *facilitative* use of the technology – and to give her students an authentic audience of their peers for their writing and thinking about literary texts – a more *integrative* goal. Allison similarly used Google Drive not only to *facilitate* her organization of student submissions of essays, peer revision, and her

own commenting and grading, but also took advantage of the research and media embedding potential of Google Drive to *integrate* the technology with her teaching of online research skills and hypertextual writing. Further, as my description of Allison's practice in Chapter 5 illustrates, teachers often moved between integrative and facilitative approaches within single assignments or lessons, as they used technologies to both translate otherwise long-standing and previously analog ELA pedagogies into digital spaces and to transform the content of their courses in response to the demands of the digital age.

This complication of the facilitative-integrative framework emphasizes how this framework might be used as an analytic. Such an analytic provides a framework for those looking to research how, why, and to what ends teachers use digital tools and technologies in the classroom. Certainly, as I argue in Chapter 5 and throughout this dissertation, those practices that *integrate* digital technologies, disciplinary content, and teacher pedagogy have the potential to engage students in meaningful discussion of and learning about the role of digital technologies in their lives as learners. These integrative approaches reflect teacher belief systems that position technologies as one integral component of classroom practice; require teachers to be strategic about when, why, and how they use digital technologies with students; and call upon students to make similar strategic decisions about how technologies might "fit" within their content-based learning. They pull technologies into the fold of the day-to-day of classroom life, instead of positioning them as separate from the work of teaching and learning. All four of my focal participants at Borealis voiced beliefs that aligned with such integration of digital technologies, even when their ultimate practice reflected a primarily facilitative approach; Kristin, for example, emphasized the importance of providing students a choice as to what media the

composed in when describing an assignment in which some groups of students chose to create commercial video responses to a literary text:

> Our students, like you've seen with the commercial thing, they have fun doing that and being creative in that way. Other students, I always give them options, and some of them are writers. They like creative writing and they've written some amazing stories to go along with the periods that we're studying.

However, for Kristin, this choice had more to do with encouraging student interest and engagement than with the development of student literacies within multiple media. As such, many teachers stopped at providing student choice, as Donna did in her multimodal independent reading assignment, which she had borrowed from Mary. Of the teachers I observed, only Mary and Amanda called on students to discuss and critique their learning and choice-making in digital environments.

The facilitative-integrative distinction I propose here is therefore theoretically useful in that it provides a lens for observing and interrogating how teachers take up and use digital technologies with students, *and calls attention how such practices require students to build their meta-awareness in digital spaces*. As I observed Borealis teachers and attempted to articulate the differences I was seeing in their uses of technologies, this distinction helped me understand both teachers' reasons for using a particular technology and how those goals were or were not tied to student learning outcomes. For example, in an interview with Donna in the middle of the semester, she reflected on how using Quia (an online assessment site) for test reviews allowed her to both address learning goals for students (by helping them review content before a final exam) and to address planning goals for herself (by providing data on concepts students might

need to revisit in the following unit). When observing teachers, I was therefore able to ask myself – does the use of this technology help students become digitally literate? Does it teach students how to be strategic users of technologies? Does it build students' meta-awareness about digital technologies or digital composition? Or is the technology, in this case, serving another purpose? This allowed me to tease out which uses of technologies operated specifically in service of students' digital literacy learning, and which uses did not.

This is not to say that *facilitative* uses of technologies were "bad;" they were, in fact, quite common and at times transformative for student learning of disciplinary content. Kristin's use of Spruz.com for online literary discussion forums, while primarily a facilitative approach that helped Kristin assess students and enabled richer discussions of texts during class, also led to richer discussions of texts in class as students extended their use of "exit strategies" to ask questions of one another and follow up on other students' ideas in face-to-face discussions. Similarly, Donna's use of Quia for test review had the potential to benefit student learning as Donna used data from the online review to inform her planning and teaching in the following unit. Facilitative uses of technologies therefore had the potential to be transformative for student learning in ways that did not necessarily build students' learning about and facility with digital technologies, but enabled their teachers to provide richer experiences with existing disciplinary content. Far from "bad," facilitative uses of digital technologies are common and potentially beneficial for today's learners, as they make content easier to access, make student outcomes easier for teachers to analyze, and make communication between school stakeholders easier to facilitate.

The analytic distinction between facilitative and integrative approaches to using technologies in the classroom offers a few new possibilities to researchers and practitioners interested in digital integration. Unlike previous frameworks for characterizing teacher practice with digital technologies, this framework does not "tack on" technology to an existing theoretical framework. Unlike the TPACK framework (Mishra & Koehler, 2006) and Hicks, Turner, and Stratton's (2013) framework, the distinction I make here does not add technology as a new component of an existing theory, but builds a new framework from analysis specifically focused on how, why, and to what ends teachers at one high school used digital technologies in their teaching. For researchers, such a framework provides a language for understanding "integration" as a more complex process than simply the use of technologies in the classroom, highlighting how technologies are taken up in different ways and for different reasons by teachers. For practitioners, this framework offers a lens for observing teacher practice and for potentially evaluating the effectiveness of integration initiatives, professional development opportunities, or teacher practice, depending on the goals of the practitioner and his or her institution.

What this framework *does not* offer is a way to "categorize" or "label" individual teachers as either "digitally savvy" or "digitally inept." Dichotomies for discussing teacher uses of technologies are not new to the literature (popular and scholarly) on digital integration. Prensky's popular *digital natives* and *digital immigrants* distinction positions adults (and, thus, many of today's teachers) as permanent outsiders in the digital landscape, problematically obfuscating the complexities of digital literacies and digital engagement. Much of the literature on teachers' uses of technologies focus on teacher resistance to digital integration, speculating as to why teachers struggle to integrate technologies and focusing on teachers' shortcomings when it comes to digital integration (Ertmer, 2005; Hew & Brush, 2007; Singh, 2013). Literature from

English Education and National Writing Project scholars and teachers depict the opposite end of the spectrum, highlighting the practice of exemplary teachers and sometimes undervaluing the struggles and lengthy learning journeys necessary to develop such practice (e.g. Herrington et. al., 2009; Hicks, 2009; Hicks & Hyler, 2014). This study and its findings seek to disrupt depictions of teachers as "digital immigrants" or digitally incapable, and instead understands teachers' uses of technologies as multifaceted, as serving multiple important purposes in teachers' professional lives, and as serving student needs in multiple ways. Though Mary's and Amanda's integrative practices, described in depth in Chapter 5, certainly offer a model for how digital integration can serve to promote and develop students' digital literacies, this study does not seek to devalue the learning and practice of teachers like Kristin, whose primarily facilitative digital pedagogies served the needs of her students and her goals for her teaching.

Learning from Borealis Teachers: Design and Implementation of Teacher Learning Opportunties

Borealis's approach to PD supported digital integration and teacher learning. However, in the DigLit PLC sessions I observed, PLCs rarely provided a space for "teacher learning and pedagogical reflection" in ways Principal Jameson and Mary might have wished. At one point at the end of a PLC session spent compiling student data for end-of-the-year evaluations, one PLC member even lamented, "Do you realize that we just wasted two solid hours of our lives when we could've been teaching each other cool stuff?" As I explored in Chapter 3, teachers sometimes spent DigLit PLC sessions "teaching each other cool stuff," like how to create class websites that integrated Google Drive, Calendar, and other Google Apps; however, the bulk of many sessions – four of the six hours I spent observing the DigLit PLC, specifically – were spent attending to bureaucratic requirements. Although "teaching each other cool stuff" may not have

always resulted in productive learning time for Borealis teachers, these teachers' frustrations with how time in PLCs was spent to attend to bureaucratic concerns highlights how in-school, formal PD often fell short of teachers' expectations when it came to their professional learning.

Ultimately, the focus on aligned SMART goals and evaluation of teachers based on student achievement foregrounded "getting stuff done" in PLCs over experimentation and digital learning. As I explore in Chapter 3, teachers in some departments worked together to develop standard assessments that would allow them to easily compare and collect data on student achievement, creating tightly-knit colleague ties. In the English department, teachers spent two hours during one PLC session poring over student work in an effort to find evidence that students had improved over the course of the year, expressing frustration that despite "knowing" that students had improved, they needed to hunt down and document evidence of student progress in archived blog posts. During PLC and PD breakout sessions that were focused on digital technologies, most of the emphasis was on "how to" use digital technologies to make some of the work of teaching more efficient or streamlined (or to engage and motivate students), like when English teacher Sarah walked through "how to" build a Google Site or Allison showed colleagues "how to" organize folder in Drive during a PD breakout session. Some of the most popular technologies among Borealis teachers, such as Quia and Google Drive, were used primarily to organize course content (Google Drive) or to assess student learning with online quizzes and tests (Quia). While these PD opportunities did accompany an upswing in teacher use of technology in the classroom[1], they promoted the use of technology in service of streamlining or making easier administrative teaching tasks like assessment or data collection, and did not

[1] As I noted in Chapter 2, data about teacher usage of technologies was collected at two time points, at the start and end of data collection. Analysis showed that teachers reported using digital technologies more often on average at time 2 than at time 1, a difference that I found to be significant ($p<.001$) using a paired-sample t-test.

emphasize how such tools could prepare 21st century learners for the workforce or college classroom.

In the absence of spaces in which they could learn about digital technologies and challenge their existing pedagogical approaches, teachers at Borealis turned to professional networks within and outside of school, as I described in Chapter 4. They reached beyond their departments and PLCs to collaborate, and in Mary's case, far beyond the school as they engaged with scholarly communities, National Writing Project branches, and former mentors. These spaces, for some teachers, were rich spaces where "challenging conversations" about literacy and technology could take place. For other teachers, like Kristin, personal digital learning networks were small, restricted to a few select "digital experts" and close colleagues who could at times be simultaneously inspiring and discouraging. Regardless of whether teachers' interpersonal network connections challenged their pedagogy, inspired new approaches, provided resources, or caused a teacher to feel intimidated or uncertain, a connection can be traced from the robustness of a few Borealis teachers' interpersonal networks and their ultimate digital pedagogies, suggesting that teachers learned and shaped their practice more based on their interpersonal interactions than on their experiences in professional development – a finding that supports similar findings in earlier network studies (e.g. Zhao & Frank, 2003), but also nuances the findings of these studies by describing in detail the differences in teacher practice and how these relate to specific network-based experiences.

