Learning to Argue in a Connected World: The Arc of Productive Disciplinary Engagement In a High School Academic Social Network

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Abstract

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Calls to virtually break down school walls through connected and blended learning environments are ubiquitous as of late as technologies in service of learning evolve and as schools are under pressure to change. Within the subject area of English Language Arts, there is a dearth of research or information on how to facilitate these new, digitally enhanced methods in high schools in a way that approaches or leads to productive disciplinary engagement (PDE). The current study describes one such scenario in which an academic social network (Remix) was used for the retrieval of curriculum, the storage of student work, and the exchange for both social and academic conversations with an entire freshman class of high school students across three teachers and eight classrooms. The seven-week curriculum focused on learning to read, analyze, and write evidence-based, classical arguments. Experts in argumentation (e.g., lawyers, journalists, grant writers, ex-English teachers, etc.) interacted with the students three times during the arc of the unit to give targeted feedback to students during their growing understanding of argumentation.

To determine the degree to which PDE occurred within the platform, the posts of twenty-five randomly selected students, who had at least one interaction with an expert, were downloaded and coded for Social and Cognitive Presence—two domains of the Community of Inquiry Model. The analysis illustrated that Social Presence acted as connective tissue to academic tasks and that socializing moved to an academic orientation as students collaborated and worked toward a common goal. Cognitive Presence also moved from trigger events which included recognizing and puzzling over contemporary issues to the exploration and integration of ideas as the unit progressed. The discourses associated with academic social networks proved slightly troublesome for students, lending credence that they need more practice in such platforms when posting and responding to academic content. A second investigation was completed to look more specifically at expert feedback in relation to PDE components, argumentation, and curricular activity. Differences between the three feedback interactions proved scientifically significant, thus illustrating experts adjusted their responses to students depending on the task. Experts moved from problematizing student arguments at the trigger stage of topic selection to directing students as to how to fix their arguments during the integration stage of production, thus holding students accountable to disciplinary norms as the unit progressed. Advice for how to utilize a social network and work with outside experts is also covered.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

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DEDICATION

To all the high school students and teachers who want to connect, create, achieve, and have a voice. May educational institutions live up to your potential,

Chapter 1

INTRODUCTION

For over fifteen years, the state of adolescent literacy has been labeled a national crisis, and there is grave concern that teens are going into college and the workplace less prepared than previous generations (Chapman, 2006; Lee, Grigg & Donahue, 2007; Carnegie, 2010). To reverse this downward trend, the Council of Chief State School Officers and the National Governors Association approved the Common Core Standards (National Governors, 2010) that are designed to provide a coherent trajectory for increased competence and expectations between grade levels with the ultimate goal of producing students who can succeed without remediation at the college level. Additionally, groups like Partnership for 21st Century Skills (2012) and Project Tomorrow (2012), which seem somewhat aligned or at least adjacent to the Common Core, are calling for classrooms to more fully embrace technology as a tool of learning. Such groups encourage breaking down the walls of traditional learning environments to construct classrooms in which the digital tools that adults use in the workplace and that adolescents use in their daily lives (Madden, Lenhart, Duggan, Cortesi & Gasser, 2013) are leveraged to deepen and enhance focused learning. Their goal is to take advantage of the resources that lie outside the classroom by using a "connected learning" pedagogy (Couros, 2006; Lindsay & Davis, 2013; Connected Learning, 2012) to address real world problems through expansive learning networks.

For some, such a shift signals a rumbling storm of educational transformation. Collins and Halverson (2009) argue that massive educational change is afoot equal in

magnitude to the reforms that occurred during the Industrial Revolution. In the 18th and 19th Century, the transformations in education centered on establishing a coherent educational structure to codify how schools operate (e.g., the school day's hour blocks, yearly calendar and grading systems) as well as designing static tools for learning (e.g., textbooks). In contrast, 21st Century educational change has its fulcrum set on the anytime/anywhere and interactive motherboard of digital technology with its customized content and personalized learning environments.

Regardless of whether one believes this change is occurring, Collins and Halverson (2009) rightly suggest that much of current education reform is antithetical to the hierarchical, linear, and one-size-fits-all prescriptive educational structures that the past three centuries have tried to build. They speculate that the "grammar of schooling" (Tyack & Tobin, 1994, p. 454) will be dismantled and future high schools will likely be restructured to embrace apprenticeship models in order for subject area disciplines to be contextualized within professions, which would allow youth who are disengaged with schooling an opportunity to better see the relevancy of what and why they learn. Further, as Hagel and Seely Brown (2008) believe, this educational transformation is occurring across professional domains in which the "push" of traditional process and systems is being replaced by "pull" toward an "array of highly specialized and distributed resources" that allow for greater learning choices and blended learning ecologies. They state, "Rather than seeking to dictate the actions that people must take, pull models seek to provide people on the periphery with the tools and resources (including connections to other people) required to take initiative and creatively address opportunities as they arise" (p. 93).

A revolution of the kind Collins and Halverson (2009) and Hagel and Seely Brown (2008) suggest, however, is not just about technologies, and merely pondering how we might use various technologies and their subsequent discourses in classrooms (Alverson, 2008). As

in any revolution, its genesis and sustainability is more aptly situated in people who leverage resources both digital and live in service of learning in all its shapes. As this transformation relates to English Language Arts education, some researchers and policy makers might say a codified set of honed and polished standards, theories, and edicts about the best practices in English education (e.g., Moore, Bean, Birdyshaw & Rycik, 1999; Biancarosa & Snow, 2006) are essential steps in ameliorating the crisis of adolescent literacy. Unfortunately, these improvements alone will not supply the elixir that will cure what is deemed the "literacy problem." As a number of scholars point out, teacher quality (Alvermann, 2003; Darling-Hammond & Hudson, 1989), curricular and instructional practices (Graham & Perin, 2007), policy constraints (Luke & Woods, 2009), student engagement (Schoenbach & Greenleaf, 2009; Fredricks, Blumenfeld & Paris, 2004) and student belonging (Nichols, Glass & Berliner, 2006; Booker, 2006) are also likely key components to keeping teens in school and attentive to the subjects they are learning.

To explore and respond to the curricular and instructional demands of the contemporary English classroom and make use of the tools and resources that more deeply connect and linguistically shape communities and learning, the LIFE Center at the University of Washington and Educurious Partners set out to develop a challenging, high-interest, connected curriculum that was facilitated through a blended-learning and technology-infused model (Osguthorpe & Graham, 2003; Kerres & De Witt, 2002; Driscoll, 2002) of instruction using face-to-face instruction and a social network for peer and expert collaboration. Because ninth grade tends to be the most pivotal year for whether a student stays in school and English Language Arts tends to be one of the most failed of all ninth grade classes (Neild, Stoner-Eby, & Furstenberg, 2008), Educurious targeted Freshman English to engage and challenge students with relevant curriculum. (A brief outline of the curriculum iteration that is the focus of this study is provided in Appendix 1.) While the

project goals were ambitious, the developers and researchers on the project also recognized that students and educational institutions are complex and that there are many influences and pressures on them that might work against the goals of the project. The project was less about solving the "literacy problem" or ameliorating the "drop-out rate" in mass (though that was in the back of our minds because of the project scope), and more about exploring the dimenstions of connected learning and attempting to construct a "knowledge-building environment" (Scardamalia, Bransford, Kozma & Quellmalz, 2010) in which students and experts communicate in service of learning how to build evidence-based arguments.

1.1 Context and Purpose of the Study

What follows is a description of how teachers, students, and experts interacted and engaged with one another during a project-based learning unit—*Charting Current Controversies* –in which students read about contemporary issues and wrote informed arguments during a seven-week period. The central question of the unit was: *How do I get people to listen to and take up my perspective on issues that I care about?* The question was designed to be open enough for students to explore topics of interest, and it was leading enough to be able to move the students into thinking about argument and the use of claims, evidence, and opposing arguments. These elements of argument are of particular import as an entry into deeper disciplinary discourses and practices in fields in which argument is a central activity and artifact. To answer this question and build an argument of merit, students studied the elements of argumentation, which consisted of perspective (the primary claim or thesis), reasons (claim), evidence, counter arguments and effective word choice. This unit was laced with engagement from experts, who in their professional lives acted as journalists, civil

servants, lawyers, grant writers, and PR agents. The final project included a classical, evidence-based argument to be submitted to a popular teen writing site and a podcast that was infused with the elements of argumentation that was shared out on the social network called Remix (2011).

As part of the research process, the study focused on one primary question:

When an academic social network is brought into a project-based English Language Arts classroom, in which students are focused on learning formal argumentation, how is productive disciplinary engagement (PDE) shaped over time and what are the contours of interactions that allow such engagement to flourish?

These questions were foregrounded initially by a slightly different focus, which was directed at the feedback experts gave students and then how students took up advice. However, because social media and context of the feedback substantially changed the ecology of the classroom, feedback as first envisioned proved to be one portion of a much larger milieu of classroom communication. Consequently, the investigative focus was adjusted and more broadly construed to tell a more complete, and perhaps cogent, account of what a networked classroom means in high school English classrooms and how it influences adolescent literacy.

As is often anecdotally reported, social media and school-based intellectual tasks are positioned as diametrically opposed. Social media are largely said to distract (Ahn, Bivona & DiScala, 2011) from learning, while school is said to focus it. As we know, such assumptions are arguable. This review and analysis are meant to move beyond essentialist positions in order to fill a gap in the literature in which social media are positioned as a facilitator of learning, rather than be its adversary. Informing a broader design-based research project, the essential questions are meant to determine whether there is room for

social media in schools. And if so, the study is meant to spur thought on how to best use social media in service of learning.

The research also speaks to the transitioning nature of English Language Arts classrooms and how teachers and instructional designers might best build experiences that are relevant to students' everyday lives and future workplace practices. This is done through the use of experts in argumentation and the implementation of project-based curriculum. The study also takes into account the principles of college-ready curriculum as an instantiation of the traditions of English classrooms as seen through the Common Core (Common Core State Standards Initiative, 2010) and other codified criteria for academic preparedness. These should be considered qualifiers to the term *disciplinary* since, as Ford and Forman (2006) asserted in their critique of *productive disciplinary engagement* in relation to science, the idea of placing student full-stock in a situation of disciplinarity with its associated discourse and practices is not completely realistic in the environment of secondary education…at least a great majority of the time. Disciplinarity connotes a changing and contested knowledge building process within specific domains. Nonetheless, there are common disciplinary discourses and practices that are common or foundational to real-world contexts and disciplines that may act as proxies and a gateway to deeper disciplinary engagement. Consequently, the unit that undergirds this study might best be described as aiming for foundational disciplinarity with the hope that experts might provide a professional window into their work with argumentation.

Chapter 2

LITERATURE REVIEW

2.0 Literature Review

As is reflective of this research project, the following literature review weaves together primarily two research areas--the current state of teaching of argumentation in secondary schools and the technologies that have tried to facilitate writing processes aimed at replicating the ways expert writers construct meaning. Both sets of research are located along a spectrum informed by the distinctions made by Newell, Beach, Smith, VanDerHeide and Anderiessen (2011) about the approaches people take regarding the teaching of writing in general. They posited that the teaching of writing has primarily fallen in two camps--cognitive and social. The first accentuates formalized schemas and practices, while the later focuses on the dialogic making of meaning through inquiry and exploration. Just as these differences are apparent in teacher practice, so too do they exist in digital tools that attempt to guide students in their writing. Consequently, the research literature presented below attempts to provide a background not only for the writing approaches specific to argumentation that were taken up in the unit, but also for how the technology facilitated the learning of argumentation through expert interactions.

2.1 Defining Argumentation in Secondary Education

The primary goal of *Charting Current Controversies* was to supply students with a learning experience that focused on the reading of challenging, argumentive[1] texts (Felton & Kuhn,

[1] Argumentive will be used throughout this **paper** since as Hillocks (2012) posited, the derivation accurately describes a type or genre of discourse, while *argumentative* describes the act, disposition, inclination toward argument.

2001) in a number of forms. In addition, the unit tackled the writing of researched opinions and followed the conventions and structure of classical argumentation. Special attention was given to a re-articulation and simplification of traditional argument structure (Toulmin, 1958/2003) by framing it as perspective, reasons, evidence, and opposing arguments (Kuhn & Udell, 2007). As is evident from the focus, the unit was intended to be in response to a particular need for students to engage more deeply with arguments and how they are structured while accentuating nonfiction texts and extended research.