For many teachers, experience with digital technologies as learners translated into pedagogical approaches that more often integrated technology into curricular content. For Mary, much of this experience came from her work with The National Writing Project, while for

Amanda and Allison their master's programs had called on them to engage in digital learning and writing that they in turn integrated into their own classroom practice. The National Writing Project models PD on the notion that teachers of writing should also *be* writers themselves, thus taking an experiential approach to PD that engages teachers in the very assignments and tasks they might ask their students to complete. NWP teachers read about and discuss pedagogy, share their digital compositions and offer feedback, create and conduct model lessons, and critique one another's practice in NWP's Summer Institutes, which are held nationwide throughout the summer. NWP's ultimate vision, according to their website, is "a future where every person is an accomplished writer, engaged learner, and active participant in a digital, interconnected world" (National Writing Project, 2014). They foreground teacher learning and leadership as a fundamental means of spreading and sharing professional expertise to attain this vision. Similarly, higher education programs required teachers like Allison to engage *as a learner* in online forums and to share collaborative projects using Google Apps. Amanda, the math teacher whose practice I describe in Chapter 5, attributed her digital learning to her work with colleagues in her educational technology master's program. Mary's extensive and ongoing ties to the local university also provided her with regular resources and opportunities for reflection as she shared her work in published writing and at conferences. Key here is that all of these outside networks required some Borealis teachers to engage with digital technologies *as writers* or *as learners.* These teachers' experiences support the role of experiential learning in teacher professional development. Whether such learning takes the form of digital play and creation or enactment of practice for peers, these experiences are an integral component of digital learning because it gives teachers a space to "play" with, and gain confidence using, digital technologies.

In contrast, much of the literature on PLCs in particular emphasizes data-driven assessment of student achievement and student progress on state or national standards, often measured by either standardized tests or aligned district-level, school-level, or department-level tests. Dufour et. al. (2010) offer the most popular framework for implementing PLCs; their text places emphasis on student outcomes – and rightly so, as students are the ultimate population about which educators are concerned, and no professional development is worth the time and effort if it does not offer benefits for student learning. However, recent emphases on "student achievement" and "data-driven practice" have the potential, as Borealis teachers' experiences illustrate, to undermine the very messy work of reflecting on and dramatically changing teacher practice in response to evolving technologies. Pedagogical practices, as I noted in Chapter 1, are rooted in teachers' deeply-held and beliefs about teaching, learning, content, and literacy; to change teacher practice, one must also look to teachers' belief systems and the contexts in which they teach. Data-driven models of professional development sometimes ignore this fundamental element of teacher practice – teachers' pedagogical belief systems – moving full steam ahead in an effort to raise test scores and to make sure students are "college and career ready." However, as Mary and a few of her colleagues show here, pedagogies that challenge students to consider the role of technology in their lives – a form of "college and career readiness" not easily assessable in large-scale testing environments (Homan & Reed, 2014) – requires a shifting understanding of what constitutes "ELA content," about what "literacies" are, or about what teaching and learning looks like in the 21st century. Such pedagogical learning happened for Borealis teachers in learning spaces where teachers feel they have the appropriate time and resources to critique, question, implement, experiment, and challenge their existing practice.

However, developing such learning communities within schools raises another set of challenges. The communities of practice that develop within PLCs are not "organic" in the sense that Lave & Wenger (1991) suggest, but are instead reflections of (or perhaps reactions to) the culture of the institutions in which they operate. While they may echo the logic of CoPs in some ways, they are also markedly different from the CoPs teachers might find in outside learning environments or external networks of professionals, where teachers come together by choice and on their own time in an effort to advance their own professional knowledge. Scholars have argued that such communities can be fostered, but they often accentuate interpersonal tensions or even dissolve quickly as teachers' individual goals and the goals of the institution shift (Dooner et. al., 2008; Hipp et. al., 2008; Little, 2003). The interpersonal politics of individuals in the Borealis English department were no exception; some teachers identified a "split" in the department and others struggled to understand their colleagues' approaches to digital integration. Furthermore, tasked with the work of not only helping teachers grow and learn as professionals but also evaluating teachers using student data, school leaders found themselves in a conflictual space between a desire to document evidence of student achievement and a desire to give teachers the room they needed to grow as professionals, which Principal Jameson noted in one interview, saying that BHS faculty "felt the pressure" between making everything "data-oriented" versus taking the time to "breathe" and reflect. Additionally, for Mary, Amanda, and Allison, these external networks took significant time outside of their school contracts to develop and maintain – time some teachers are not necessarily willing to take away from other responsibilities, such as family or health. This supports Vannatta and Fordham's (2004) findings that teachers more willing to work beyond contracted hours are more likely to integrate digital

technologies, and suggests that teachers *must* put in significant "extra time" in order to fully integrate technologies.

In a 21st-century digital culture where devices abound to facilitate and encourage collaboration and connectivity, PLCs are an attractive option for schools. They "make practice public," as Lieberman & Mace (2010) note, drawing teachers out of their classrooms and into spaces where they must collaborate, and maybe sometimes clash, with colleagues (Levine, 2011; Little, 2003). However, when it comes to PD that supports digital integration (or potentially any major shift in teacher practice), my findings suggest that tying teacher evaluation and student achievement to the work of teacher learning communities may overshadow more difficult and critical conversations that challenge and shape teachers' beliefs about teaching, learning, content, and literacy – conversations Borealis teachers turned to interpersonal networks to find and foster.

Complementary Methods in Studies of Literacy and Teacher Pedagogy

In this dissertation study, I begin to lay the groundwork for future studies of teacher networks alongside in-depth qualitative examinations of teachers' experiences and classroom practices with digital technologies. Though all English teachers I observed were "using technology" in ways Principal Jameson lauded as innovative, teachers' uses of technologies had different implications for student engagement. This observation led me to analyze survey data: which technologies were teachers using most often? Why did they use them? I then returned to my observational and interview data – what beliefs about literacy, about the role of technologies, and about ELA content did teachers express in interviews or observations? This iterative analysis allowed me to develop a framework that distinguished between digital pedagogies that facilitate tasks versus approaches that engage students in digital literacies, and further

contributed to my analysis of teacher networks – how did teacher networks support one or the other pedagogical approach?

My argument in this section is derived not only from the data of this dissertation study, but also from my experiences analyzing, interpreting, writing about, and presenting this data to my colleagues. Despite the popularity of mixed-methods research designs (Tashakkori & Teddlie, 2009; Webb, 2006), and despite growing interest in both the humanities and social sciences around the concept of "networks" a la Latour (e.g. Brandt & Clinton, 2002), studies combining social network analysis with in-depth qualitative interview, artifact, and observational analysis are rare. Tashakkori and Teddlie (2009) trouble the notion that "mixed methods" research requires simply a combination of qualitative and quantitative research. They instead define mixed methods research as (ideally) a type of *methodological eclecticism* that involves "s*electively and then synergistically integrating the most appropriate techniques from a myriad of QUAL, QUAN, and mixed methods* in order to investigate a phenomenon of interest" (original emphasis, p. 286). The methodological "eclectic" is also a "methodological connoisseur," according to their definition, who chooses methods entirely based upon the research questions at hand. Certainly, this is an ideal approach for many researchers; authors of research methods textbooks used in graduate classes advise current and future researchers to let their methods be guided primarily by their research questions (e.g. Corbin & Strauss, 2007; Maxwell, 2004; Merriam, 2009). However, being a methodological chameleon is unrealistic for many researchers. Academic researchers spend decades honing their methodological craft, which often includes a few specific methods, such as one of many types of discourse analysis, quantitative modeling, or social network analysis, to name just a few.

My experiences working on this dissertation project illustrates the practical and theoretical challenges that accompany the mixing of methods. I added social network theory to my conceptualization of this study a few months prior to the beginning of data collection, driven by my questions to learn and integrate a new (at least to me) research method. In order to do this, I needed to engage with and understand the fields of research that have developed social network theory and methods over the past century. As I conducted the study, literature reviews, data collection, and data analysis often left me feeling "stretched," as though I could not do justice to any one field or method as I split my attentional capacity across multiple paradigms and modes of analysis. I wished to emphasize neither method, but to give each method equal weight as I sought to learn more about how teachers' social relationships shaped their uses and integration of digital technologies and vice versa. I will leave judgments as to whether I have accomplished this goal to the reader; what I wish to emphasize here are the affordances of this approach to data collection and analysis. Integrating social network analysis not as a way to confirm my qualitative findings, but as a way to challenge and contribute to them, required me to more completely understand the social network field and the methods available to social network researchers, which vary widely. From statistics used to describe networks such as density measures and degrees of "closeness" or "betweenness" (Wasserman & Faust, 1994), to graph theory methods for visualizing networks (e.g. Frank, 1996; Girvan & Newman, 2002), to complex longitudinal models of actors' network behaviors (e.g. Coburn & Russell, 2007; McFarland, 2006; Frank et. al., 2011), the network field is diverse and constantly evolving. Had I not known, for example, that I could develop a model to examine how teachers' PLC membership predicted their participation in close colleague network subgroups, I would not have had multiple ways to investigate the connection between teachers' interpersonal networks and

Borealis PLCs. Had I not acquired experience in my pilot study designing flexible in-depth interview protocols, observing classroom practice and PD, or analyzing and coding data thematically using open and axial coding methods, I would have struggled to identify how teachers' uses of digital technologies in the classroom differed. Only by splitting my attention as equally as possible between my two sets of methods could I understand the epistemological and methodological assumptions and beliefs of the fields from which they hail and take advantage of how their methods might be used to answer my research questions.

Many studies of adolescent and adult literacy have acknowledged the role that close familial and educational relationships play in shaping literacy practices (e.g. Brandt, 2001; Gee, 2000; Heath, 1983; Ito et. al., 2009). Network analysis provides another way in which ethnographers and qualitative researchers might investigate the social spaces of schools, "like an ANT," to use Latour's term, surveying how teacher (or adolescent, or administrative) relationships play a role in the development of teacher or student literacies and pedagogies. Partnerships between social network scholars and scholars in predominantly qualitative fields may also provide opportunities for researchers to realize Teddlie and Tashakkorie's "selective and synergistic" combination of methods to address phenomena of interest. Anecdotally, my ability to engage in the mixed-methods approach I take in this dissertation speaks to the support of my mentors and the flexibility of my coursework, program, and institution. Resources available to me included the ability to reach beyond my institution to take two courses at another university, to enroll in summer statistics institutes at my university, and to take complementary methods courses and courses with professors whose methodological backgrounds were diverse and often multimethodological. These resources allowed me to fully integrate social network methods into this dissertation and to learn not simply the methods, but the theories and literature

of the social network field necessary for scholars looking to expand their methodological repertoire.

My findings and experiences both suggest the need for more programmatic efforts to bring together diverse disciplines and methodologies (ways of not only conducting but also of thinking about how one conducts research) in graduate programs of education. Such programs certainly exist – my program even offers one such example, joining the humanities and the social sciences in a program of English *and* Education. However, most of the empirical readings and examples of research I encountered in my master's work and prior to my second year of my PhD privileged qualitative work while at best occasionally citing quantitative studies and at worst condemning them as "positivist" and "falsely objective." Similarly, researchers who hail mostly from quantitative backgrounds would often ask me "how many schools" I was studying, and would question the validity of my findings when I explained that my sample size was limited to a single school. Studies I was exposed to in my quantitative and SNA methods coursework were often extensive, involving multiple schools and districts across the country or state, making it logistically difficult for these researchers to engage in qualitative research, if they did so at all. Making visible to graduate students those studies that richly employ multiple and complementary methods, or even studies whose methods differ drastically from those a field is more "used to" or "comfortable with," as my mentors have done for me, may provide opportunities for new scholars to continue challenging disciplinary boundaries and developing mixed-methods research and theory.

Future Directions: Expanding the Framework and Supporting Teachers' Digital Learning in Design-Based Studies

Drawing on the implications for teachers and students I have described in this chapter and my findings in previous chapters, my future research will use social network analysis alongside in-depth observations of teacher practice and interviews with teachers to further interrogate the links between teachers' digital learning, teachers' digital pedagogies, and students' digital literacy learning. These studies will seek to expand and build upon the framework I present here, further defining how digital pedagogies might integrate technology with content and teacher practice and mapping the implications of different pedagogical practices for student learning. Beyond social network analysis and qualitative analyses of teacher practice, I will also continue to integrate new methods, such as design based research methods (DBR), in an effort to both research and create professional learning opportunities for teachers and schools. Such studies will seek to identify links between particular types of professional development, classroom practice, and ultimately student literacies. In this section, I begin to define a research agenda that expands upon the findings of this dissertation study.

First, future studies will begin interrogating the link between digital pedagogies and students' digital literacy learning. While I was able, in this study, to observe students and the literacy practices teachers encouraged during class in their projects and assignments, I did not include student work, interviews with students, or observations of students' literacy practices as data in this study in an effort to limit its scope. Future studies will seek to understand how student literacies might be shaped, upheld, or undermined in classrooms where digital technologies are used in different ways and to different ends, perhaps drawing on analysis of students' social networks as contributors to students' digital learning, and certainly examining

students' digital practices within classrooms. Scholars have long been interested in the literacy knowledge students bring with them to the classroom, often obtained in social interactions (sometimes digital) that occur outside of school (e.g. Ito et. al., 2009; Gee, 2000; Lewis & Fabos, 2005; Moje & Tysvaer, 2010). In a mixed-methods study of adolescent literacies, Moje, Overby, Tysvaer, and Morris (2008) make the argument that students' out-of-school literacy practices are shaped by their social networks. However, literacy scholars have yet to use social network methods specifically to examine how students' social interactions, digital or otherwise, might mediate students' literacy learning. Furthermore, few studies have attempted to trace a link between teacher practice and student literacy development. Future studies and collaborations might build upon this one by examining teachers' digital pedagogies alongside students' digital learning in a classroom context.

Additionally, this study carries many implications for the design of teacher in-service learning environments and experiences. In an effort to extend what I have learned in this study, I plan to both continue studying teachers' in-service learning and to begin contributing new designs and models for in-service teacher professional development related to digital technologies. I have already begun some of this work in my position with Boston Public Schools, designing blended online and face-to-face digital learning opportunities for urban teachers across grade levels and disciplines. However, other opportunities for simultaneously designing and studying teachers' professional learning will enable me to combine practice with research in my design of new professional development "interventions." In their 2003 call for more design-based research, the Design-Based Research Collaborative (DBRC) argued that educational interventions are "enacted through the interactions between materials, teachers, and learners," and that in order to honor this interaction, researchers must attend to the settings and contexts in

which educational interventions are put into place (p. 5). Design-based research (DBR) methods therefore attend to the educational contexts in which research is conducted by designing educational interventions within and for specific contexts and with specific attention to how artifacts (such as innovations or curricular materials) interact with settings and practice in a dynamic relationship. Further, design-based methods often require the researcher to work *with,* not *for,* schools and school districts, in order to design interventions that attend to the goals and concerns of school stakeholders. By responding to the "emergent features of a setting," DBR methods remain flexible to the emergent goals and demands of the settings in which the research is being conducted.

Though this study did not include a specific intervention that I had designed and put into action at Borealis High School, it did examine how school-based interventions, like the recently-instituted PLCs and technology-focused PD breakout sessions, played a role in teacher learning about and practice with digital technologies. Though teachers at Borealis reported positive relationships within their PLCs and felt as though Borealis PD gave them plenty of opportunities for learning and reflection, the findings I shared in Chapter 3 suggested that the design of some Borealis PD, meant to inspire innovation and experimentation with new digital tools, may have at times undermined those goals by tying teacher learning to teacher evaluation and student achievement. School administrators, tasked with designing and implementing professional development opportunities for teachers and staff, are often caught between wanting to inspire creativity and innovation and needing to adhere to district and state policies that limit their options and place additional demands on teacher time and professional development.

Design-based research offers the potential to examine these tensions and to respond to the needs and interests of particular contexts. Such research offers the ability to be locally responsive to the needs of particular schools or districts while simultaneously learning more about how teachers develop their pedagogy within in-school, in-service training settings. Furthermore, extending the reach of the current study to include student experiences would enable me to examine how PD interventions and teacher pedagogy ultimately shape student literacy learning. These extensions of the current study will enable me to both refine and build upon the framework for digital pedagogies and the methods I have developed in this dissertation.

Conclusion

Today's teachers and students find themselves surrounded by digital devices and the software and online apps to which they grant access. Boston Public Schools, for example, recently invested in 10,000 Chromebooks, which now grace computer carts in urban classrooms as teachers work from their "Laptops for Learning," or L4L, MacBook Pros to present material on Smartboards throughout the district. Borealis, after the conclusion of this study, "went Google," a move that has similarly happened at the school where I conducted my pilot study and has occurred at districts around the country. The move to use and integrate Google Apps entails not only access to Google's email server, but access to Google's many apps for education, including the new Google Classroom and the constantly-evolving Google Drive, which offer new possibilities for course management, development of course content, and communication between all educational stakeholders: from administrators to families to students and their communities.

Alongside the possibilities, such moves to digitize education raise concerns among teachers, parents, and administrators about digital safety as educators work with children and adolescents in spaces that break down the walls and boundaries of the school. Further, adherence to particular platforms like Google raises questions about intellectual property and student rights, about the corporatization of education in the United States, and about responsible digital engagement, all issues that came up in interviews with Borealis teachers. Today's secondary teachers find themselves in a landscape that, as Hicks (2013) argues, no longer asks *whether* digital technologies should be included in teaching and learning, but *how, why,* and *to what ends* they should be included. Evolving policies related to curricular and assessment standardization champion the use of digital technologies for data gathering and large-scale assessment environments; PARCC and Smarter Balanced have already developed digitized nationwide assessments based on the Common Core State Standards. However, these new uses of technology in education "miss the point" when it comes to developing students' digital literacies. While they certainly facilitate efficient assessment of our nation's students, such testing settings rarely challenge traditional notions of literacy or content, as I have argued elsewhere (Homan & Reed, 2014). The teachers in this study nuance notions of digital technologies as efficiency-boosters, illustrating how in a single school's English department, digital technologies are put to varying uses with different implications for student learning. Further, this study challenges popular approaches to school-based in-service learning, showing that even in a space where teacher leadership and teacher interests were highly valued, where multiple opportunities for teacher learning were offered, and where teachers wanted to integrate more new tools into their teaching, most teachers' digital pedagogical learning occurred in interpersonal interactions or in networks outside of the school setting. Borealis teachers' "professional learning communities"

(at least those tied to their digital learning) rested not solely in the official PLCs instituted by the school, but also in those networks teachers developed and fostered on their own – sometimes, these overlapped with institutionally-defined communities; more often, they did not.

If teachers are to engage in literacy pedagogies that challenge notions of technologies as efficiency tools, and instead position technologies as integrated components of the content-based curriculum, Borealis teachers' experiences suggest they must have access to networks that will expose them to such practice; will enable critical, reflective, and sometimes difficult conversations about ethics and digital citizenship; and will engage them as composers and creators in digital environments. How schools develop professional communities that foster this kind of professional learning and network-building, and how such professional learning plays a role in the development of teachers' digital pedagogies and students' digital literacies, will remain my focus and fascination moving forward.

Appendices

Appendix 2.1: Methods-by-Question Matrix

Orienting Question 1: How do teachers' social networks shape their digital literacy learning and, by extension, their pedagogical beliefs and practices?		
	Ethnographic Methods	*Social Network Methods*
How do teachers' social network connections foster or impede their digital literacy learning?	*Observations*: Fieldnotes from observations of teachers' interactions with colleagues to examine how teachers help one another learn. *Interviews:* Questions about teachers' relationships with colleagues and what they gain from these relationships (or what they struggle with in these relationships). *Artifact Analysis:* Artifacts teachers share between one another and observations or questions about how these are integrated into teacher practice.	*Graphic Analysis:* Analysis of the network graphs of social ties within the school; comparison of this with qualitative descriptions of teacher practice and teacher learning.
How do the characteristics and structures of teachers' social groups correspond with teachers' digital pedagogical beliefs and practices?	*Observations:* Fieldnotes and observations of teacher talk about their pedagogies, as well as observations of their teaching, combined with observations of teacher interactions. *Interviews:* Attention to how teachers talk about their colleagues in interviews, and how this talk about social relationships aligns (or not) with the decisions teachers make in the classroom, their assertion of what is most important to them in their teaching, and their practices with digital technologies.	*Graphic Analysis* Analysis of the structures of teachers' networks using graphic and clustering analysis.
How do institutional structures and teacher networks, taken together, shape teachers' digital	*Observations:* Observations of teachers' PLCs and their interactions within them, combined with observations of teacher practice. *Interviews:* Interviews with teachers about the role of PLCs in their learning, how PLCs contribute to their practice. *Artifact Analysis:* Attention to artifacts that get	*Selection Modeling:* Analysis of how teachers' networks are functions of their membership in PLCs, and how this corresponds with qualitative observations of teacher

pedagogical beliefs and practices?	passed around both in professional development sessions and in collegial interactions.	practice.
Orienting Question 2: As teachers develop digital literacies, what factors play a role in the development or change of teachers' existing pedagogies?		
	Ethnographic Methods	*Social Network Methods*
What tangible or intangible resources foster the translation of digital literacy knowledge and practices into teachers' pedagogical approaches?	*Observations:* Observations of teachers throughout their school days and in their PLCs, with specific attention to curricular, digital, or other resources teacher exchange and take up. *Interviews:* Interview questions about how teachers go about finding help from people or from outside resources and what resources teachers feel are most helpful, such as websites, fellow teachers' curricular materials, or other professional development materials. *Artifact Analysis:* Collection and analysis of resources teachers mention specifically.	*Statistical Analysis:* Analyses of teachers' uses of various technologies as teaching tools; analysis of how resources play a role in teacher networks and exchange of social capital.
How are teachers' approaches to integrating technologies in the classroom different, and how are these differences reflected in their practice?	*Observations:* Observations and analytic comparisons of how teachers use digital technologies in the classroom in different ways. *Interviews:* Interviews in which I ask teachers to explain their pedagogical beliefs about digital technologies. *Artifact Analysis:* Analysis of curricular materials to examine how digital technologies are positioned in teachers' classroom assignments and instruction.	*Statistical Analysis:* Statistical comparison of teachers' responses about which technologies they use most often on network survey.
What obstacles do teachers in this school encounter when they are learning how to integrate new digital technologies into their practice?	*Observations:* Noting when and where teachers get frustrated or discouraged, what they say when they're learning to work with a new technology, or how they react with tech doesn't work. *Interviews:* Conversations with teachers about what they find rewarding, frustrating, or difficult about working with particular digital technologies.	*Statistical Analyses:* Analysis of whether reports of obstacles to integration are significantly correlated with uses of digital technologies in the classroom or attitudes about technology.