Scholars have increasingly pointed out the need for high school students to engage in sustained reading and writing practices with nonfiction texts. Applebee and Langer (2006), after analyzing four consecutive years of student written products on the National Assessment for Educational Progress (NEAP), reported their concerns about the types of writing that teachers assigned to students. They noted that a little over 40% of eighth graders and roughly 33% of twelfth graders reported engaging in writing essays that included analysis or interpretation only a few times per year. Their findings echoed earlier analyses of students' writing assignments (Persky, Daane & Jin, 2003).

Perhaps in response, the Common Core Standards (Common Core State Standards Initiative, 2010) now contain a 70/30 split in standards illustrating a greater emphasis on reading and writing nonfiction texts, as opposed to narrative, creative writing, and literature. The Common Core does footnote that the percentages are meant to cover reading and writing across a day's curriculum, yet there is disagreement on whether the split should also apply discretely to the language arts standards alone. Because of the lack of past attention given complex argumentation at the secondary level, the *Nation's Report Card: Reading* revealed that fewer than 10% of students were able to make informed judgments about texts and under 15% of seniors had the ability to write a structured essay with a coherent claim with subsequent supports (Perie, Grigg & Donahue, 2005).

A number of reasons have been cited for why argumentation has been a weak spot for students in assessment situations. Traditionally, since argumentation couples reading and analysis with writing through research, students often stumble with comprehension and critical analysis of more challenging texts on a broad range of subjects for which they know little (Carnegie Council on Advancing Adolescent Literacy, 2010). Consequently, high school teachers, who have often been trained in literary analysis almost exclusively, must then teach students how to read more advanced texts on a range of subjects (Greenleaf, Shoenbach, Cziko, Mueller, 2001). Teachers may also neither have the content knowledge to engage students in argumentation since they are not well-versed in concepts, such as causality and proof, claims supported by evidence, warrants, and making apparent premises (Hillocks, 2010; Kuhn, 2005), nor the instructional know-how to guide and support students in their learning in contexts outside of literary analysis (Hillocks, 2010; Shanahan & Shanahan, 2008). Some teachers fear the potential discord that might occur in an environment where disagreement is productive and must be nurtured (Powell, Farrar, & Cohen, 1985). Additionally, overwhelmed teachers fear the avalanche of work in scaffolding and feedback and grading that is associated with assigning an extended research project in which students have to argue an informed perspective (Kellogg & Whiteford, 2009). Lastly, others have pointed to the difficulty of crafting arguments to audiences that reside only within schools—ultimately the teacher. Therefore, students are not able to authentically experience what it means to argue a point well in front of broader audiences, subsequently, deferring to the authority of the teacher (Berland & Reiser, 2009) and tackling issues or taking positions with which their teacher may not agree (Beck, 2006).

To provide clarity to teachers about the parameters of argumentation, the Common Core Standards (Common Core State Standards Initiative, 2010) advocates that students must engage with argumentation, not opinions, starting at the sixth grade. Teachers must

stress to their students the difference between these related genres, and they must especially emphasize that arguments entail a defendable position that is supported by coherent and distinct claims that are backed by evidence and that address concerns of the opposition. In contrast, opinions require a point of view with supporting reasons on any myriad of topics. The shift from the word *opinion* to the word *argument* conjures a different set of signifiers. Argument clearly alludes to classical argumentation in which developing claims and counter claims and marshaling appropriate evidence are key components of writing at sixth grade and beyond.

However, while many may think that *argument* is a fairly stable and agreed upon term, its etymology illustrates interesting nuances that change the scope, nature and intent of argumentation. In relation to the Common Core, we see a fairly traditional read on the genre as *logos*, or logical argument, as Aristotle conceived it (Kennedy, 1991) because of the standards' emphasis on structure. Many prominent scholars of Aristotle and argument have pointed out, however, that Aristotle believed logical argument should be located in the world and used for actually everyday discourse about issues (Toulmin, 1958/2003). And as Toulmin expressed, the pattern of claim, warrant, evidence, qualifier, and counter claim were not necessarily intended to be used within classrooms as a pattern to be strictly followed in composition, but rather a useful tool of analysis (see Lunsford, 2002). Bricker and Bell (2008) noted that the influence of Platonic tradition pushed logic into syllogistic reasons and the formal frameworks around logic that we currently see in education (Perelman & Olbrechts-Tyteca, 1969; Toulmin, 1958/2003).

Yet, there is more to argumentation than just syllogisms and finely constructed products. The role of audience, rationality, reasonableness and relevancy (not to mention Aristotle's two other well-cited elements of *pathos* and *ethos*) all play a hand in the power of an argument. Eemeren and Grootendorst (2004) specifically focus on the role of

reasonableness and accentuate the role of audience as the determiners of an argument's quality. To clarify their position, Eemeren and Grootendorst (2004) wrote, argumentation is "a verbal, social and rational activity aimed at convincing a reasonable critic of the acceptability of a standpoint by putting forward a constellation of propositions justifying or refuting the proposition expressed in the standpoint" (p. 1).

Several aspects of Eemeren and Grootedorst's (2004) definition stand out and make interesting additions to the more form-based definitions of argument we have come to know. First, they posit that argument can be both "verbal" (read as linguistic), enveloping text and speech, as well as visual, as has been viewed similarly by other digital humanities scholars (Handa, 2004; Foss, 2004, 2005; Olsen, Finnegan & Hope, 2008). Second, argument is defined as a "rational" activity evoking the space of logic, over *ethos and pathos*. Finally, they push argumentation into a social space with an audience who is an active part of the argument—either through receptive "listening" or through actual dialogue as a "reasonable" critic.

Given today's culture of ideological provocateurs, the last point begs the question—"What does reasonable mean?" Eemeren and Grootendorst (2004) suggested three criteria for assessing the reasonableness of an argument. The first parallels the logical constructions previously mentioned that follow Toulminic structure. The second criterion called "anthropological relativism," however, puts the audience in the position of judging the reasonableness of an argument. Both Perelman and Olbrecht-Tyteca (1969) and Toulmin (1958/2003) articulated precursors of this concept, but Toulmin accentuated that audience should be contextualized within various disciplines and professions, and perhaps by extension knowledge building communities. Consequently, an argument's value is informed by jurors who know the background to the issues and the associated schemas of discourse through which the argument is being funneled. Lastly, Eemeren and

Grootendorst (2004) suggested the critical-rationalistic perspective, that reasonableness of an argument be judged by its ability to solve differences, rather than its ability to make one side the victor. This harkens to Rogers (1970; Baumlin, 1987; Hum, 2008) who believed that argument should also include a deep understanding and careful listening of one's opposition in the hopes that the sides might gain consensus. Consequently, the analysis of an argument can take several different tacks—from form and structures to audience considerations to solution orientations. The stance of the interlocutor, in the broad sense of the term, and the audience are linked—points that will be brought to bear in the analysis of student work and expert feedback in this study. What do experts provide students in the process of making argument? What do they bring to bear to process? Do their disciplinary discourse and ways of arguing and seeing, as Toulmin noted, find their way into the feedback, thus accentuating the *disciplinary* associated with *productive disciplinary engagement* in the classroom?

However, just as experts guided students, so too did the curriculum and pedagogical practices that were implied within it. While "Charting Current Controversies" was facilitated in a social network to give students a broader audience, its curriculum, with subsequent instructional practices, was aligned to both cognitive and social frameworks (Newell, Beach & VanDerHeide, 2011). For example, the curriculum objectives steered students to developing a schema from which to create and transfer argumentive structures attuned to a Toulmin-esque analytical model (Toulmin, 1958/2003; Toulmin, Rieke & Janik, 1979), and to make the connective threads between the language of the unit and Toulmin's microstructural model of argumentation, students had to identify in readings and then apply in their writings. The elements of argumentation were articulated as: perspective (the primary claim or thesis), reasons (claims), evidence (grounds), and counter arguments (rebuttal). Making warrants, providing backing, and modal qualifiers were not an

accentuation of the unit. Emphasis, however, was placed on identifying loaded language and dog whistles and using classical argumentation structure which consisted of the following components: introduction, background information, first claim with evidence, second claim with evidence, third claim with evidence, etc., counter argument and conclusion.

Consequently, the unit concentrated on the form and structures of argumentation while at the same time contextualizing arguments within current issues—first through a case study and then through a free choice of topics. The unit riffed on Toulmin's model without explicitly teaching his conceptualizations directly, nor did it require students to work on deconcontextualized syllogisms that followed the analytical model. As Toulmin (1958, 2003) proposed a more situated view of argumentation through context, even calling for empirical work comparing arguments in various fields (Bricker & Bell, 2008), the curriculum for the unit fused an accentuation on argument structure within a classroom context that allowed for independent exploration and engagement with people who argue for a living—the experts.

While a curriculum with a fully social perspective (Newell, Beach & VanDerHeide, 2011) would have highlighted the development of theories, novel ideas, and courses of action in solution to a problem, students and teachers did negotiate the parameters of effective argumentation (Newell, Beach & VanDerHeide, 2011). This was intended to soften the accentuation on the structure of argumentation and make the process more social and constructive. Given the time constraints of a seven-week unit, the learning objectives as related to the Common Core Standards (Common Core State Standards Initiative, 2010), seemed best realized through a cognitive framework with an embedded social aspect facilitated through an academic social network.

Thus far in the literature review, the discussion of argumentation has provided a context by which to understand why and how the unit addressed argumentation. To recap, research has shown that teachers often shy away from assigning large researched arguments because of either lack of time or knowledge. The Common Core Standards have recently placed greater emphasis on argumentation in high school, as opposed to simple opinions, which are often supported by feeling, versus evidence. Despite this distinction, argumentation as a form, as shifted little since ancient times, though contemporary scholars have focused more on the variety of ways that argument might be made and the role of audience and context in understanding the value that is placed on the argument. In relation to the study, the unit used both cognitive and social methods of writing pedagogy. The cognitive approach was used as part of instruction for students to learn the schema of argumentation. In contrast, social approaches were leveraged through expert and student interaction during which topics and ways of arguing were explored.

2.2 Technologies that Facilitate Argumentation and Writing Processes

In order to further accentuate the social nature of argument, social media was leveraged to facilitate conversations between among students and between students and experts. While technologies have long been developed to aid student in writing, they have been geared traditionally toward a cognitive orientation. Over the last 20 years, for instance, there have been a number of technologies that have been said to help students improve as writers-- from simple word processing technologies, to tools that have been explicitly made with the intention of guiding students through writing, to technologies that have simply emerged from outside of school spaces in general culture that employ a type of literacy that may have some saliency in assisting youth as writers, e.g., social networks.

Most of the technologies designed for explicit coaching or helping with the writing process are framed with a cognitive orientation—meaning suited for individual composition and the facilitation of writing processes. Given that the current study takes place in English Language Arts classrooms that are using social media to retrieve content, store work, share opinions, collaborate with peers, and communicate with experts as a means toward writing improvement, it is appropriate to situate the research within a larger history of digital tools and subsequent expert practices that have attempted to help adolescents become better writers. This section of the literature review addresses how writing expertise has been viewed from a cognitive and social perspective in the research and how various tools have been designed accordingly to facilitate expert-like behaviors in students.

Early tools and research were greatly focused on the expert-writer paradigm as realized through the individual (Flower & Hayes, 1980; Bereiter & Scardamalia, 1987), not a broader network of people. Under this framework, experts and non-experts were studied in detail to capture the nuances of writing processes to reveal a recursive and iterative process of planning, drafting and revising with expert doing all of these practices more deeply and over longer periods of time than non-experts (Flower & Hayes, 1980; Bereiter & Scardamalia, 1987). Additionally, experts were said to be more concerned with precisely articulating meaning rather than just reporting or regurgitating happenings, ideas or concepts—a developmental difference Bereiter and Scardamalia (1987) phrased as "knowledge transformation" versus "knowledge telling" respectively. Other researchers took up these models to illustrate that experts also spent more time thinking about audience as they wrote and crafted (McCutchen, 1996; Kellogg, 2006), though younger children certainly took into account audience as they wrote (Cameron & Moshenko, 1996).

Simple word processing was said to aid students in developing more expert-like practices, and various other technologies were explicitly designed to aid writers through planning, drafting and revising as discrete processes. An early meta-analysis involving thirty-two studies on the effects of word processing on writing suggested that the use of the computer facilitates the fluid conceptualization of written utterances from prelinguistic to translator and revisor of text and frees the writer from mechanical concerns (Bangert-Drowns, 1993). Each of the studies in the analysis compared two groups of students receiving identical writing instruction but assigned to either a word processing or pencil and paper method to complete their writing assignments. Although the meta-study did not parse the findings by age, results showed word processing conditions had a small-to-medium effect for the quality and length of the texts produced. Emergent writers also seemed to benefit more from composing with the computer. A later meta-analysis resulted in even larger effect sizes for length and quality of text between conditions in favor of word processing (Goldberg, Russell, & Cook, 2003). While some believe that word processing reduces student attention to the correction of surface features (Bangert-Drowns, 1993), no research supports this. In fact evidence of revision both after the text is complete and during composition, revealed that elementary students (Cochran-Smith, 1991) and some college students (Hawisher, 1987) have a heightened awareness of surface level mistakes rather than substantive issues in their writing.

To assist writers during the initial stage of writing, several tools were designed to supply instructional support or frameworks for planning through concept maps and outlines—perhaps bringing writers into more expert-like practices. Sturm and Rankin-Erickson (2002) compared three groups of high school students with writing disabilities. The first group planned with concept map software; the second with "old-school" concept mapping using pen and paper; and the third used no concept mapping at all. The two

conditions—concept mapping by hand and concept mapping through the computer—produced longer and higher quality texts than the no mapping condition. These results are not so surprising given previous studies. Within the area of argumentation, the use of computer graphics scaffolding had a significant positive effect on middle school students' arguments as they formulated evidence to solve a problem (Belland, 2010). Another analysis of college students illustrated that using argument-mapping technology is useful in crafting arguments across disciplines (Martin Davies, 2009).

Other graphing tools and research protocols focused more intently on collaboration as students develop arguments and positions, thus landing more solidly on the social perspective of research (Newell, et al, 2011). Graphic organizers have been used to structure online discussions on controversial topics by assisting participants in visually laying out the various arguments and how they are connected and how they might be rearticulated for clarity and focus (Dowell, Tscholl, Gladisch & Asgari-Targhi, 2009). Shared graphic organizers provide spaces for peers to gain a common understanding of different aspects of arguments that appear across various texts (van Amelsvoort, Andriessen, & Kanselaar, 2008). Additionally, the research found that fifth graders who collaboratively created an argument diagram rather than collaboratively listing pros and cons produced higher quality arguments.

Another set of studies looked at the chat and online dialogue as well as graphic organizers to see if one method or combined method was more effective in producing better student writing. In a two-part study, students created pro/con stances on a set of topics. In online chat, pairs either generated their own diagrams or used prefabricated diagrams supplied by the computer. Analysis of the diagrams showed that collaboration promoted greater recall and elaboration of arguments (Marttunen & Laurinen, 2007) and that the self-generated diagrams contained more of the students' prior knowledge (Salminen,

Marttunen & Laurinen, 2010). Lastly, another study demonstrated that using graphic notation tools along with asynchronous online argument versus just asynchronous online argument helped students formulate a position earlier in the writing process leading to more complex arguments (Suthers, Vatrapu, Medina, Joseph, & Dwyer, 2008).

There have also been several digital tools developed with the goal of facilitating writing processes and providing some indirect guidance for using what are considered expert-like writing strategies (Hayes & Flower, 1980; Bereiter & Scardamalia, 1987). One of the early tools was the Writing Partner (Zellermayer, Salomon, Globerson, & Givon, 1991). The tool offered students metacognitive support during planning, drafting and revising. Rhetorical considerations were heavily weighted up front during the planning stages by asking writers questions about purpose, audience, and intention. Then, throughout drafting, writers were randomly given metacognitive questions of the purpose, organization, and elaboration within their paper. During the revision stage, generalized revision-process and questions concerning rhetorical goals were again posed to the writers. For the study, students were assigned to one of three conditions: solicited guidance, unsolicited guidance or no guidance from the Writing Partner. Pre- and post-test hand written essays were gathered to see if there was an internalization of the metacognitive support. The unsolicited guidance condition showed the greatest difference between pre- and post-test writing scores. In a similar study of a like metacognitive tool, Bonk and Reynolds (1992) illustrated that self-solicited support was not effective for middle school students perhaps because the students did not understand when to ask the tool for prompting.

A more design-oriented study of the Computer Tutor for Writers application (Rowley & Meyer, 2003) showed high school writers achieving a full letter grade above the control group with a yearlong exposure to the tool. Writing processes and cognitive apprenticeship

instructional strategies were used to facilitate expert practices by the students. All the tools mentioned not only encouraged the building of metacognitive frameworks for the writers to gain in their writing expertise, but also acted as a replacement of a more knowledgeable writer who could facilitate growth through key metacognitive strategies. The process was meant to instill the internal dialogue that pushed the writer forward while exposing him or her to the features and processes that go into writing like an expert as defined by Flower and Hayes (1980) and Bereiter & Scardamalia (1987).

A number of tools, mostly following Scardamalia and Bereiter's (1994) concept of scaffolding knowledge construction, have also been designed to specifically facilitate the development of arguments. InterLoc, for example, guided students through sentence starters via an intelligent tutoring system that lead to the formulation of an argument. For example, its prompts include statements like "Is there any evidence? Another view might be? I disagree because…" in order to lead users to a deeper understanding of their issue. Research found that university students who engaged with the tool were more likely to challenge another's position and craft more elaborate arguments than students who just participated in forums (Mcalicaster, Ravenscroft, & Scanlon, 2004). Also, a larger study revealed that teachers and students thought it assisted in writing collaborative arguments (Mcalicaster, et al, 2004). Digalo, software that facilitates turn taking along in forums, has also been determined to aid students in developing a broader and more nuanced perspective on issues since students were exposed to more perspectives (Schwarz & De Groot, 2007; Muller, Tartas, Perret-Clermont, DePietro, 2007). Another study on the same software found that turn taking in forums lead to more targeted claims within arguments than without facilitation (Schwartz & Glassner, 2007).

While the above mentioned tools were directed as interventions during the writing process, another set of tools was also developed and researched to supply students and

teachers with information as a formative or summative assessment. In response to the amount of time it takes to give substantive feedback, some researchers have suggested ways to offset time giving feedback through automated response systems (Shermis & Burnstein, 2003). These tools at best have not gained traction in schools and at worst have been deemed inappropriate and just plain faulty (Haswell, 2006; Erickson, 2006).

Several common intentions seem to be at the heart of the above writing technologies either by design or happenstance. They were intended to be of help to budding writers. They were centered around giving feedback to students that is then actionable either immediately or on another assignment. And lastly, in some instances, they were meant to reduce teacher intervention by cuing writers and facilitating production that led to higher quality writing. All technologies were noticeably academic in nature—as is the nature of how cognitive frameworks have been used by educators. However, better writing or enriched writing practices were not always the case. Obviously, these activities take place digitally, and the writing facilitation tools seem to entail a certain amount of collaboration, even if it is through a not-so-smart system of reminders and instructional practice. In the end, however, the writer practices employed by these technologies are focused on the individual rather than taking into account the greater sociocultural components of how, why, when, and what texts are formed.

Interestingly and in contrast to in-school writing technologies, scholars who study literacy in informal settings have illustrated how technology in combination with spontaneous participation in various network often form robust, more naturalist learning environments into which youth join on their own. In the area of informal learning environments, digital social tools tend to emerge through the advances in technology as it occurs in society in general. Thus, the adoption of technology is more organic and fulfills the needs and desires of the user. Another result is that these technologies usually produce a

set of discourse practices that many say runs counter to academic writing. Some scholars (see Ranker, 2008; Hull & Nelson, 2005), however, have shown that these practices overlap and are complementary to formal writing regardless of medium of expression. There have been repeated calls from academics (Alvermann, 2008; Hull & Schultz, 2001) to more thoroughly explore the connections between the informal, alternative literacy practices (most often called New Literacies) of youth and those that occur in schools in an attempt to understand how best to leverage tools and new discourses, if at all. As New Literacy researchers and theorists have often warned (Street, 2001; Gee, 2004), however, the learning that occurs in informal settings and through technology should not always be assumed to produce a literacy that can or should be applied to schooling. Sometimes the derived literacy is not as "rich, dynamic or relevant to education" (Mills, 2010) as some first set out to believe, and as Hull (2003) articulated, scholars should "celebrate youth culture clear-eyed, without romanticizing it…" Still others (Gee, 2000; Lankshear & Knobel, 2007) have expressed concern about colonizing these practices in a plunder of youth discourses and activities in the hopes that some sort of ill-defined *hope* for deep engagement by youth will be realized. Yet, as has been often described from those that have studied the traversal of youth's literacy practices across spaces in the learning ecologies of youth, there is a clear divorce and even disavowal between the literacy practices that teens perform at school and those they employ with at home and community centers (Leander & Lavvorn, 2006; Steinkuehler & Williams, 2006; Hull & Nelson, 2005). This perhaps causes a reification of how society generally privileges school-based learning over self-directed learning.

The intention of the digital social network that facilitates experts' engagement as part of the current study was established to create a "Community of Practice" (Lave & Wenger, 1991; Wenger, 1999) that forms a system of legitimate peripheral participation in which youth gain expertise in writing and argumentation over time as they become more

involved in the community. When people have a common interest and collaborate over it for an extended period of time, people learn how to develop the practices of that set of knowledge. Lave and Wenger defined such learning communities as having three simple traits: 1) a domain area of common interest; 2) a community of members of a specific domain interact and engage in shared activities where they build relationships that enable them to learn from each other and 3) a practice: a shared repertoire of resources which can include stories, helpful tools, experiences, stories, ways of handling typical problems, etc.

In comparison to traditional classrooms, the social network at the center of the study was intended to provide the foundation a "situated learning" experience where students come into practices and knowledge within a particular context. Instead of episodic, summative feedback by teachers that often is considered more obligatory as opposed to actionable by students, the network was intended to facilitate spontaneous dialogue between participants about student and expert writing. This type of learning situation is much more in tune with the types of informal learning environments described by Lave and Wenger (1991). Although in this study the expert's authentic knowledge is contained within a school-based system, the situation might well amplify the expert's insider knowledge and practices and subsequently bring students into more authentic contexts through online dialogue. Or conversely, the network might show no effect on academic conversation and any potential dialogue might simply be trumped by the traditional school-based feedback scenarios that students regularly endure in which learning is less of a conversation and more of an object lesson on mistakes. In designing the network and curricular contours, the relationships between participants in the social network space were intended to grow as the students took on a more central role in the community as a legitimate writer of works that were to be published to a real audience with feedback from professional writers. Additionally, the designed learning situation was meant to emphasize the idea of cognitive

apprenticeship (Brown, Collins & Duguid, 1989) in which learning requires students to develop practices and use cognitive tools that are authentic to particular professions and other real-world situations as has been done in other disciplines, such as history (Wineburg, 1997) and math (Shoenfeld, 1992).

As mentioned in the introduction of this proposal, Gee (2007; Gee, Hull & Lankshear, 1996) has criticized language arts curriculum for producing a set of skills that are unrelated to the realities of work life and navigating professional trajectories—stating that schools are not assisting youth in becoming flexible readers and writers across disciplines and situations since it opts for one type of discourse. Gee's concept of *Discourse* (with a big D) was meant to broaden the term of literacy to account for:

> "ways of behaving, interacting, valuing, thinking, believing, speaking and often reading and writing that are accepted instantiations of particular roles (or 'types of people') by specific groups of people…. [Discourses] are, thus, always and everywhere social and products of social histories" (Gee, 1996, viii).

To Gee, Discourse acts as an "identity kit" (Hull & Schultz, 2001) that signals a group's ways of being (e.g., behaviors, activities, and beliefs) to others. Thus, the form, process, and intentions behind a writer are located with particular Discourses that are based on the collective identities of the group to which and in which the writing occurs. Discourse keeps people in and out of particular groups no matter how loosely or tightly the group is structured. Interestingly, outside of school, professions are often where people learn how to engage in varying Discourses outside of the purely academic realm of the essay and research paper.

One of the traits of learning in non-school environments is the authentic and gradual participation with increased responsibilities for the learner in a community of practice (Lave & Wenger, 1991; Rogoff, 1994). In these environments, multiple levels of

participation and varying roles surround the learning endeavor, and rather than a student and teacher relationship acting as the social force behind writing, there are a number of relationships at play between writers who have different skills and who respond to specific goals (Beaufort, 2000). Often as people in these spaces grow in their writing abilities, they are brought in closer contact with those who are participating in highly important Discourse practices within the community. Additionally, as Beaufort (2000) showed in an ethnographic study of how writing tasks are distributed and enacted in a non-profit organization, those of high status in an organization had content specific knowledge that was valuable across a number of writing related tasks such as, genres, rhetoric, and process.