Appendix 2.2: Study Phase Breakdown

	Time Allotted	***Ethnographic Methods***	***Social Network Methods***
Phase 1	Weeks 6-8	- Initial observations of and interviews with all teachers in the department to identify participants for Phase 2	- Administration of social network survey and questionnaire; initial analyses of social network data.
Phase 2	Weeks 9-16	- Observations of teachers (4 day-long observations, 4-5 subsequent observations, for a total of 20-25 observations) - In-depth semi-structured interviews with teachers (3-4 per teacher, 12-16 total interviews) - Artifact collection	- Collection of egocentric network data with the English teachers participating in the ethnographic portion of the study.
Phase 3	Weeks 17-18	- Final interviews as needed, finish observations of teachers, wrap-up	- Administration of social network survey and questionnaire again, in order to gain information about changes in networks and investments in particular spaces.

Appendix 2.3: Interview Protocols

Interview 1

For Four Teachers in Ethnographic Study

Interview 1: Teaching Practices and Digital Technologies

The goals of this interview are to:

- Learn more about the teacher's approach to teaching English Language Arts.
- Learn what spaces outside the classroom influence the teacher's teaching decisions
- Learn about the teacher's beliefs about technology and its role in the classroom
- Learn about what "kind of teacher" this teacher perceives herself/himself to be

Say: "In this first interview, I want to get to know you and your classroom a little bit, get a feel for what's important to you in your teaching. I also want to talk a little bit about digital technologies, like the Internet or other technologies you might use or don't use in your classroom, and learn about how you make decisions related to technologies. Do you have any questions?

1. **Describe your students and your classroom to me.**
    a. What are the needs of your students?
    b. Do you use any particular instructional models in your teaching of writing or reading? If so, what are those, and why do you use them?
2. **How would you characterize your approach to teaching English?**
    a. What do you value when it comes to teaching English? Give me an example of that from your curriculum.
    b. In what ways do others in the school share your approach?
    c. In what ways is your approach unique?
3. **Describe your favorite, or one of your favorite, units to me.**
    a. Why is this your favorite unit?
    b. Describe a lesson plan from this unit that sticks out in your memory.
    c. In what ways is this unit typical of how you regularly teach? In what ways is it atypical?
4. **Tell me about time in the past few months when you have used a technology in the classroom.**
    a. What did you do? What happened?
    b. Why did you choose to use that technology?

c. Who did you talk to about using this technology, and why?

5. **Tell me about a time when you made a decision about whether or not to use a new technology in the classroom.**
    a. What were the circumstances surrounding that decision?
    b. What did you eventually decide to do? Describe how that looked in your classroom.
    c. Why did you make that decision? What were others' reactions to that decision?

Remaining questions in this initial interview will revolve around teachers' responses to the technological questionnaire. These questions might ask teachers to provide examples of their uses of technologies in the classroom or in their day-to-day lives, ask about their beliefs about the role of technologies in the classroom, etc.

Interview 2

Interview 2: Egocentric Network Interview Survey

The goals of this interview are to:

- Learn about who this teacher considers a friend, both inside and outside the school

- Learn about this teacher's technological connections inside and outside the school, what technologies she uses most often to communicate with people, and who she communicates with most often using technologies.

- Learn about this teacher's connections related to her work both inside and outside the school, who she talks to about her teaching, and how far her network extends beyond the school walls.

Say: "In this interview, I'm going to ask you a series of questions about the people you know and trust both here at school and outside of school. I'll also be asking you where you see these people, how often, and how important they are to you. You only need to give me first names. Do you have any questions?"

Name Generator 1: Close Friends

Say: "First, let's talk about your friends. Who are your close friends?" Then: "Who else?"

Follow-ups after they generate a list:

1. Where do you most often see this person? Where else?
2. Do you talk to this person daily, weekly, monthly, or yearly?
3. On a scale of 1-5, 1 being not very close at all and 5 being very close friends, how would you rate your relationship with this person?
4. What do you talk to this person about?

Name Generator 2: Technologically-Enabled Connections

Say: "Now, I want to know about connections you have with people that are enabled by digital technologies. Who do you talk to primarily online, like over email, on social networking sites, or in other webspaces? You might also see these people in person, so some of these people might repeat from your list above."

Follow-ups after they generate a list:

1. Do you ever see this person face to face?
    a. If so, where?
    b. How often? Daily, weekly, monthly, or yearly?
2. What technologies do you use to communicate with this person (prompt with possibilities if necessary: facebook, email, texting, blogs, twitter, etc.)?
3. How often do you communicate with this person: daily, weekly, monthly, or yearly?
4. On a scale of 1-5, 1 being not very close at all and 5 being very close, how would you rate your relationship with this person?
5. What do you talk to this person about?

Name Generator 3: Work Consultation

Say: "This will be the last list of people; now I want to know about people you talk to about your teaching. These can be people you go to for advice or to talk our ideas, or people you tell stories to about your day. Who do you talk to about work?"

Follow-ups after they generate a list:

1. Where do you most often see this person? Where else?
2. What technologies do you use to talk to this person, if any?
3. Do you talk to this person daily, weekly, monthly, or yearly?
4. On a scale of 1-5, 1 being not very close at all and 5 being very close, how would you rate your relationship with this person?
5. What do you talk to this person about?

Interview 3

Interview 3: Social Relationships with Colleagues Within the School

The goals of this interview are to:

- Learn more about teachers' social relationships within the school, go more in-depth than interview 2 about relationships with colleagues.

- Learn more about why a teacher goes to a particular person for curricular/technological advice or brainstorming.

- Learn about the spaces in which a teacher interacts with others with regards to teaching and who occupies those spaces.

- Learn how relationships with colleagues impact the teacher's decisions in the classroom

Say: "In this interview, I want to go into a little more depth about your relationships with colleagues in the school and how those relationships have shaped your approach to teaching and learning about teaching. Also, I want to know how you use some technologies to communicate with colleagues and why you choose those technologies."

1. **Describe a time in the past few months when you collaborated with a colleague in the school.**
    a. Why were you collaborating? What led you to collaborate?
    b. When and where did you meet to collaborate? How often did you meet?
    c. Why did you choose to collaborate with this person?
    d. How did the collaboration go, looking back? Would you engage in a collaboration like this again? Why or why not?
2. **In what ways do your colleagues help you with your planning or your thinking about teaching?**
    a. Tell me about a specific time when a colleague helped you with planning.
    b. Tell me about a specific time when a colleague impacted or changed your thinking about something.
    c. Which colleagues do you find most helpful? Why?
3. **Tell me about a time when you disagreed with a colleague.**
    a. What was the disagreement about?
    b. Why did you disagree with this colleague? Why do you think this colleague believed what he/she believed?
    c. Have you had similar disagreements with other colleagues?
4. **Who among your colleagues do you spend a lot of time around?**
    a. Why do you see so much of these colleagues?
    b. Why do you choose to spend time with these colleagues instead of other colleagues?
    c. Tell me about a recent interaction with one or a few of these colleagues. What did you do? Where did you meet?
5. **Tell me about a time in the past few months when you used an online technology to communicate or share resources with a colleague.**
    a. How often do you use this technology? With whom do you communicate using this technology?
    b. What were you sharing with your colleague (or what were they sharing with you), and why?

c. What other technologies (if any) do you use to communicate with colleagues (and which colleagues)? If necessary, can prompt by mentioning social network sites, twitter, or other online writing spaces.

The remaining questions in this interview will be created following the egocentric network interview (Interview 2), in which I will gain information about the teacher's ties within and outside of the school. I will use this space to ask follow-up questions that I didn't get to in Interview 2 or to ask for further elaboration.

Interview 4

Interview 4: Meaningful Professional Learning and Development Spaces

The goals of this interview are to:

- Learn more (than I gained in initial survey) about what spaces teachers find important to their professional development and learning.

- Learn what spaces teachers find unimportant to their development, and what makes these spaces unimportant.

- Probe findings from observations of teachers in multiple professional spaces, learn more about the spaces I see teachers occupying regularly in my observations.

Say: "In this interview, I hope to learn more about how you learn more and grow as a teacher, and in particular, where this learning happens and with whom. I want to know what you find really important to your growth and development as a teacher and what learning experiences have been formative for you in this past school year."

1. **Tell me about something new you learned this semester or this year about teaching in general, or teaching English, or your own practice.**
    - **a.** Where did you learn this?
    - **b.** Who else was there?
    - **c.** How did this new knowledge impact your teaching?
    - **d.** Give me an example from your classroom about a time when your teaching changed because of this knowledge.
2. **What school-organized professional development sessions did you attend this year? (Get a list, then ask follow-up questions)**
    - **a. Which of these sessions did you find most helpful to your teaching?**
        - i. Why were these sessions helpful to your teaching?
        - ii. What happened in these sessions? Describe how things went in the session.

iii. How did these sessions influence your teaching? Tell me about a classroom lesson or interaction that was shaped by these sessions.

b. Which of these sessions did you find least helpful to your teaching?

i. What made these sessions unhelpful?

ii. What happened in these sessions? Describe how things went in the session.

iii. Did these sessions influence your teaching in a positive or negative way? If so, tell me about a classroom lesson or interaction that was shaped by these sessions.

c. What would you say are the characteristics of professional development sessions that are useful to you in your teaching and thinking? What are the characteristics of unhelpful events?

3. **What outside-of-school professional development, if any, did you engage in this year? (Get a list, then ask follow-up questions)**

a. Who else was involved in these events/sessions?

b. How did you find out about these events/sessions?

c. Where were these events/sessions held?

d. Which of these sessions did you find most helpful to your teaching?

i. Why were these sessions helpful to your teaching?

ii. What happened in these sessions? Describe how things went in the session.

iii. How did these sessions influence your teaching? Tell me about a classroom lesson or interaction that was shaped by these sessions.

e. Which of these sessions did you find least helpful to your teaching?

i. What made these sessions unhelpful?

ii. What happened in these sessions? Describe how things went in the session.

iii. Did these sessions influence your teaching in a positive or negative way? If so, tell me about a classroom lesson or interaction that was shaped by these sessions.

4. **Tell me about a time, if you can, when an event or interaction with a family member or an event at home influenced your teaching.**

a. Who did you talk to, what happened during the interaction?

b. In what way did your teaching change or shift? Tell me about a specific instance in your teaching that was a result of that interaction.

c. Was this event or interaction beneficial or detrimental to your teaching, or neither? Why?

5. **The remainder of questions on this interview protocol will be determined by the teacher's responses to the questions about important spaces on the initial questionnaire. I will seek to ask for examples and stories about interactions or events that took place in particular spaces that the teacher marks as important or unimportant in the remainder of this interview.**

Appendix 2.4: Interviews and Observations Calendar

Month	*Participant*	*Observations*	*Interviews*
February (Phase 1)	Mary	N/A	Interview 1
	Donna	N/A	Interview 1
	Allison	N/A	Interview 1
	Kristin	N/A	Interview 1
	Other participants	N/A	Interviews with three other teachers in the English department
	Professional Development	Observation of faculty break-out PD sessions	
March (Phase 2)	Mary	Full day observation	Interview 2
	Donna	Full day observation	Interview 2
	Allison	Full day observation + 2-hour observation of 2 American Literature classes	Interview 2
	Kristin	Full day observation + 1 hour observation of Literature and Composition 10 class	Interview 2
	Other participants	1 hour observation of Melinda, a teacher in the English department, and her Literature and Composition 9 class	Interview with Amanda, a teacher in the math department
	Professional Development	Observation of DigLit PLC	
April (Phase 2)	Mary	N/A	N/A
	Donna	1 hour observation of 9th grade American History class	N/A
	Allison	N/A	Interview 3
	Kristin	1 hour observation of British Literature	Interview 3

		class	
	Professional Development	Observation of DigLit PLC	N/A
May (Phase 2)	Mary	2 1-hour observations of creative writing class, 3 1-hour observations of American Literature class	Interviews 3 and 4
	Donna	1 hour observation of journalism class 1 hour observation of 9th American History class	Interviews 3 and 4
	Allison	2 1-hour observations of American Literature class	Interview 4
	Kristin	2 1-hour observations of British Literature class	Interview 4
	Other participants	N/A	Interview with Melinda, a teacher in the English department
	Professional Development	Observation of DigLit PLC	

Appendix 2.5: Survey Instruments

Time 1 Survey, January 2013

I. Background Information

1. Years Teaching:
2. Gender:
3. Disciplinary Affiliation (choose as many as apply):
    - Mathematics
    - Science
    - Social Studies
    - English
    - Special Education
    - Art
    - Music/Fine Arts
    - Career and Technology Education
    - Physical Education
    - ELL/ESL
    - Physical Education
    - World Languages
4. Room # (for example, "A04" or "Gymnasium")
5. Do you house a COW (Computers on Wheels) unit in your classroom?
    - Yes
    - No
6. Do you house any other technological resources in your classroom? Check all that apply:
    - Desktop computers (3+)
    - Still Cameras
    - Tablets
    - iPods
    - Smartboard
    - LCD projector
    - Video Cameras
    - Audio recording equipment
    - None of the above
    - Other (please specify)

II. Professional Learning Communities and Professional Development

7. Which PLC are you a member of? Provide the focus of your PLC below:
8. Indicate the degree to which you agree with each of the following statements about your PLC: [Strongly disagree Disagree Neither Agree nor Disagree Agree Strongly Agree]
    - I have learned a lot about my teaching practice in PLC sessions
    - I look forward to PLC days

- Members of my PLC help one another beyond the time designated for the PLC meetings
- I have positive relationships with most members of my PLC
- I prefer my PLC to other forms of professional development (e.g. PD days, full-department meetings, etc.)

9. This year, my PLC has helped me (check as many as apply):
    - implement a new pedagogical practice (e.g. modeling, peer review, conferencing)
    - integrate a new digital technology
    - implement a new assessment technique
    - reflect on my existing classroom practice
    - design engaging lessons for students
    - create units of study for a class
    - create a new curriculum for a class
    - none of the above
    - other:

III. Uses of Digital Technologies in Your Daily Life

The following questions ask about your use of digital technologies *in your daily life, not directly connected to your work as an educator*. This could include uses of technologies you use to communicate with friends or family, for example. I will ask about your uses of technologies at school in the next section.

10. Indicate which of the following technological devices you have used in the past four months *in your daily life, outside of school*:
    - smart phone
    - tablet computer
    - laptop computer
    - desktop computer
    - e-reader
    - assistive technology (e.g. a screen reader, voice amplification system)
    - global positioning system
    - MP3 player
    - none of the above
    - other:
11. Indicate approximately how often in the past four months you have used the following software- and web-based tools *in your daily life, outside of school*: [Never Rarely Sometimes Often All of the Time]
    - Blog platforms (such as Blogger, WordPress, Tumblr, etc.)
    - Webpage design sites (such as GoogleSites, WordPress, etc.)
    - Social media sites (such as Facebook, Twitter, LinkedIn, etc.)
    - Video or photo sharing sites (such as Flickr, YouTube, etc.)
    - Quiz / assessment sites (such as Quizlet, Quia, etc.)
    - Online presentation sites (such as Prezi, Google Presentations, etc.)
    - Screen capture sites or software (such as Jing, Camtasia, etc.)

- Notetaking sites or software (such as Evernote, OneNote, etc.)
- Drive backup and file sharing sites (such as Dropbox, Box,
- etc.)
- Other (please specify)
- Other (please specify)
- Other (please specify)

IV. Uses of Digital Technologies at School

The following questions ask about your uses of digital technologies over the past four months (or this school year) *that are specific to your work as a teacher*. This could include work done in spaces outside of school, such as in professional development, master's classes, or other work affiliated with your job that does not occur on school grounds).

12. Indicate which of the following technological devices you have used in the past four months *in your work as a teacher*:
    - smart phone
    - tablet computer
    - laptop computer
    - desktop computer
    - e-reader
    - assistive technology (e.g. a screen reader, voice amplification system)
    - global positioning system
    - MP3 player
    - none of the above
    - other:
13. Indicate approximately how often in the past four months you have used the following software- and web-based tools *in your work as a teacher*: [Never Rarely Sometimes Often All of the Time]
    - Blog platforms (such as Blogger, WordPress, Tumblr, etc.)
    - Webpage design sites (such as GoogleSites, WordPress, etc.)
    - Social media sites (such as Facebook, Twitter, LinkedIn, etc.)
    - Video or photo sharing sites (such as Flickr, YouTube, etc.)
    - Quiz / assessment sites (such as Quizlet, Quia, etc.)
    - Online presentation sites (such as Prezi, Google Presentations, etc.)
    - Screen capture sites or software (such as Jing, Camtasia, etc.)
    - Notetaking sites or software (such as Evernote, OneNote, etc.)
    - Drive backup and file sharing sites (such as Dropbox, Box,
    - etc.)
    - Other (please specify)
    - Other (please specify)
    - Other (please specify)

V. Reasons and Occasions for Technology Use

14. You indicated that you often use [____] in your work as a teacher. Briefly describe how you use these tools using the checkboxes below. Check as many as apply.

    I use these tools:

    - in the classroom, with students
    - in professional development sessions
    - in graduate coursework
    - Other (please specify)

    I use these tools because:

    - I am encouraged to do so by other teachers
    - I am encouraged to do so by administrators
    - it helps me plan or stay organized
    - students find it engaging
    - it helps me meet state/national standards
    - I believe it is important for students to learn how to use this digital technology
    - Other (please specify)

This question was repeated for any tool/technology a teacher reported using "often" or "all the time" in the classroom.

VI. Reasons for Not Using Technology and Technology Obstacles

15. You indicated that you *never* use some of these digital technologies. Specifically, you said you never use: [drawn from responses to item ___] Choose one or two of these. Use the space below to tell me why you never use these digital technologies in your work as an educator.
16. In the last four months, which if any of the following obstacles have you encountered when trying to use technology in your work as a teacher? Check as many as apply.
    - Lack of hardware resources
    - Lack of software resources
    - Lack of Internet connectivity
    - Lack of personal knowledge about how to use a digital technology
    - Lack of student knowledge about how to use a digital technology
    - Lack of support from colleagues
    - Lack of support from administrators
    - Lack of time to learn how to use a digital technology
    - Lack of time in the curriculum to integrate digital technologies
    - Lack of interest in incorporating digital technologies
    - None of the above
    - Other obstacles (please specify)
17. Is there anything else you would like to tell me about your uses of digital technologies?

VII. Teacher Networks

For the remaining questions, choose colleagues with whom you interact by clicking on their names in the selection box.

18. Who do you consider your closest colleagues?

    [List of teacher names, divided by departments, omitted for confidentiality purposes]

19. In the past four months (or this school year), who have you consulted about the use of digital technologies in your classroom?

    "Consulting" could include (but is not limited to) asking for advice, co-planning lessons, debriefing lessons, or brainstorming ideas related to digital technologies in your classroom

    [List of teacher names, divided by departments, omitted for confidentiality purposes]

    Who else have you consulted in the last four months about digital technologies (in school or outside of school? List names and positions below:

20. In the past four months (or this school year), who have you consulted about curriculum?

    "Consulting" could include (but is not limited to) asking for advice, co-planning lessons, debriefing lessons, or brainstorming ideas related to your discipline or content in general.

    [List of teacher names, divided by departments, omitted for confidentiality purposes]

    Who else have you consulted in the last four months about curriculum (in school or outside of school)?

    List names and positions below:

VIII. Further Contact

Almost done!

Please indicate whether you would be willing to be interviewed about your uses of digital technologies in your work as an educator.

Thank you so much for your time!

A shorter version of this survey will be sent out again at the end of the school year. If you also participate in that round, your name will be entered in a drawing to win a $100 Visa Gift Card.

Have a wonderful semester!