Other researchers have pointed out the differences between writing in the workplace as a professional skill and writing in schools for an academic audience. Brandt (1998), for instance, described how people learn specific discourses in work environments through acts of *sponsorship*. Because work environments and various professions often spawn specialized discourses and genres and because school often does not train students in these ways of writing, reading, and speaking, the workplace becomes the site of learning specific literacies. Sponsors, who are more knowledgeable in the literacy schemas, styles, and practices of the profession, guide less versed others into the discourse of the profession. Sponsors can be bosses, mentors or peers, and they guide novices through direct and implicit instruction such as informal modeling and guidance.

By contrast, school writing has a generalized set of writing skills that often revolved around individual reflective thought (Beaufort, 2008) as well as analysis, synthesis and evidence building (The Common Core Standards, 2011). While this type of writing is also present in the workplace, school-based writing most often puts the sole individual student as sole composer for an audience of one—the teacher—and is often in response to literature

rather in response to problems and issues that youth face today or work toward the solution of a problem (Scherff & Piazza, 2005). In contrast, while the workplace often employs skills of analysis, synthesis and persuasion, it is often more collaborative and situated within specialized discourse and set of goals. It is often published to a broader audience, and it seldom is in response to literature.

In addition to the influence of workplace and professionalized practices of feedback and group writing, social networks help facilitate communication and specialized writing between teens and more knowledgeable others. Greenhow, Robelia and Hughes (2009) suggested that the millennial generation also desires to be part of the evaluation process as well as get feedback from their peers. Their interest is depicted as a natural part of creating digital content. Although Greenhow et al. merely postulated about adolescent use of the Web in relationship to learning, Ito, Horst, Bittanti, boyd, Herr-Stephenson, Lang, Pascoe, and Robinson (2008) revealed how youth operate on the web and seek out learning opportunities as they play roles. In a seminal study about how kids and youth engage with technology in out-of-school environments, Ito et al interviewed over 800 youth and young adults and conducted over 5000 hours of online observations. Their primary research questions included: How are new media being integrated into youth practices and agendas? How do these practices change the dynamics of youth-adult negotiations over literacy, learning, and authoritative knowledge? Their conceptual frame centered on Genres of Participation, a concept developed by Ito that divides technology use into domains—that which is friendship driven versus that which is interest driven. They extended these concepts into three areas, in which technology is used for *hanging out*, *messing around*, and *geeking out*. The three genres of participation describe different forms of commitment to media and learning engagement, and they also correspond to different social and learning

dynamics, perhaps more attuned to peripheral participation (Lave & Wenger, 1991) than traditional classroom structures.

Within informal online spaces, feedback is an occurrence within "participatory culture" which offers "relatively low barriers to artistic expression and civic engagement, strong support for creating and sharing intentions, and sometime of informal mentorship whereby experienced participants pass along knowledge to novices" (Jenkins et al., 2009, p. xi). During the last ten years, the Pew Research Center's Internet & American Life Project has accumulated much data on how youth use technology. While there have always been striking differences in the means of communicating between teens and adults, recent trends illustrate a widening gap between today's youth and previous generations in how they communicate through social networks. Dowdall (2009) noted that teens' the ubiquitous use of social networking can be viewed as contributing to a new 'technosocial sensibility' (Castells, Fernandez-Ardevol & Linchuan, 2006, p. 142). The act of producing texts for one's 'networked public' (boyd, 2007) occurs as part of most teens' everyday communication (Davies & Merchant, 2007), as well as a source of creativity and voice. These social networks provide youth with rapid, informal means to get feedback and dialogue around a common object (writing, photos, games, etc.). This happens naturally within such environments. Despite being informal and rapid, the communication and exchange is of educative value.

For instance, Black's (2007) study of the Fanfiction.net community highlighted not only the rich discourse that could be produced in such environments, but also how relationships were managed to motivate one's readership to provide feedback. Black's main subject for the Fanfiction.net study was a Chinese-American girl, Nanako, who had been learning English for two and a half years when she first began posting anime-based stories on Fanfiction.net. Black described becoming adept at networking in this space and

developing a considerable group of readers and avid followers through not only the fictions she created but also through her linked affiliations. Knobel and Lankshear (2004) referred to this form of linking as a meta-literacy that is spurred on by the "attention economy" (p. 19). Goldhaber (1997) described "attention getting" in contemporary culture is a matter of paying attention, even if it is an illusion, to the discourses around a person. This includes building connections and loyalty, even though at a distance. Attention is "engagement with information" in which information flows between the writer and readers and is sustained through the social relationship between them (Knobel & Lankshear, 2004).

For instance, in Black's (2007) study, the youth garnered attention from an audience, a component of writing that becomes amplified in New Literacies. At the time of Black's publication, her subject had over 6000 reviews of 50 plus publicly posted fanfiction texts. Becoming linked in to the fanfiction community, made her linked to a set of resources. Looking back at the subject's trajectory over two years, Black (2007) noted that feedback from fans assisted Nanako in building grammar and rhetorical skills and practices. Black explained that because there is an array of resources and forms of knowledge that were valued in affinity space, and because there were no authorized roles and imposed forms of knowledge, Nanako and her readers were confident in their abilities to give and receive feedback. Writers and readers in this space drew from various networks of information that were dispersed across people (reviewers, co-writers, fanfiction consultants), tools (spellcheckers, thesauruses), other media, and websites (writing help sites, fansites). Jenkins (2006) also described how writers of fanfiction often use sites for beta-reading before actually publishing their work. After youth submit their scripts by genre, they prompt readers to give specific feedback to their editors/readers.

The role of audience figures prominently in social network spaces, and when writing is placed as a central object of discussion within such a network, it facilitates the feedback

process. While interaction in online fanfiction sites centered on writing and improving compositional skills, success was not determined just by traditional, print-based literacy skills. Instead, there are multiple opportunities to be valued in the community as composers and technical, artistic, and design specialist. Studies in on-line journaling and blogging have shown similar literacy benefits as fanfiction sites. They also provide space to find emotional support, to vent frustration, and to contribute to political discussions (Guzzetti & Gamboa, 2005; Thomas, 2009). These are attributes of being linked-in and "hypersocial" (Ito et al, 2008) with digital texts as a way of finding and communicating with a real audience. Such spaces with an accentuation on audience, potentially act as primers for more formalized compositional practices in which writers are deeply aware of their audiences and lead to situations of knowledge transformation (Scardamalia & Bereiter, 1987) and knowledge crafting (Kellogg, 2006).

The above examples illustrate how participants in various affinity spaces share their expertise. They make explicit to beginning writers the norms and criteria for success through dialogue and real time support. Advice runs the literacy gamut from building more rounded characters and more interesting plots to grammar considerations. As Lankshear and Knobel (2007) commented the people who participate in blogging and fanfiction engage in "practices marked by generosity and a sense that the more who participate, the richer the experience. In terms of *ethos*, [participatory practices], celebrate free support and advice, the building of practice, collective benefit, and cooperation before competition, where everyone is a winner" (p. 19).

Consequently, many scholars have suggested that educators should attempt to leverage and encourage youth digital communication practices for academic purposes by designing learning environments that make use of the technologies that youth use most (Alvermann, 2008; Brown & Adler, 2008). However, the text teens create as members of

social network sites differ from the qualities of text that the youth create as part of their everyday school-based lives. These differences are important for educators who support youth as the youth learn to create texts in the wider context of digital communication (Marsh, 2008; Merchant, 2007). This broadening of what counts as textually valid coupled with an increase in the various modes of communication youth use to express themselves, must also be grounded in rigorous academic engagement in order for such spaces to be considered useful to schools. The daily textual experiences of teens are likely to involve a mix of the old and new in which traditional and contemporary texts mingle as they learn to read and write using a range of tools and resources (see Lewis & Fabos, 2005; Nelson, Hull & Roche-Smith, 2008; Ranker, 2008). As our technologies evolve, the spectrum of youth text production expands. As a result, teens must learn to navigate multiple complex textual forms, they must be able to decode and formulate meaning in a diverse number of ways that reflect the everyday, real life experiences of people. This type of in-school use of social networks also allows youth a safe place to practice being public and a venue to form an academic sense of self (boyd, 2007) by engaging with experts through apprenticeship like methods (Collins, Brown & Newman, 1987). By using these methods, students potentially see more relevancy in their academic practices and gain a glimpse of how communication, specifically writing, is taken up in professions and numerous other discourse communities.

In the literature on out-of-school learning spaces that use the expert model and that engage youth in literacy activities, a more thorough image of the relationship between expert and learner emerges. For example, Chavez and Soep's (2005) ethnographic study illustrated how participants transcended the conventional relationship between adult "teachers" and youth "learners" to co-produce media products. Chavez and Soep introduced the concept of "pedagogy of collegiality" (p. 409) to describe this process. Using two case studies, the researchers demonstrated the four features of "pedagogy of collegiality" which

include: joint framing, youth-led inquiry, mediated intervention, and distributed accountability. Chavez and Soep described a framework that recognized the asymmetrical relationships among adults and disenfranchised youth at the same time it presented an alternative learning framework based on collaboration, shared expertise, and the "culture of critique" (p.430). Through iteration and feedback from adults, many of whom were journalists, the youth began to adopt the practice of removed assessment in which they honestly critiqued peer writing as an artifact to be improved. The process heightened the teens' sensitivity to audience and clarity of thought, and they took up the professional practices of review and revision as an essential and central part of the writing process. Teske (2012) found, however, that in such collegial situations, students who are learning from experts outside of school and who are engaging in alternative mediums of expression use their school-based knowledge to make sense of and compose in new mediums. The relationship between expert and learner can have some tensions as the learners come to understand the craft and the new discourse.

Online mentorship has been documented in the research since the 90s (Knouse, 2001). While most of this work is related to the workplace and how mentors might be used to boost early career success by coaching protégés and building confidence by sharing strategies and getting feedback (DeVoe, 1999), there are some documented instances of schools using online mentors to assist students. The Hewlitt Packard Telementoring Project (Bellinger, 1998) still exists today (http://telementor.org/) and connects mentors in STEM with high school design teams who are assigned a class project. Additionally, Northwestern University established a program linking science faculty with high school students in order to suggest resources and supply students with an authentic understanding of what it means to be a scientist (O'Neill & Gomez, 1996). The studies document the supports professionals provide students as the students come into a deeper understanding of

scientific inquiry and careers. Also, other research has documented how mentorship results in a social capital that is mutually beneficial for mentor and protégé (Philip & Hendry, 2000).

Despite the slim research on online mentoring, the general use of digital social networks is gaining traction in schools as the technologies become more available and easier to use (Collins & Halverson, 2009; Greenhow & Robelia, 2009; Kist, 2009). There is a growing body of scholarship demonstrating how social media are used in schools at all levels as closed Learning Management Systems (LMS) are considered too limiting (Crosslin, 2010; Stuetzer, Carley, Koehler & Thiem 2011; Mott, 2010). At the university level, microblogging has proven effective for gaining student attention through media (Efron & Winget, 2010). This media type proved useful for informing students of objectives, stimulating prior knowledge, presenting content, guiding learning, prompting performance, giving feedback, evaluating performance, and enhancing retention (Holotescu & Grosseck, 2011). Polin (2010) described how social media influenced the way students communicated with each other, teachers and parents. On the positive, the tools helped prime conversations through online dialogue that prompted deeper thinking and activation of prior knowledge. The network offered another means of communication between student and teacher that increased the amount of support a teacher was able to provide, and thus, teachers felt more connected with their students. Students also gained heightened awareness of distinctions between online and personal presence. However, teachers often had difficulty prompting students in productive student engagement, and matching microblogging with the teacher's pedagogy was often difficult (Light & Polin, 2010).

Others have illustrated how social media can be used effectively while teaching argumentation since students practice strategies through interaction and collaboration, exchanging ideas and negotiating differences (Andriessen, Baker & Suthers, 2003a, 2003b;

Beach, Anson, Breuch & Swiss 2010). The back and forth between students is said to contribute to "dialogic argumentation" (Clark & Sampson, 2008, p 294) during which claims and evidence are proposed and then interrogated by students. Beach and Doerr-Stevens (2011) supplied the most illustrative example of using networks to teach argumentation. High school students created characters representing various perspectives around a single controversy and then developed a network presence for them. Then speaking in that role, students argued their side of the controversy—in this case the district's Internet policy. The student character profiles were fleshed out to express the nuances of positionality and the character argument—enacting "projected identities" (Gee, 2004, p. 111-12). Students used this space as a way to explore the issue through a different lens that in some cases ran counter to their personal opinions. The researchers argued this methodology within the platform established a situation in which the students could better write an opposing argument, as well as allowing them to engage with prewriting in a deeper way.

The findings presented in this literature review cover a range of technologies, teaching, and learning practices and activities surrounding writing and argumentation. Infused in this analysis were references to both cognitive and sociocultural traditions. Following the lead of Newell, et al (2011) the study presented here forward calls on both methodological lines in order to aptly articulate the ways that students, teachers and experts engaged in the system toward academic goals. As mentioned previously, the curriculum was centered on argumentive schematics to bring students into challenging academic forms. At the same time, the social network played host to the operations of collaboration among students and between students and experts.

As the current study moves into analysis, the above distinctions between cognitive and social orientations are explored within the context of the unit and the engagements between students and experts. A social network acted as the hub of student and expert

communication. Within the space and through the curriculum, both cognitive and social traditions of teaching argumentation were used in an attempt to provide youth with an insiders lens to argumentation. What follows explores the breadth and depth of student engagement among each other and with experts as they learned about argument within a digital academic network.

Chapter 3

METHODS

3.1 Structure of the Unit

Holding true to the methods of project-based learning, the unit centered on two essential questions—*How do people make their voices heard among the cacophony of other competing opinions on controversial issues? And why do some voices get heard while others seem to go nowhere?* Given these questions, argumentation was the central genre of exploration for the unit. The unit itself was divided into three modules. The first module was focused on bringing students into the skill it takes to make a well-thought out argument with clear perspective and supporting reasons and credible and appropriate evidence. Addressing and countering the opposition also featured as key components of a good argument. Enrique Cerna, a well-known PBS journalist, introduced the unit through a video explaining that the use of the Internet and social media has made it easier for people to share their opinions—sometimes to a wide audience. However, he also voiced the problem that the opinions are not always well-written or based in evidence because any one can write anything about anyone or anything and it can spread quickly. After Cerna introduced the central framework for parsing an argument for its quality, students continually practiced identifying elements of argumentation. Students explicated a variety of opinions mostly in written form for perspective, reasons, evidence and opposing arguments.

The unit started with an examination of published youth opinions in the digital magazine, *Teen Ink*, which opened up discussion about what makes for successful, as well as ineffective, arguments. Then to heighten students' awareness of the difference between reasons and evidence, they selected informational pieces on a variety of topics from

procon.org and practiced parsing information via perspectives into reasons and evidence. This practice was meant to prepare students for reading a controversial case study of which they had two options. More specifically, students could either dive into the controversy surrounding the Islamic Center being built near Ground Zero or venture into Seattle's race-based admissions policy that went to the Supreme Court. The content of each case study consisted of:

- News stories and mini-documentaries to build knowledge through active watching and note taking
- Cartoons to show numerous angles of the controversies through an alternative medium
- A number of written op-ed pieces from the "wild" of which students chose two opposing viewpoints to analyze for quality
- An example of a high profile, well-written argument (e.g., Mayor Bloomberg's speech defending the right of the center and Juan Williams' critique of the Supreme Court ruling and the evolution of Brown v The Board of Education.

Throughout the case studies, the teacher modeled how to read and unpack challenging texts for the elements of argumentation. Meanwhile students located the perspective of the author, as well as the reasons and evidence that were marshaled in its defense. Students also paid attention to the role that opposing arguments play in making an argument and why one would mention a contrary stance to one's own. The case studies concluded with students either writing their own opinion of the controversy or a critique of three opinions they read. Also at this point, outside experts provided general feedback to students on their arguments.

In the second module, students moved on to developing their own opinions on topics they cared about. First, students created a list of arguable topics of which they were interested, and then they presented the reasons why they were interested in the topic to their assigned experts. Experts then gave the students advice on how to approach the topics and thoughts about which topic they thought was best and why. From a broad range of student-proposed topics, students selected a grouping of roughly eight to ten topics per class to investigate in teams given the expert feedback. In the teams, the students worked together to develop a set of secondary quality informational sources, as well as a primary source either of their own gathering or from a library database. From the set of sources, students crafted individual researched arguments, some of which were in opposition to their fellow group members. Finally, the students sent their final arguments to the experts for review and feedback before final submission to their teachers.

The third module, which was completed by roughly a quarter of the students, consisted of students thinking about verbal broadcasting of their opinions through podcasting. They then went on to learn audio editing and produce a group podcast of a group topic. They thought about the discourse of podcasting and tried to use formal argumentation and research within this less formal medium. The podcasts were uploaded to Remix for sharing across classes.

3.2 Principle Framework: Productive Disciplinary Engagement in the Network

Students were meant to gain a growing sense of argumentation through the activities and practices of each module. To understand this potential growth, PDE (Engle & Conant, 2002) was used as a central framework for the first part of the analysis. However, before

going deeply into any particular research methods, the term and theoretical underpinnings of PDE in relation to this study and the research questions must be clarified.

In foundational research on PDE, discourse was the main investigatory unit of analysis for understanding how students formally and spontaneously participate, engage, contribute, and take up the thoughts and ideas generated in class (Herrenkohl & Guerra, 1998; Barron, 2000; Chi, Siler, Jeong, Yamauchi & Hausman, 2001). In contrast to the moment-by-moment moves by teachers and students that are part of conversation and occur live, in-class, the current study located the unit of analysis primarily within the participant postings that occurred within the digital platform, Remix, an academic social network that students used to retrieve and store content and exchange ideas with peers and experts. Remix was not the exclusive hub for conversation and dialogue as might be assumed in some definitions of blended learning (Staker & Horn, 2012). In fact, live conversation was the norm, and healthy doses of digital participation and activities occurred each day online. Such activities included: highlighting opinions from the "wild" for the elements of argumentation, ordering paragraphs to follow classic argument structure, composing Cornell Notes on mini-documentaries and newscasts, responding to a peer's work, contributing to a research bank, reflecting on the meaning of an editorial cartoon through a discussion board, etc. Online activities were intended to bubble to the surface of class discussion in order to illuminate and introduce concepts.

As a result of these analyses, a type of blended learning environment emerged (Kerres, & DeWitt, 2003) in which teacher facilitation was pivotal to class operations and student understanding, rather than exclusively masked behind all digital content and only online activities. These distinctions in the unit of analysis are important to understand the primary focus of the research, as well as the learning environment in a more holistic way. It was not traditional teaching devoid of technology and focused exclusively on paper and the

teacher, nor were students simply doing distance learning with a teacher standing by in support either in the classroom or online. It was now a mixture of old and new instructional practices and methods, perhaps signaling the transitioning nature of how teacher and students use tools for learning beyond physical textbooks, pencils and paper. Although screen time was coupled with talk time, the primary focus in this research study, however, was to see how and if PDE emerged and was sustained in the social network. Situations in which students collaborated and shared with other students and in which students worked with experts were meant to be key points of PDE (Engle & Conant, 2002). Remix was positioned to facilitate one channel of these interactions.

Although there is a history of thinking about PDE in the learning of science (Scott, Mortimer & Aguiar, 2006; Ford & Forman, 2006), the concept has made fewer in-roads into the discipline of English/language arts (Lillejord & Dysthe, 2008). At its surface, the concept is fairly straightforward. While what constitutes *productive* and *engagement* might also be arguable depending on one's educational philosophy and disposition, *productive* referred to the active progression toward an academic goal, particularly the learning of argumentation. Live and online discussions, one-to-one messaging, interactions with experts, status updates, contributions to a group research bank, assignments, reflections, etc., all counted as productive if they contributed to, or even tangentially surrounded, the academic goals of the unit. Engagement entailed the degree to which students performed and contributed to class activities (Engle & Conant, 2002) and the connection they felt toward the activities. As ground work to understanding the influence of discipline within the concept, Engle and Conant (2002) identified four principles that are able to be transferable across disciplines for fostering enriched student conversations about the subject matter and the literacy practices that students are trying to grasp and understand—whether it be arguing like a lawyer or crafting metaphors like a poet. These

design principles include: a) *problematizing* the subject by taking on intellectual "problems" of the discipline (Warren & Rosebery, 1996); b) positioning newcomers as *authorities* in addressing the problem (Scardamalia, Bereiter & Lamon, 1994; Wertsch & Toma, 1995); c) making students *accountable* to the discipline's norms (Resnick & Hall, 2001; Schulman & Quinlan, 1996) and d) providing students with the *resources* they need to do the work (Barron, 2000). The unit highlighted each of these principles by engaging the students in the schematics and tools of argumentation, allowing students choice (Reeve & Tseng, 2011) of their topics that had real world cogency, supporting the development expertise according to topic and arguments, and providing students with experts who had to be sensitive to arguments as part of their professions.

Yet, beyond a surface level read, the four principles question what it means to do English Language Arts. The lens of PDE highlights similarities and differences between professional and academic practices, activities, and skills. The differences reflect the pinch points of ideology and identity as they manifest in what is in and out of bounds for secondary English Language Arts versus how literacy is taken up in people's lives beyond school walls. Differing views of what disciplinary means could be one reason why the concept of PDE has not made much traction in the literature pertaining to English Language Arts. For instance, there are competing ideas of what writing and reading are within professions and specialized disciplines in college (Beaufort, 2000; Norris, 2009) beyond the teaching of literature and the essay writing that is often instantiated in high school (Scherff & Piazza, 2005). Thus, the unit asked students and teachers to engage in discourses of argumentation and opinion and how they relevantly manifest in happenings outside of school (New London Group, 1996). Argumentation was expanded to include graphical and verbal discourse, as well as the incorporation of editorial cartoons, newscasts, and mini-documentaries in addition to written opinions and formal arguments. An

emphasis was placed on questioning and identifying the components of the writers' craft to accentuate the type, style, and form of writing (Boyle, 2013) that was to be expected for the students' project. Throughout the unit, the students focused on the elements of argumentation. To provide a space in which PDE would potentially flourish, the youth who engaged in the social network with expert writers were provided with a window through which to gain insights about writing for specific purposes related to argumentation.

3.3 Setting: Hematite High School

Hematite High was located in a middle class suburb near a major metropolitan area and edged solidly between tech epicenters in the Silicon Forest. Since it had an active history of integrating outside professions into classroom practices, Hematite High was identified as an excellent school in which to enact the curriculum. The teachers and administration seemed open and willing to build new curriculum that would be more engaging for students through project based learning—a point punctuated by the large grant they received that was devoted to more deeply developing curriculum with project-based learning (PBL) methodology. Consequently, all departments were striving to add choice, collaboration and investigation to the curriculum. The incorporation of people from the community with a wide variety of expertise was also a key initiative of their curriculum redesign, which made working with Educurious with its proposed network of experts an attractive proposition.

The PBL grant provided the ninth grade English teachers with one period per day to design project based learning curriculum for next year. Because of this time allotment, the district's lead curriculum developer for English Language Arts thought Hematite and their ninth grade English teachers would be a good match for the Educurious curriculum, and he worked through the principal to gain access to the teachers and make the formal request of

Educurious pilot participation. Because these measures to assure mutual agreement from the teachers were a bit clumsy, the principal weighed in heavily in favor of their involvement with the enactment.

Lastly, the district had a past with online content management systems. In fact, the teachers in the district had gone on strike in previous years because the platform paced the curriculum and did not offer as much freedom to create content from scratch, as the teachers desired. The participants initially viewed Remix as a replacement content platform that did not fair well in the district. The old platform delivered the district content to teachers and gauged their progress with students. Eventually, it proved to be a point of contention in labor negotiations, which resulted in teachers striking because of it. Consequently, the teachers viewed Remix with skepticism and engaged with it reluctantly. This dynamic, however, did not seem to adversely influence how the teachers treated the researchers or the enactment team. Instead, the teachers felt that doing the enactment informed their understanding of PBL in language arts— something they had been struggling with for some time. The designated fourth period planning sessions for PBL became a space for honest joint reflection about the unit, the platform, and nuances of classroom practice. It also became a time for revising the curriculum and anticipating issues that might lie ahead.