Time 2 Survey, June 2013

I. Background Information

1. Years Teaching:
2. Gender:

3. Disciplinary Affiliation (choose as many as apply):
    - Mathematics
    - Science
    - Social Studies
    - English
    - Special Education
    - Art
    - Music/Fine Arts
    - Career and Technology Education
    - Physical Education
    - ELL/ESL
    - Physical Education
    - World Languages

II. Uses of Digital Technologies at School

The following questions ask about your uses of digital technologies over the past four months (or this school year) *that are specific to your work as a teacher*. This could include work done in spaces outside of school, such as in professional development, master's classes, or other work affiliated with your job that does not occur on school grounds).

4. Indicate which of the following technological devices you have used in the past four months *in your work as a teacher*:
    - smart phone
    - tablet computer
    - laptop computer
    - desktop computer
    - e-reader
    - assistive technology (e.g. a screen reader, voice amplification system)
    - global positioning system
    - MP3 player
    - none of the above
    - other:
5. Indicate approximately how often in the past four months you have used the following software- and web-based tools *in your work as a teacher*: [Never Rarely Sometimes Often All of the Time]
    - Blog platforms (such as Blogger, WordPress, Tumblr, etc.)
    - Webpage design sites (such as GoogleSites, WordPress, etc.)
    - Social media sites (such as Facebook, Twitter, LinkedIn, etc.)
    - Video or photo sharing sites (such as Flickr, YouTube, etc.)
    - Quiz / assessment sites (such as Quizlet, Quia, etc.)
    - Online presentation sites (such as Prezi, Google Presentations, etc.)
    - Screen capture sites or software (such as Jing, Camtasia, etc.)
    - Notetaking sites or software (such as Evernote, OneNote, etc.)
    - Drive backup and file sharing sites (such as Dropbox, Box,

- etc.)
- Other (please specify)
- Other (please specify)
- Other (please specify)

III. Reasons and Occasions for Technology Use

6. You indicated that you often use [____] in your work as a teacher. Briefly describe how you use these tools using the checkboxes below. Check as many as apply.

   I use these tools:

   - in the classroom, with students
   - in professional development sessions
   - in graduate coursework
   - Other (please specify)

   I use these tools because:

   - I am encouraged to do so by other teachers
   - I am encouraged to do so by administrators
   - it helps me plan or stay organized
   - students find it engaging
   - it helps me meet state/national standards
   - I believe it is important for students to learn how to use this digital technology
   - Other (please specify)

This question was repeated for any tool/technology a teacher reported using "often" or "all the time" in the classroom.

IV. Reasons for Not Using Technology and Technology Obstacles

7. You indicated that you *never* use some of these digital technologies. Specifically, you said you never use: [drawn from responses] Choose one or two of these. Use the space below to tell me why you never use these digital technologies in your work as an educator.
8. In the last four months, which if any of the following obstacles have you encountered when trying to use technology in your work as a teacher? Check as many as apply.
   - Lack of hardware resources
   - Lack of software resources
   - Lack of Internet connectivity
   - Lack of personal knowledge about how to use a digital technology
   - Lack of student knowledge about how to use a digital technology
   - Lack of support from colleagues
   - Lack of support from administrators
   - Lack of time to learn how to use a digital technology
   - Lack of time in the curriculum to integrate digital technologies
   - Lack of interest in incorporating digital technologies

- None of the above
- Other obstacles (please specify)

9. Is there anything else you would like to tell me about your uses of digital technologies?

V. Teacher Networks

For the remaining questions, choose colleagues with whom you interact by clicking on their names in the selection box.

10. Who do you consider your closest colleagues?

    [List of teacher names, divided by departments, omitted for confidentiality purposes]

11. In the past four months (or this school year), who have you consulted about the use of digital technologies in your classroom?

    "Consulting" could include (but is not limited to) asking for advice, co-planning lessons, debriefing lessons, or brainstorming ideas related to digital technologies in your classroom

    [List of teacher names, divided by departments, omitted for confidentiality purposes]

    Who else have you consulted in the last four months about digital technologies (in school or outside of school? List names and positions below:

12. In the past four months (or this school year), who have you consulted about curriculum?

    "Consulting" could include (but is not limited to) asking for advice, co-planning lessons, debriefing lessons, or brainstorming ideas related to your discipline or content in general.

    [List of teacher names, divided by departments, omitted for confidentiality purposes]

    Who else have you consulted in the last four months about curriculum (in school or outside of school)? List names and positions below:

Appendix 2.6: Description of Pilot Study Research

The complementary methodological design of this study was in part inspired by my pilot research, which I conducted in February, 2011 through March, 2012. My case study of one teacher blogger and her classroom practices with writing technologies led me to question how teachers' collegial relationships and classroom practices are mutually informative and influential, especially in increasingly digital educational settings, where teachers are afforded more opportunities to connect with their colleagues both within and outside their buildings and districts. At the time of the pilot study, Sylvia[1] was an English teacher at Ridgemont high school, which serves a semi-urban district alongside 11 other high schools of varying sizes. Sylvia was the newspaper faculty adviser and taught three sections of Senior Literature and Composition. During the year-long pilot study, I collected three types of formal qualitative data on two research trips[2], along with informal data that was not part of the original pilot study design but has informed the present study design. Formal data included: observation field notes, in-depth interview audio transcripts, and Sylvia's posts from a blog she maintains with her co-author, Bruce. During my visits, I also stayed with Sylvia in her home; had meals with her, her husband (a high school science teacher) and her daughter; babysat during parent-teacher conferences; and went for long runs and hikes with Sylvia – all of which added to my understanding of the participant and her perspectives on digital writing. Information obtained as a result of my personal friendship with Sylvia served as informal data.

The pilot study's original design focused only on Sylvia; however, as I spent time with Sylvia at school, it became clear that studying her digital beliefs and practices also meant

[1] All teacher and school names are pseudonyms

[2]Sylvia is not local, so collecting data involved two longer visits with approximately twelve months between them, during which time I analyzed initial data, presented with Sylvia about our ongoing work at a professional conference, and collected and read blog posts, all of which contributed to the design of interview protocol for the second field visit.

studying the teaching practices of her colleague and fellow blogger, Bruce, as well as a number of other teachers with whom Sylvia shared multiple digital and non-digital spaces. Given the limitations of my IRB approval, I was only able to talk to Sylvia in an official capacity, but many of her interactions with colleagues and stories about interactions with colleagues and students led me to question the role of social relationships in the development of Sylvia's digital pedagogies. For example, Sylvia noted in an interview that when it comes to getting technological advice:

> I usually wheel around in my chair and ask Bruce. Cuz he's, the role he plays in the building, he's on the tech committee and he's also on a district-level tech committee… so I often turn around and ask him, and if that doesn't work I might ask... it depends on what it is, it really depends on what it is.

This made me wonder about Sylvia's "technological consultation network," or the people she goes to for ideas or advice about technology: who is included in this network, and how do the members of this network share information among themselves? Certainly Bruce is a primary actor in many of the spaces in Sylvia's life – but who else in Sylvia's professional live shapes her pedagogical approach to digital integration? The use of network analysis in the current study allows me to analyze teachers' social relationships digital pedagogies overlap.

The pilot study also raised questions about the teachers whose pedagogical approaches to integrating technology (or not) were different from Sylvia's – namely, those teachers who were reluctant to experiment with new digital tools in their classrooms. Sylvia often spoke of colleagues who struggled with new technologies, emphasizing that they were either made nervous by them or felt incompetent when faced with them. Sympathetic to these teachers' struggles, Sylvia emphasized the incredible amount of time and dedication it took for her to develop her own digital literacies and pedagogies, using the phrase "baby steps" in multiple

interviews. Sylvia's descriptions of classrooms that were unlike hers – spaces that focused on literature analysis, handwriting skills, or computers as tools for typing papers, based on her characterizations – made me question how teachers learn about digital technologies and how they acquire new digital practices. Expanding the reach of my study to include teachers at various stages of acquiring digital literacies and developing digital pedagogies would allow me to probe this new set of questions.

References

Anderson, J. G. (2002). Evaluation in health informatics: social network analysis. *Computers in Biology and Medicine, 32*(3), 179–193. doi:10.1016/S0010-4825(02)00014-8

Anderson, J. G., & Jay, S. J. (1985). Computers and clinical judgment: The role of physician networks. *Social Science & Medicine, 20*(10), 969–979. doi:10.1016/0277-9536(85)90253-9

Avila de Lima, J. (2010). Studies of networks in education: Methods for collecting and managing high-quality data. In A. J. Daly (Ed.). *Social Network Theory and Educational Change.* Cambridge, MA: Harvard Education Press.

Bandura, A. (1977). Self-efficacy: toward a unifying theory of behavioral change. *Psychological Review, 84*(2), 191–215.

Baker-Doyle, K. J. & Yoon, S. A. (2010). Making expertise transparent: Using technology to strengthen social networks in teacher professional development. In A. J. Daly (Ed.). *Social Network Theory and Educational Change.* Cambridge, MA: Harvard Education Press.

Bawden, D. (2008). Origins and concepts of digital literacy. Lankshear, C. and Knobel, M. (Ed.), Digital Literacies (pp. 17-32) Peter Lang. ISBN: 1433101696.

Becta research. Reports and publications: Barriers and enablers to teachers' use of ICT. (n.d.). Retrieved June 30, 2014, from http://www.teachfind.com/becta/becta-research-research-reports-and-publications-barriers-and-enablers-teachers-use-ict

Belland, B. R. (2009). Using the theory of habitus to move beyond the study of barriers to technology integration. *Computers & Education, 52*(2), 353–364. doi:10.1016/j.compedu.2008.09.004

Borgatti, S.P., Everett, M.G. and Freeman, L.C. (2002). UCINET for Windows: Software for Social Network Analysis. Harvard, MA: Analytic Technologies.

Brandt, D. (2001). *Literacy in American Lives* (1st ed.). Cambridge University Press.

Brandt, D., & Clinton, K. (2002). Limits of the local: Expanding perspectives on literacy as a social practice. *Journal of Literacy Research*, *34*(3), 337–56.

Brun, M., & Hinostroza, J. E. (2014). Learning to become a teacher in the 21st century: ICT integration in Initial Teacher Education in Chile. *Journal of Educational Technology & Society*, *17*(3), 222?238.

Burnett, C. (2009). "That's more like how they know me as a person": one primary pre-service teacher's stories of her personal and "professional" digital practices. *Literacy*, *43*(2), 75–82. doi:10.1111/j.1741-4369.2009.00517.x

Burnett, C. (2011). Pre-service teachers' digital literacy practices: exploring contingency in identity and digital literacy in and out of educational contexts. *Language and Education*, *25*(5), 433–449. doi:10.1080/09500782.2011.584347

Chase, Z., & Laufenberg, D. (2011). Embracing the squishiness of digital literacy. *Journal of Adolescent & Adult Literacy*, *54*(7), 535–537.