3.4 Participants

3.4.1 Students

Despite its location and perceived affluence in the greater metropolitan area, nearly 40% of Hematite students were on free or reduced lunch, and roughly 15% of them either did not have a computer at home or Internet service. The site was fairly diverse with regard to

socio-economics and race and ethnicity with 50% classified as white, 20% Asian, 14% Latino/a, and 5% African American. The school recently became the primary site for new ELL students in the district, and it tended to attract special education students in the district because of the quality of its programs. Of the 240 ninth grade students at Hematite High, 135 students agreed to participate in the study. To create manageable amount of data with which to work, a group of 25 students was selected through stratified random sampling from a subgroup of students who were assigned to experts who had also consented.

Through informal conversation, the students revealed that they perceived Hematite High as the poor stepson in comparison to the successful high schools in the area that have achieved national status in widely publicized popular journals. As students chatted during first period about the prestige of the other schools, the teacher jokingly commented, "Well, we are better looking," after which snickers of agreement floated from the students. The students seemed to take rankings with a grain of salt, though it was on their minds. The teachers noted that the culture of the school was highly supportive of differences. It was known for having "nice" students as evidenced by teachers' stories about less popular kids being elected homecoming queen and king and how community service meant more than popularity in the kids' minds.

3.4.2 Experts

Experts were recruited through a variety of channels including personal connections, listserv announcements through alumni networks, educational open houses, and school volunteer channels. Experts came from journalism, opinion writing, public policy, law, business and marketing. Six experts were brought into the project via a volunteer network

and were not vetted for experiential knowledge of argumentation. A few experts had been either disaffected by school as a teen or had dropped out. All the experts were or had been connected to writing and in particular, opinions and persuasion, as part of their professions. In all, forty-seven writing experts were enlisted to work with students. Another smaller set of ten research experts was brought on board to assist students during the research process. This addition was a particularly important position since the school had recently lost its librarian due to budget cuts. The resource experts were recruited by making connections with local teen librarians and the local university's library science program. Of the forty-seven *writing* experts, twenty-seven consented to participate in the research study, and of the *research* experts, eight agreed.

The writing experts associated with the Hematite enactment were given three formal assignments of engagement with students. First, they were asked to give students feedback on their case study opinion/critique that was to be found in the blog area of the social network. Second, students wrote experts asking for their opinions of three possible controversial topics the students were considering for their final research project. And finally, experts gave feedback on a second draft of the students' final researched opinions either via Word's track changes or the comments field in the social network. Experts were given a list of the main curriculum objectives for the unit (perspective, reasons, evidence, and opposing arguments). Research experts were asked to review students' research banks for thoroughness and credibility. Training videos were distributed to all experts as a way for them to become acclimated to the social network and set up their individual accounts.

3.4.3 Teachers

The language arts teachers at Hematite were known in the area for their quality. Miss Nelson was National Board Certified and had a deep Humanities background with degrees

in English and Art History. She had been teaching for over 12 years. She recently had her second child and was working part-time and managing the demands of school and parenthood. She was the teaching lead for the ninth grade language arts teachers. Ms. Bugsby was a second year teacher who was the student teacher of Miss Nelson three years prior. She had a degree in English literature and was accepted to law school only to leave after she sensed a "higher calling to do community good." Subsequently, she left law school to get a post-baccalaureate and Masters in Teaching. Her colleagues said she was a very strong beginning teacher. Mr. Richland had deep ties to the district, having grown up and gone to school in the area. He had 15 years experience as a teacher and a degree in literature from a nearby state school. In addition to teaching ninth grade English, he also taught yearbook and newspaper in a single class, and a few years back he received his physical education certificate and now filled half his day as gym teacher. He explained this move as a way to break up his day and reduce the monotony of teaching the same subject for four periods a day.

To further focus our observations and to instill a model of slow instructional release with the teachers within a day, the researcher co-taught the first period of instruction with each of the teachers throughout the length of the enactment. Specifically, the periods were Miss Nelson's period 1, Ms. Bugsby's period 2, and Mr. Richland's period 7. Additionally, there were times in which the researcher co-taught or individually taught the other classes for the teachers. For instance, he had a regular presence in Ms. Bugsby's period 3, and if teachers were sick, the researcher covered for them. The research team supported all eight of the classes from a content and technology standpoint. Miss Nelson taught two morning periods. Mr. Richland taught two afternoon periods, and Ms. Bugsby taught four periods across the morning and afternoon.

Part of the class support came in the form of a one-hour daily reflection and planning period with the teachers. At the session, which occurred during period 4, we reflected on how we felt the class went that day. Consequently, the conversation ultimately focused on Miss Nelson and Ms. Bugsby's classes since they each had two classes in the morning (one taught with me and one taught independently). Mr. Richland's classes were not until the afternoon. At the sessions, the group discussed adjustments to the instruction and the curriculum, and how the technology did or did not seem to be working either because of school tech infrastructure or because of tech issues in the platform. Mr. Richland would often ask questions of the other two teachers who had already taught the curriculum and adjust his instructional strategies accordingly. The group would also tweak the next day's lesson according to their perceptions and feelings about whether students were getting concepts and seemed to need more instruction or practice time.

3.5 Researcher Positionality

In many case study situations, the researcher was positioned as a participant observer (Blumer, 1966; Layder, 1993; Chiseri-Strater, 1996) in the classroom. Since the researcher was a co-teacher in three out of the eight classrooms, he was thus introduced as a researcher and co-teacher to the students in the three classes. Such sociological approaches to empirical inquiry are not new to the study of literacy (see these seminal pieces: Lee, 2001; Brice Heath, 1983; Dyson, 1997). In classes beyond the initial periods in which he taught, the researcher was largely known as a researcher since the teachers took primary (if not sole) responsibility for instruction, while the researcher only gathered interview, artifact, engagement and assessment data from these classes.

Additionally, while the researcher did have teaching experience, he was not deeply embedded in Hematite school culture. In fact, he would most likely be considered an

outsider of the pedagogical and institutional norms of the school and department. People, who performed long-standing work at the school, e.g., teachers and longitudinal researchers who were connected to the PBL grant, had many insights about the culture of the school, especially those concerning the English department. Through teacher interviews, the researcher came closer to understanding the history of the department and its curricular focus. Nonetheless, he was likely the face of the curriculum and the Educurious platform for the teachers and students, and he urged them to be as honest and upfront in their reactions to the curriculum and tools. He explained that he wanted all types of feedback no matter the nature since it was part of an iterative design process. He also informed them that while he was part of the platform and curriculum design process, no single person was the author, and in fact they should consider themselves part of the design team as well.

While they knew the researcher was somewhat invested in the Educurious project, he informed them that he was representing the position of co-teacher in the hopes of understanding when and if the curriculum and tools seemed to work well. He informed them that he had a healthy skepticism about the powers of the curriculum and platform, but he also wanted to give the enactment all his effort so it would be beneficial to students and teachers. When teachers, on occasion, seemed reluctant to share their feelings or seemed as if they were having trouble articulating a position, he assured them that they would not hurt his feelings and that curriculum and platform are rarely perfect, especially as a second iteration. By doing so, he assured the teachers that they were part of the design process and that the curriculum and toolset would only become better through critical feedback.

3.6 The Academic Social Network

The Educurious platform powered by Remix (Pinkard, Barron, & Martin, 2008) acted as the tool for retrieving content, posting work and more generally communicating academically and socially for both case studies. Consequently, the curriculum, the connections that were facilitated, and the tools that were brought to bear on the tasks, were meant to assist as a fertile field in which to plant the principles of PDE. A number of platform technologies were reviewed, but Remix was determined to be the richest environment for students to "apprentice" in the discourse of formalized argumentation. The methods to gain access to the types of communication and the degree to which students were in active engagement with a disciplinary literacy practice were various and rested largely on a sociocultural framework, even though statistical data were also gathered.

The research questions for the study were best served by locating participants' thoughts in the context of everyday life at school (see also Cole, Hood, & McDermott, Lave & Wenger, 1991) and in relation to the classroom ecosystem, which included teachers, students, experts, and their conceptions of school and language arts and their purpose. While the researcher did not have the opportunity to observe students and inquire about their literacy practices outside of school, the environment of the various classrooms and variations that occurred between them allowed for greater breadth of data collection from both online and in-person perspective—stretching "beyond the conceptions of context-as-container" (Leander & Lavvorn, 2006, p. 293). Data gathering in person and online allowed us to better understand how a wide range of actors, including humans, texts, technologies, and objects, were brought into relationship with one another, and how these relationships had unique qualities. Additionally, the Educurious platform, Remix, could even be considered a primary actor (Latour, 2005) in the classroom ecosystem since it seemed to have its own agency and set of proclivities that often changed due to the constant

development that occurred at the same time as the curricular enactment. The platform's fickle nature often bewildered users. That said only one student's final assignment from the subgroup of 25 students was lost within the Remix platform.

To make sense of how the social network was taken up as a tool for learning and to understand the degree to which it facilitated an enriched academic experience through PDE in English Language Arts, a broad set of data gathering methods were used: general content analysis, daily observations, and artifact analysis.

Table 1: Study's Data Points

Artifact/Data Point	Method	Framework	Reason
Activity in the Platform (Remix)	Content Analysis	Community of Inquiry Framework (CoI) (Garrison, Anderson, & Archer, 2001; Garrison et al., 2000; Kanuka, Rourke, & Laflamme, 2007; Shea, Hayes, Vickers, Gozza-Cohen, Uzuner, Mehta, Valchova & Rangan, 2010)	The analysis was meant to get a baseline illustration of the participants' use of the platform. The broad-brush stroke analysis revealed how the platform was used and the types of expression/ communication that occurred beyond academic assignments. The data indicated the degree to which students engaged with the content and each other and experts through social media throughout the course of the unit.
Artifact Analysis	Discourse Course Analysis	Textual analysis and thematic analysis (Guest, 2012) with attention to PDE (Engle & Conant, 2002)	Student work and expert feedback were analyzed for the degree to which the platform played host and the curriculum facilitated disciplinary practices within the domains of argumentation. The data provided insights into how the experts guided students into deeper understandings of argumentation and the social interaction provided cognitive.
Daily Observation	Note Taking and Digital		Three ELA periods were video recorded each day. These

	Recording		periods were the first time each of the three teachers taught the lesson. The classes were video recorded and field notes were taken. Observations were referenced to find key moments of engagement.

3.7 Data Gathering Tools and Methods

To make sense of how the social network was taken up as a tool for learning and to understand the degree to which it facilitated an enriched academic experience through PDE, a broad set of data gathering methods and analysis were used: general content analysis, text analysis on feedback artifacts, and daily observations of classrooms. Two analyses were conducted. The first focused on content analysis of the posts across the seven weeks using the Community of Inquiry (CoI) model. It was intended to illustrate students' interactions within the platform from a social and academic standpoint over the course of the unit, thus providing a broad brush stroke of PDE. The second analysis focused on the writing experts' feedback according to the components that foster PDE, as well as how the experts guided students who were grappling with classical argumentation.

3.7.1 Content Analysis of Student, Expert, and Teacher Posts using the Community of Inquiry Framework

To understand the scope of student, teacher, and expert use of the platform and the interactions that occurred within it, content analysis (Neuendorf, 2002) was conducted on platform posts to see the extent to which the platform was used for various types of communication—including PDE. Posting included any textual or graphical artifact that was typed or uploaded into the platform. Consequently, this included posts to the:

- Profile, a page within the site on which users write information about themselves letting others know about them in a public display
- Messages, the primary means of digital interpersonal communication between participants
- Portfolios, the area in which students and experts would store work and where teachers on occasion would post resources for the class
- Blog, a space where all participants could create a public digest on subjects of their choosing
- Notebook, the only private space for users and often acted as a journal or note taking spot; students were aware that the notebook was fair game for research
- Groups, students could belong to public or private groups that were both academically and socially oriented
- Comments, could be placed on user blogs and portfolio items by the person who posted the message or others in the network

At the time of the enactment, there were no metrics or formal analytics to grasp exactly what was being posted to the system without a great deal of manual work. So in order to grasp the types and amount of communication that were happening in the system, the posts of 25 randomly selected, consented students who had at least one expert interaction were the focus of analysis. Their posts were tracked to map how various parties were using the system.

The Community of Inquiry (CoI) framework was used to define the contours of network use (Garrison & Arbaugh, 2007; Shea, Hayes, Vickers, Gozza-Cohen, Uzuner, Mehta, Valchova & Rangan, 2010). The CoI model, an emerging and exploratory qualitative coding method (Garrison, 2007) has been used to analyze online learning communities, but

it also has import into blended learning scenarios (Garrison & Vaughan, 2012). CoI is focused on the construct of presence, which is defined along three domains of analysis—Social, Cognitive, and Teacher. Two of the domains are described below with the coding structure represented in Appendix 2 and 3.

Social presence is explained as how the learner projects him or herself socially and emotionally within a network. Much of the research in this area has focused on how Social Presence is related to the interpersonal satisfaction one feels within a digital learning environment (Arbuagh & Benbunan-Fich, 2006) and how learning growth is hard to cultivate without a social foundation (Garrison & Cleveland-Innes, 2005). To capture Social Presence, the coding structure established by Rourke, Anderson, Garrison and Archer (1999), revised by Swan and Shihby (2005), and further refined by Shea et al (2010) was used with minor modifications to reflect the nuances of the unit. The social construct has three categories. First, postings were coded as *affective* when users expressed emotions, use humor, self-disclose, and convey value. Second, *open communication* was coded when users continued a thread, quoted others, referred to others' messages, asked questions, complimented others, provided personal advice or expressed appreciation, agreement or disagreement. Third, *group cohesion* consisted of vocatives such as addressing someone by name, using inclusive pronouns, using of salutations, sharing socially and reflecting on the course. These codes were used inclusively.

Cognitive Presence codes were sourced from the work of Garrison, et al (2001) and Shea, et al (2010). Although the code structure was developed for discussion boards in particular, the same code set can be used for a blended environment in which the platform was also used as a portfolio space and learning management system. Cognitive Presence codes were designed to address phases in class activities and were used inclusively. Four phases of student activity are represented by the system:

- *Trigger* event: was an evocation that creates curiosity, presented an organizing principle or problem, framed an issue and asks for a response or assesses the learners knowledge base. The triggering event might come through the acknowledgment of the problem or through a sense of perplexity.
- *Exploration*: pertained to gaining an understanding of the problem through group and private activities and managing ambiguity and divergent thinking. Indicators included discovering the features of the problem through group or individual exploration, exchanging information, suggesting solutions or alternative paths to discovery, leaping to conclusions, or contextualizing comments within points made within a conversation.
- *Integration*: focused on the learner's process of meaning making in which users synthesized ideas, created solutions, and tested ideas through real world application.
- *Resolution*: were the activities that bring a conclusion to the problem, reducing the complexity of the task by building a solution to the issue and defending it in some way. Resolution was not used as part of coding since the curriculum's focus was not specifically geared toward the ideas of resolving or crafting a solution to an issue. While students argued a position, they were not required to build solutions—though some did.

Teaching Presence (Shea, et al, 2010) was not investigated as part of this analysis since the teachers' instruction and work with students almost exclusively resided outside the platform. (This will be discussed in full in the analysis section.) Experts, however, did take on a pedagogical role within the platform. All their communication with students was done through Remix. However, given their special role within the unit, a theory-driven

approach was taken in the analysis of their feedback and advice to the students—namely the components of PDE and the elements of argumentation.

Much of the existing research on CoI has centered on correlations between the various components within purely online environments. Within the blended learning context, these indicators become a bit murkier since live discussion and interaction are the primary mode of communication. However, the three elements still held strength as indicators of online activity within this study and its overall goal of learning.

For the current study, the elements and subsequent coding structure of CoI were intended to reveal the degree to which the network facilitated PDE between participants at a broad level, as well as how the platform was used by participants generally. In doing so, the analysis acted as a foundation from which to discuss participants' reflections about the unit curriculum and its orchestration, as well as how social networks were used as tools for learning within a traditional classroom structure.

The coding structure of CoI was chosen because it was thought to overlap well with PDE, consequently providing a broad snapshot of how students and experts interacted with each other in the platform over the course of the unit. First, the concept of *engagement* within the construct referred to how students participated in class activities and the degree to which students participate with each other and the content. The CoI framework was used to parse engagement into two of the three CoI domains—Social Presence and Cognitive Presence. By outlining which posts to Remix were social, cognitive, or both, analysis was intended to illustrate how students communicated and engaged with argumentation (or not) overtime within various spaces within the digital network. This should not be confused with time on task since second-by-second analysis of students was not the goal of analysis. Instead, the analysis of "over time" related to the daily posts of students and experts during the six weeks of instruction.

Within the Social Presence domain, analysis was used to show the degree to which students engaged with each other and the experts socially. It was also intended to illustrate the nature of informal communication within the platform and its use. The CoI framework provided codes to analyze how groups formed bonds, coordinated group efforts, and behaved in response to common artifacts or general activities that were occurring in their lives. Within the CoI frame, this was expressed as affect, open communication, and group cohesion.

The Cognitive Presence was deemed appropriate for illustrating academic engagement. Hence, Cognitive Presence touched the *disciplinary* side of PDE, but through the window of a process and trajectory by showing the degree to which students participated in a) *trigger* events that piqued curiosity and posed questions, b) *exploratory* events in which students discovered features of a problem, and c) *integration* events during which they synthesized ideas and tested out ideas.[2] The analysis intended to show how disciplinary engagement surfaced during the scope of seven weeks and across activities that the platform hosted. Again, there was live instructional and collaborative talk that occurred in the class regularly, but the analysis focused on only what was documented in Remix to highlight the affordances of such tools.

Lastly, the *productive* component of PDE was addressed within the CoI framework since it focused on the intellectual progress of students as documented through posts in the platform. Many PDE studies highlight points in time in which discussions act as indicators

[2] The CoI model also contained a fourth category, *resolution*, but it was not used in this study since the codes required the student to be metacognitive and reflective in their responses to their own work. They did not need to defend or provide a solution, strictly speaking, though in retrospect, the unit could have used such a step to further accentuate the nature of project-based learning. In contrast, the students were simply asked to argue for a perspective, which is a slightly different task than finding a solution and defending its merit. While some arguments lend themselves to this structure, others do not. This is not to say that experts did not request this of students, as the analysis will reveal.

of student growth. In contrast, the CoI analysis offered an opportunity to analyze PDE at a higher level and to see how patterns of engagement grew and faded over time and task. The CoI analysis was a "rough cut" that provided an initial understanding of the scope of PDE in illustrating student trajectories. Perhaps analogous to a beehive, the platform housed the products of activities and was the hub of online communication. It was where participants focused their online activity. CoI analysis provided a window though which to see levels of the production of by students. Consequently, the CoI codes served as indicators of where productive work occurred, leading to further investigation, but these codes alone were not sufficient for understanding the detailed nuances of disciplinary engagement of how students were guided by experts. CoI was too broad and did not target argumentation explicitly. To unearth the potential richness of expert feedback and to deepen the analysis of disciplinary engagement, a second set of codes was developed.

3.7.2 Analysis of Formal and Informal Student/Expert Feedback Interactions

While content analysis using CoI supplied a general understanding of types of content posts that were put into the system by users, a more detailed, theory driven analysis specific to PDE (Engle & Conant, 2002) and thematic analysis (Guest, 2012) related to the contents of the feedback of expert and student engagement was also conducted in order to understand the contours of written feedback. The role of feedback was of primary importance in the unit's design. While research on feedback on student writing has a long history (Kluger & DeNisi, 1996; Bangert-Drowns, Kulik, Kulik, and Morgan, 1991; Hattie & Timperley, 2007), an overwhelming amount of the research has looked at the practice through a quantitative lens with highly structured experimental designs. In contrast, research in New Literacies has used rich description to illustrate expert and youth interactions. Yet, little is known

about how feedback from professionals with content expertise plays out when analyzed through an ethnographic lens, especially in relation to academic work. Additionally, PDE has largely relied on discourse analysis, opting to dive deeply into the nuances of conversations, instead of looking at the how engagement plays out over an extended period of time. This study will attempt to look at both the breadth of PDE, and then also look closely at expert and student exchanges to understand the depth of their communication and advice. Consequently, the first set of codes for feedback was specifically related to the four components that are said to foster PDE: problematizing, authority, accountability, and resources.

In order to understand the types of advice that experts provided students with regard to argumentation, the three feedback exchanges with experts were analyzed. According to the curriculum enacted at Hematite High, there were three scheduled exchanges between student and writing experts and one scheduled between the research experts and students. The first exchange occurred in relation to the case study. The case study consisted of a series of views from the media and readings that students had to analyze collectively and individually on one of two topics—whether the Islamic Center near Ground Zero should be built and whether the decision by the Supreme Court to overturn a race-based admissions policy for public schools was fair and aligned to affirmative action. For the case study, experts were guided to provide a set of general impressions about student writing. This exchange acted as a way for them to acclimate to student work and writing abilities.

The second exchange with argument experts consisted of reviewing students' ideas for topics for their final arguments. Students wrote a short introduction and then listed three topics in which they were interested. They were asked to also inform their experts why they thought the topic ideas were interesting to them. In return, experts were to

provide their impressions of the topic from the perspective on which topic seemed most meaty, arguable and interesting.

The third exchange entailed students sending their final arguments off for review, and experts provided feedback in Word. The third exchange carried out the arguments proposed by students in the second exchange. When students received feedback on their topics, they then presented their best idea to the class for further vetting. The class then selected between eight and ten topics to focus on in groups. The groups then collectively developed a research bank on the topic, and the students also were asked to send their research banks to the research experts for review.

For each exchange, the student invited the expert to review his or her work. The expert would then write a message back to the students and/or place their feedback in either the comments field or in a Word document. Consequently, this series of communiqués totaled four messages per each student and four by the aggregate of experts per student. Thus, if students were on top of their work and got it in on time, they received formal feedback on four products—the case study opinion, final topic ideas, the research base and the final argument.

Despite the episodic nature of the expert/student engagement, a naturalistic communication between students, experts and teachers within the platform was encouraged. Consequently, outside of the formal exchanges outlined, messages within the platform with students and email with teachers were also exchanged between participants. While this type of communication did not occur often, it was accounted for through the CoI analysis mentioned earlier.

A set of codes was established to reflect key interests and themes in the study. To flesh these aspects out in relation to argumentation, Voss and Van Dyke's (2001) work related to argumentation and psychology used to anchor the codes to how people have

traditionally viewed genres of argumentation from a rhetorical and argumentive standpoint. Rhetorical codes focused on audience-driven choices a writer might make, such as references to word choice, the use of story, grammar, style, and direct references to audience expectations. Argument codes were tied to argument form and structure. While this set of codes led the analysis, it was initially left open to include patterns that would surface from the analysis. Keywords that stood out in the context of the feedback and situation were noted, as were how words accentuated or lessened significance and how the expert used transitions to build cohesion between texts (Halliday & Hasan, 1989). From the coded results, a set of categories emerged that reflected how feedback took up the PDE within the realm of argumentation. The text was also viewed for how (if at all) the experts tried to enact or called on their socially recognizable identity within their profession—a point that was followed up upon during interviews, but not formally analyzed as part of this dissertation. Within a set of student work, the feedback was analyzed to see what patterns developed or progressed over time and how an expert's approach may have shifted (Gee, 2011).

After breaking the textual feedback into thought units and then aggregating them into thematic stanzas (Gee, 2007), analysis was specifically geared to the following dimensions within the feedback given the goals of the unit and study's interest in professional practices in writing:

- Argumentation (e.g., reasons and evidence, rhetorical strategies, counter arguments)
- General writing improvement (e.g., grammar, spelling, general conventions)
- Writing practices that tend to help or detract from writing
- Personal and professional statements
- Dispositions or differences toward writing in school and professions

- Social-emotional feedback (the positive and negative)
- Word count of feedback
- Dimensions of PDE, including moments in the feedback that problematized the subject, positioned newcomers as Authorities, held students Accountable to the discipline's norms, and provided students with the resources they needed to do the work

See Appendix 4 for a thorough explanation of the codes used to understand the expert feedback.

3.7.3 Observations

Three classes at Hematite were observed and video recorded each day of the enactment. A research assistant, who video recorded class happenings and teacher and student responses to class activities, also took field notes during class. Class sessions that seemed particularly notable in relation to PDE were tagged for further analysis. Usually, these were days that included activities such as group talk about readings, facilitations of online discussions, and writing collaborations. They also included moments in which the teacher or students responded in a way that seemed to surprise or push back on the curriculum or establish boundaries on PDE. These days were noted in the field notes and revisited to gain clarity about what occurred in relation to the CoI codes.