Chow, I. H.-S. (2012). The role of social network and collaborative culture in knowledge sharing and performance relations. *S.A.M. Advanced Management Journal*, *77*(2), 24–37,2.

Coburn, C. E., & Russell, J. L. (2008). District policy and teachers' social networks. *Educational Evaluation and Policy Analysis*, *30*(3), 203–235.

Coburn, C. E., Choi, L., & Mata, W. (2010). "'I would go to her because her mind is math': network formation in the context of a district-based mathematics reform." In A. J. Daly

(Ed.). *Social Network Theory and Educational Change*. Cambridge, MA: Harvard Education Press.

Cochran-Smith, M., & Lytle, S. L. (1999). Relationships of knowledge and practice: Teacher learning in communities. *Review of Research in Education*, *24*, 249–305. doi:10.2307/1167272

Cole, R. P. & Weinbaum, E. H. (2010). Changes in attitude: Peer influence in high school reform. In A. J. Daly (Ed.). *Social Network Theory and Educational Change.* Cambridge, MA: Harvard Education Press.

Corbin, J., & Strauss, A. (2007). *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory* (3rd ed.). Sage Publications, Inc.

Daly, A. J. (2010). *Social Network Theory and Educational Change*. (A. J. Daly, Ed.). Harvard Education Press.

Daly, J., & Finnigan, K. (2012). Exploring the space between: Social networks, trust, and urban school district leaders. *Journal of School Leadership, 22,* 493-530.

Design-Based Research Collective (2003). "Design-based research: An emerging paradigm for educational inquiry." *Educational Researcher, 32*(1), 5-8.

Dooner, A.-M., Mandzuk, D., & Clifton, R. A. (2008). Stages of collaboration and the realities of professional learning communities. *Teaching and Teacher Education*, *24*(3), 564–574. doi:10.1016/j.tate.2007.09.009

Dufour, R., DuFour, R., Eaker, R., & Many, T. (2010). *Learning by Doing: A Handbook for Professional Communities at Work* (2nd edition). Bloomington, IN: Solution Tree.

Emerson, R. M., Fretz, R. I., & Shaw, L. L. (1995). *Writing Ethnographic Fieldnotes* (1st ed.). University of Chicago Press.

Ertmer, P. A. (2005). Teacher pedagogical beliefs: The final frontier in our quest for technology integration? *Educational Technology Research and Development*, *53*(4), 25–39. doi:10.2307/30221207

Fletcher, J. M., & Ross, S. L. (2012). *Estimating the Effects of Friendship Networks on Health Behaviors of Adolescents* (Working Paper No. 18253). National Bureau of Economic Research. Retrieved from http://www.nber.org/papers/w18253

Frank, K. A. (1995). Identifying cohesive subgroups. *Social Networks*, *17*(1), 27–56. doi:10.1016/0378-8733(94)00247-8

Frank, K. A. (1996). Mapping interactions within and between cohesive subgroups. *Social Networks*, *18*(2), 93–119. doi:10.1016/0378-8733(95)00257-X

Frank, K. A. (1998). Chapter 5: Quantitative methods for studying social context in multilevels and through interpersonal relations. *Review of Research in Education*, *23*(1), 171–216. doi:10.3102/0091732X023001171

Frank, K. A., & Fahrbach, K. (1999). Organizational culture as a complex system: Balance and Information in models of influence and selection. *Organization Science*, *10*(4), 514–515. doi:10.2307/2640369

Frank, K. A., Zhao, Y., Penuel, W. R., Ellefson, N., & Porter, S. (2011). Focus, fiddle, and friends: Experiences that transform knowledge for the implementation of innovations. *Sociology of Education*, *84*(2), 137–156. doi:10.1177/0038040711401812

Freire, P. (1972). *Pedagogy of the Oppressed, 30th Anniversary Edition*. (M. B. Ramos, Trans.) (30th Anniversary edition.). New York: Bloomsbury Academic.

Gee, J. P. (2000). Teenagers in new times: A new literacy studies perspective. *Journal of Adolescent & Adult Literacy*, *43*(5), 412–420.

Ghamrawi, N. (2013). Teachers helping teachers: A professional development model that promotes teacher leadership. *International Education Studies*, *6*(4), 171–182.

Girvan, M., & Newman, M. E. J. (2002). Community structure in social and biological networks. *Proceedings of the National Academy of Sciences of the United States of America*, *99*(12), 7821–7826. doi:10.1073/pnas.122653799

Glaser, B. G., & Strauss, A. L. (2012). *The discovery of grounded theory: strategies for qualitative research*. New Brunswick, N.J.: Aldine Transaction.

Goody, J., & Watt, I. (1963). The consequences of literacy. *Comparative Studies in Society and History*, *5*(3), 304–345.

Grabill, J. T., & Hicks, T. (2005). Multiliteracies meet methods: The case for digital writing in English education. *English Education*, *37*(4), 301–311.

Granger, C. A., Morbey, M. l., Lotherington, H., Owston, R. d., & Wideman, H. h. (2002). Factors contributing to teachers' successful implementation of IT. *Journal of Computer Assisted Learning*, *18*(4), 480–488. doi:10.1046/j.0266-4909.2002.00259.doc.x

Granovetter, M. S. (1973). The strength of weak ties. *American Journal of Sociology*, *78*(6), 1360-1380.

Greene, J. C. (2007). *Mixed Methods in Social Inquiry* (1st ed.). Jossey-Bass.

Greenhow, C., Robelia, B., & Hughes, J. E. (2009). Web 2.0 and classroom research: What path should we take *now*? *Educational Researcher*, *38*(4), 246–259. doi:10.3102/0013189X09336671

Hamilton, D. (2009). Blurred in translation: Reflections on pedagogy in public education. *Pedagogy, Culture & Society*, *17*(1), 5–16. doi:10.1080/14681360902742829

Hargreaves, A., & Dawe, R. (1990). Paths of professional development: Contrived collegiality, collaborative culture, and the case of peer coaching. *Teaching and Teacher Education*, *6*(3), 227–241. doi:10.1016/0742-051X(90)90015-W

Harris, A., & Jones, M. (2010). Professional learning communities and system improvement. *Improving Schools*, *13*(2), 172–181. doi:10.1177/1365480210376487

Heath, S. B. (1983). *Ways with words: language, life, and work in communities and classrooms*. Cambridge [Cambridgeshire] ; New York: Cambridge University Press.

Herrington, A., Hodgson, K., & Moran, C. (2009). *Teaching the New Writing: Technology, Change, and Assessment in the 21st-Century Classroom (Language & Literacy Series)*. Teachers College Press.

Hew, K. F., & Brush, T. (2006). Integrating technology into K-12 teaching and learning: current knowledge gaps and recommendations for future research. *Educational Technology Research and Development*, *55*(3), 223–252. doi:10.1007/s11423-006-9022-5

Hewett, B. L. (2000). Characteristics of interactive oral and computer-mediated peer group talk and its influence on revision. *Computers and Composition*, *17*(3), 265–288. doi:10.1016/S8755-4615(00)00035-9

Hicks, T. (2009). *The Digital Writing Workshop* (1st ed.). Heinemann.

Hicks, T. (2013). *Crafting digital writing: Composing texts across media and genres*.

Hicks, T., Turner, K. H., & Fink, L. S. (2013). No longer a luxury: Digital literacy can't wait. *English Journal, High School Edition*, *102*(6), 58–65.

Hicks, T., Turner, K. H., & Stratton, J. (2013). Reimagining a writer's process through digital storytelling. *LEARNing Landscapes*, *6*(2), 167–183.

Hillocks, G. (1995). *Teaching Writing as Reflective Practice*. Teachers College Press, Teachers College, Columbia University.

Hipp, K. K., Huffman, J. B., Pankake, A. M., & Olivier, D. F. (2008). Sustaining professional learning communities: Case studies. *Journal of Educational Change*, *9*(2), 173–195. doi:10.1007/s10833-007-9060-8

Holland, D., Jr, W. L., Skinner, D., & Cain, C. (2001). *Identity and Agency in Cultural Worlds*. President and Fellows of Harvard College.

Homan, E. C. (2014). The shifting spaces of teacher relationships: Complementary methods in examinations of teachers' digital practices." *Journal of Technology and Teacher Education, 22*(3), 311-331.

Homan, E. C. & Reed, D. (2014). "Learning from digital students and teachers: Re-imagining writing instruction and assessment for the 21st century." In Purdy, J. P. & McClure, R. *The New Digital Scholar*. Medford, NJ: Information Today.

Hord, S. M. (2009). Professional learning communities. *Journal of Staff Development*, *30*(1), 40-43.

Horn, I. S. & Little, J. W. (2010). Attending to problems of practice: Routines and resources for professional learning in teachers' workplace interactions. *American Educational Research Journal*, *47*(1), 181–217.

Hughes, J. (2005). The role of teacher knowledge and learning experiences in forming technology-integrated pedagogy. *Journal of Technology and Teacher Education*, *13*(2), 277–302.

Huisman, M. & van Duijn, M. A. (2003). *StOCNET: Software for the statistical analysis of social networks*, University of Groningen Digital Archive | IR@RUG.

Inan, F. A., & Lowther, D. L. (2010). Laptops in the K-12 classrooms: Exploring factors impacting instructional use. *Computers & Education*, *55*(3), 937–944. doi:10.1016/j.compedu.2010.04.004

Ito, M. (2009). *Hanging Out, Messing Around, and Geeking Out: Kids Living and Learning with New Media* (1st ed.). The MIT Press.

Kadushin, C. (2011). *Understanding Social Networks: Theories, Concepts, and Findings*. Oxford University Press, USA.

Kajder, S. B. (2010). *Adolescents and Digital Literacies: Learning Alongside our Students*. Urbana, Ill: National Council of Teachers of English.

Kale, U., & Goh, D. (2014). Teaching style, ICT experience and teachers' attitudes toward teaching with Web 2.0. *Education and Information Technologies*, *19*(1), 41–60. doi:10.1007/s10639-012-9210-3

Keengwe, J., Schnellert, G., & Mills, C. (2012). Laptop initiative: Impact on instructional technology integration and student learning. *Education and Information Technologies*, *17*(2), 137–146. doi:10.1007/s10639-010-9150-8

Keesler, V. A., & Howe, C. (2012). Understanding educator evaluations in Michigan: Results from year 1 of implementation. Michigan Department of Education.

Kervin, L., Verenikina, I., Jones, P., & Beath, O. (2013). Investigating synergies between literacy, technology and classroom practice. *Australian Journal of Language and Literacy*, *36*(3), 135+.

Kittle, P., & Hicks, T. (2009). Transforming the group paper with collaborative online writing. *Pedagogy: Critical Approaches to Teaching Literature, Language, Composition, and Culture*, *9*(3), 525. doi:10.1215/15314200-2009-012

Koehler, M. J. & Mishra, P (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education, 9*(1), 60-70.

Lankshear, C., & Knobel, M. (2008). *A New Literacies Sampler*. (K. Michele & L. Colin, Eds.). Peter Lang Publishing.

Lankshear, C., & Knobel, M. (2011). *New literacies*. Berkshire, England ; New York: Open University Press.

Latour, B. (2007). *Reassembling the Social: An Introduction to Actor-Network-Theory*. Oxford University Press, USA.

Lave, J., & Wenger, E. (1991). *Situated learning: legitimate peripheral participation*. Cambridge [England]; New York: Cambridge University Press.

Lawson, T., & Comber, C. (1999). Superhighways technology: personnel factors leading to successful integration of information and communications technology in schools and colleges. *Journal of Information Techology for Teacher Education, 8*(1), 41–53. doi:10.1080/14759399900200054

Lazega, E., Mounier, L., Snijders, T., & Tubaro, P. (2012). Norms, status and the dynamics of advice networks: A case study. *Social Networks, 34*(3), 323–332. doi:10.1016/j.socnet.2009.12.001

Learned, J. (2014).*"Feeling like I'm slow because I'm in this class": Secondary School Contexts and the Identification and Construction of Struggling Readers.* Dissertation. Ann Arbor: University of Michigan Press.

Lee, D. H. L., & Shaari, I. (2012). Professional identity or best practices?—An exploration of the synergies between professional learning communities and communities of practice. *Creative Education, 03*(04), 457–460. doi:10.4236/ce.2012.34070

Levine, T. H. (2011). Experienced teachers and school reform: Exploring how two different professional communities facilitated and complicated change. *Improving Schools*, *14*(1), 30–47. doi:10.1177/1365480211398233

Lewis, K., Gonzalez, M., & Kaufman, J. (2012). Social selection and peer influence in an online social network. *Proceedings of the National Academy of Sciences*, *109*(1), 68–72. doi:10.1073/pnas.1109739109

Lewis, C., & Fabos, B. (2005). Instant messaging, literacies, and social identities. *Reading Research Quarterly*, *40*(4), 470–501.

Lieberman, A., & Mace, D. P. (2010). Making practice public: teacher learning in the 21st century. *Journal of Teacher Education*, *61*(1-2), 77+.

Little, J. W. (2003). Inside teacher community: Representations of classroom practice. *Teachers College Record*, *105*(6), 913–945. doi:10.1111/1467-9620.00273

Maxwell, J. A. (2004). *Qualitative Research Design: An Interactive Approach* (2nd ed.). Sage Publications, Inc.

McFarland, D. A. (2001). Student resistance: How the formal and informal organization of classrooms facilitate everyday forms of student defiance. *The American Journal of Sociology*, *107*(3), 612–678. doi:10.1086/338779

McFarland, D. (2005). Motives and contexts of identity change: A case for network effects. *Social Psychology Quarterly*, *68*(4), 289–315. doi:10.1177/019027250506800401

McGrail, E. (2006). “It’s a double-edged sword, this technology business”: Secondary English teachers’ perspectives on a schoolwide laptop technology initiative. *TEACHERS COLLEGE RECORD*, *108*(6), 1055–1079. doi:10.1111/j.1467-9620.2006.00685.x

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*, 415–444.

Merriam, S. B. (2009). *Qualitative Research: A Guide to Design and Implementation* (3rd ed.). Jossey-Bass.

Mintzes, J. J., Marcum, B., Messerschmidt-Yates, C., & Mark, A. (2013). Enhancing self-efficacy in elementary science teaching with professional learning communities. *Journal of Science Teacher Education*, *24*(7), 1201–1218. doi:10.1007/s10972-012-9320-1

Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers College Record*, *108*(6), 1017–1054. doi:10.1111/j.1467-9620.2006.00684.x

Moje, E. B. (2009). A call for new research on new and multi-literacies. *Research in the Teaching of English*, *43*(4), 348.

Moje, E. B., Dillon, D. R., & O'Brien, D. (2000). Reexamining roles of learner, text, and context in secondary literacy. *The Journal of Educational Research*, *93*(3), 165–180.

Moje, E. B., Overby, M., Tysvaer, N., & Morris, K. (2008). The complex world of adolescent literacy: Myths, motivations, and mysteries. *Harvard Educational Review*, *78*(1), 107–154,278–280.

Moje, E. B., & Tysvaer, N. (2010). Adolescent literacy development in out-of-school time: A practitioner's guide. New York, NY: Carnegie Corporation of New York

Murphy, P., & Ivinson, G. (2003). Pedagogy and cultural knowledge: a sociocultural perspective. *Pedagogy, Culture & Society*, *11*(1), 5–9. doi:10.1080/14681360300200157

National Governors Association Center for Best Practices, Council of Chief State School Officers. (2010). Common Core State Standards for English Language Arts. National Governors Association Center for Best Practices, Council of Chief State School Officers.

The National Writing Project, DeVoss, D. N., Eidman-Aadahl, E., & Hicks, T. (2010). *Because Digital Writing Matters: Improving Student Writing in Online and Multimedia Environments* (1st ed.). Jossey-Bass.

Neal, J. W., Neal, Z. P., Atkins, M. S., Henry, D. B., & Frazier, S. L. (2011). Channels of change: Contrasting network mechanisms in the use of interventions. *American Journal of Community Psychology*, *47*(3-4), 277–286. doi:10.1007/s10464-010-9403-0

Olson, D. R. (1977). From utterance to text: The bias of language in speech and writing. *Harvard Educational Review*.

Ong, W. J. (2002). *Orality and Literacy* (2 edition.). London; New York: Routledge.

Pearce, L. D. (2012). Mixed methods inquiry in sociology. *American Behavioral Scientist*, *56*(6), 829–848. doi:10.1177/0002764211433798

Penuel, W. R., Riel, M., Krause, A. E., & Frank, K. A. (2009). Analyzing teachers' professional interactions in a school as social capital: A social network approach. *Teachers College Record*, *111*(1), 124–163.

Penuel, W. R., Frank, K. A., Sun, M., Kim, C. M., & Singleton, C. (2013). The organization as a filter of institutional diffusion. *Teachers College Record*, *115*(1), 1–33.

Prensky, M. (2011). Digital natives, digital immigrants. In *The Digital Divide* (pp. 3–11). New York: Penguin.

Rainie, L., & Wellman, B. (2012). *Networked: The New Social Operating System*. The MIT Press.

Richmond, G., & Manokore, V. (2011). Identifying elements critical for functional and sustainable professional learning communities. *Science Education*, *95*(3), 543–570. doi:10.1002/sce.20430

Scribner, S., & Cole, Michael. (1981). *The Psychology of Literacy*. Harvard University Press.

Scenters-Zapico (2010). *Generaciones' Narratives: The pursuit and Practice of Traditional and Electronic Literacies on the U.S.-Mexico Borderlands.* Utah State University Press.

Schmidt, D., Baran, E., Thompson, A., Koehler, M.J., Shin, T, & Mishra, P. (2009, April). *Technological Pedagogical Content Knowledge (TPACK): The Development and Validation of an Assessment Instrument for Preservice Teachers*. Paper presented at the 2009 Annual Meeting of the American Educational Research Association. April 13-17, San Diego, California. Selber, S. A. (2004). *Multiliteracies for a digital age*. Carbondale: Southern Illinois University Press.

Selber, S. A. (2004). *Multiliteracies for a digital age*. Carbondale: Southern Illinois University Press.

Shoffner, M. (2009). Personal attitudes and technology: implications for preservice teacher reflective practice. *Teacher Education Quarterly*, *36*(2), 143.

Shulman, L. S. (1986). Those who understand: Knowledge growth in teaching. *Educational Researcher*, *15*(2), 4–14. doi:10.3102/0013189X015002004

Singh, U. (2013). Technology integration in teacher education: An infusion or a delusion? *Researchers World*, *4*(3), 147–154.

Song, H. (2012). The role of teachers' professional learning communities in the context of curriculum reform in high schools. *Chinese Education & Society*, *45*(4), 81–95. doi:10.2753/CED1061-1932450406

Stoll, L., Bolam, R., McMahon, A., Wallace, M., & Thomas, S. (2006). Professional learning communities: A review of the literature. *Journal of Educational Change*, *7*(4), 221–258. doi:10.1007/s10833-006-0001-8

Tashakkori, A., & Teddlie, C. (2003). *Handbook of Mixed Methods in Social & Behavioral Research*. SAGE.

Toker, U., & Gray, D. O. (2008). Innovation spaces: Workspace planning and innovation in U.S. university research centers. *Research Policy*, *37*(2), 309–329. doi:10.1016/j.respol.2007.09.006

VanKooten, C. L. (2014) *Developing Meta-Awareness about Composition through New Media in the First-Year Writing Classroom.* Dissertation. Ann Arbor: University of Michigan Press.

Vannatta, R. A., & Fordham, N. (2004). Teacher dispositions as predictors of classroom technology use. *Journal of Research on Technology in Education*, *36*(3), 253–271.

Vygotsky, L. S., Cole, M., John-Steiner, V., Scribner, S., & Souberman, E. (1980). *Mind in Society: The Development of Higher Psychological Processes* (14th edition.). Cambridge: Harvard University Press.

Warschauer, M., Real, G. D., Grant, D., & Rousseau, M. (2004). Promoting academic literacy with technology: Successful laptop programs in K-12 schools. *System*, *32*(4), 525–537. doi:10.1016/j.system.2004.09.010

Wasserman, S., & Faust, K. (1994). *Social Network Analysis: Methods and Applications* (1st ed.). Cambridge University Press.

Webb, P. R. (2006). Reconceptualizing classroom-based research in computers and composition. *Computers and Composition*, *23*(4), 462–476. doi:10.1016/j.compcom.2006.09.003

Weick, K. E. (1995). *Sensemaking in Organizations*. Thousand Oaks: SAGE Publications, Inc.

Westheimer, J. (1999). Communities and consequences: An inquiry into ideology and practice in teachers' professional work. *Educational Administration Quarterly*, *35*(1), 71–105. doi:10.1177/00131619921968473

Williams, D. J. (2013). Urban education and professional learning communities. *Delta Kappa Gamma Bulletin*, *79*(2), 31–39.

Wortham, S. (2004). From good student to outcast: The emergence of a classroom identity. *Ethos*, *32*(2), 164–187. doi:10.1525/eth.2004.32.2.164

Zhao, Y., Pugh, K., Sheldon, S., & Byers, J. L. (2002). Conditions for classroom technology innovations. *Teachers College Record*, *104*(3), 482–515.

Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal*, *40*(4), 807–840.