Chapter 4

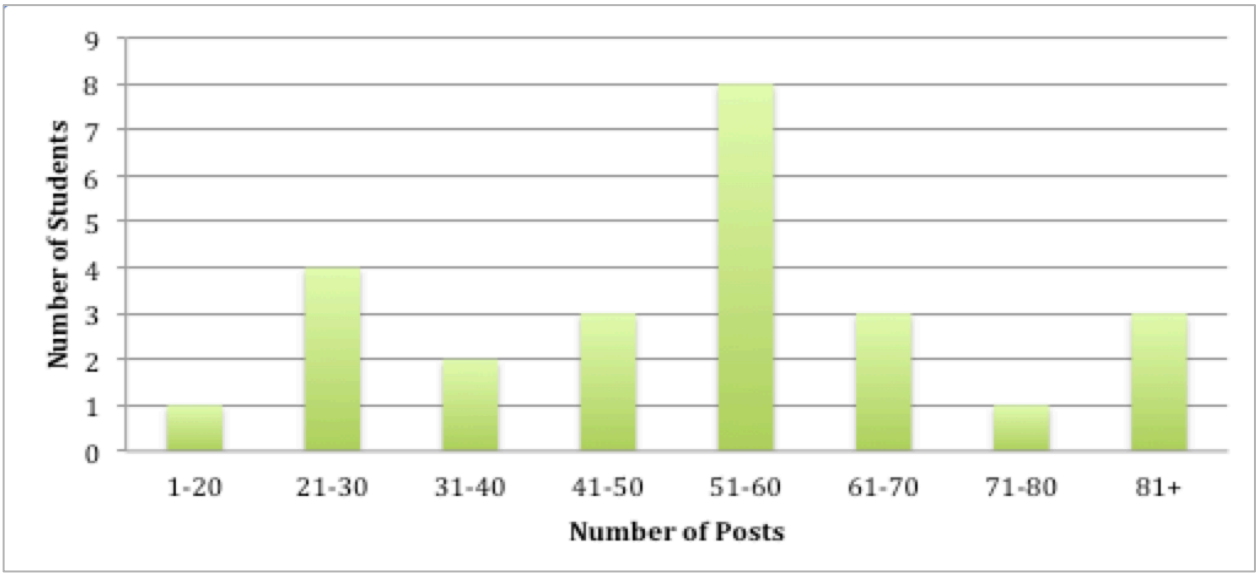
ANALYSIS

For a baseline understanding about what generally happened within Remix, the learning network platform of choice during this enactment, the Community of Inquiry (CoI) model (Garrison, Anderson, & Archer, 2001; Garrison et al., 2000; Kanuka, Rourke, & Laflamme, 2007; Shea, Hayes, Vickers, Gozza-Cohen, Uzuner, Mehta, Valchova & Rangan, 2010) was used to disaggregate the social and cognitive online behaviors that occurred. The CoI analysis was meant to provide a broad brushstroke of online PDE. The analysis provided the degree to which PDE manifested within the platform, not as it occurred in class through dialogue. Consequently, the general arc of CoI's Social and Cognitive Presence were documented across time.

4.1 An Inventory of the Student Posts

In aggregate, as illustrated in Figure 1, 1326 posts where made by the 25 students during the unit that lasted roughly seven weeks (33 days because of a holiday) depending on the classroom and progression. This averaged to 53 posts per student per the duration of the unit, or 1.6 posts per day across all posting types. There was a fairly substantial range of total posts per student—20-135 posts—with those at the high end ratcheting up the count due to their Messaging contributions, which were mostly social in nature.

Figure 1: Number of Posts per Student (n = 25)

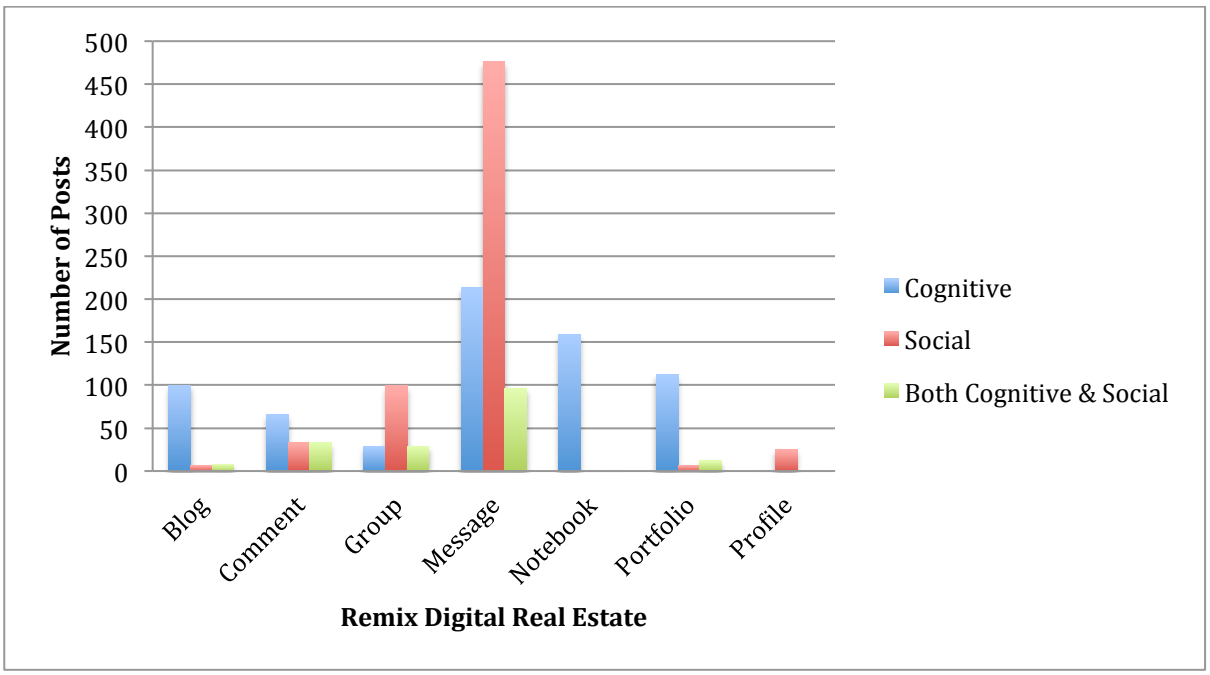


Coding for both Social and Cognitive Presence underwent the same method of inter-rater reliability. To start, twenty posts were randomly selected, and three raters each coded the set of posts after a short training session. Comparisons were made between raters, and there was 79% agreement between the three raters on Social Presence and 69% agreement on Cognitive. The raters then reconvened, reviewed the set of twenty, and addressed any discrepancies. Agreement was then reached at over 95%. In the second round of coding, two new sets of 100 posts were randomly selected, and two of the raters were each given one set. The third rater was given the combined set of 200. Again, they coded based on Social and Cognitive Presence. Agreement reached 91% for Social and 90% for Cognitive. The third rater then coded the remaining 1,106 posts, or roughly 85% of the entire bank.

At a macro level, analysis revealed a close to equal split between academic and social related posts (see Figure 2). Under the CoI structure, cognitive (which overlaps heavily with academic work) revolved around learning the focus of the unit (argumentation), while social included nonacademic work and conversations. However, excluding the Notebook posts, which housed only academic work, and the Profile posts,

which proved to be only social, the categories of social and cognitive/academic were not exclusive to the post type. When disaggregated, 679 posts were categorized as academic and 647 posts as social. Additionally, there were 178 posts (13%) that were categorized under both categories since they contained a combination of social and academic attributes. These overlapping posts represent a layer of online dialogue between peers and experts and among the students themselves.

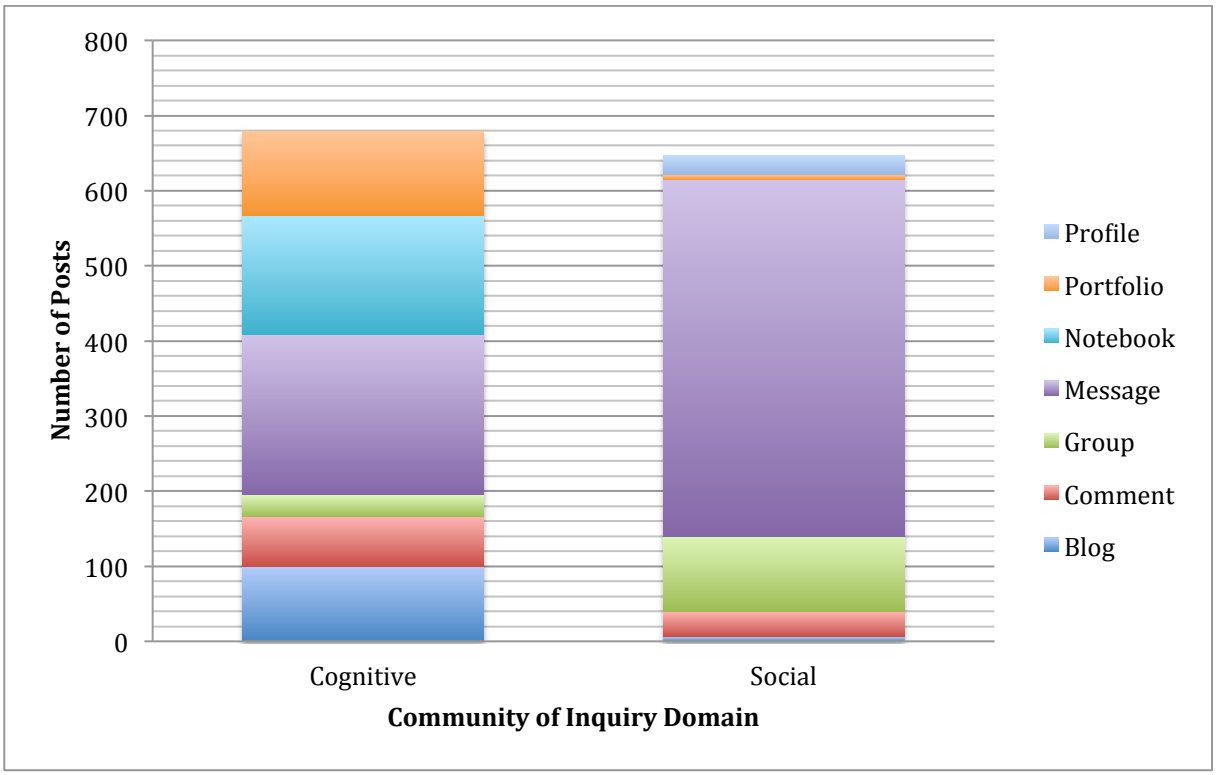
Figure 2: Post Type Disaggregated by CoI Domain



As Figure 3 further shows, the distribution of academic and social domains across posts showed that Messages, Groups, and Profiles contained the highest percentage of social posts. All the other post types (Blogs, Portfolios, Notebooks, and Comments) contained primarily academic posts—though again not exclusively, except for the Notebook area which acted as a private storage bin for students. Additionally, the Portfolio and Blog became conflated during the enactment because of periodic lapses in being able to upload to

the Portfolio. The blog space then became the secondary loading space, and the two spaces ended up hosting primarily academic work with a sprinkling of social attributes. Academic posts were shown to have the greatest distribution across all posting areas, whereas social posts were contained mostly in messages and groups.

Figure 3: CoI Domain Parsed via Posting Area in Remix



Because simple counts of posts at a broad level provide only general impressions of online behaviors or tell us where textual and media artifacts were stored, word count was analyzed as an indicator of effort on products. While it varied per post type, Portfolio, Blogs, and Notebooks (the primary location of stored academic work) tended to have compositions of 200 words or more. Messages that were associated with the academic domain could also be fairly complex, though varied greatly depending on the intent. For instance, Messages to experts from students were normally three to six sentences, while expert responses to

students were most often lengthy and quite involved—sometimes upward to 500 words. On occasion, Comments and Group academic posts included substantial lists of research that were meant to be shared between group members, depending on how the space was used within the class. In contrast, academic Comments between peers tended to be substantially shorter (usually less than 50 words), as well as not very complex. In contrast to the length of academic work, the posts related to the social domain tended to be short and not very complex. For instance, Messaging and Group posts associated with the social domain were usually just a short sentence or two and might be best described as brief salutations and digital banter.

4.2 Social Presence within Student and Expert Posts

To lay the foundation of the analysis, Social Presence was examined first. This construct was informed by past research (e.g. Short, Williams, & Christie, 1976) that looked at how students project themselves and their identities through various mediums, especially those that are text-based and asynchronous. Given the blended nature of the study setting, Social Presence was bimodal (meaning it occurred live in class, as well as digitally). Students projected their regular school identities live and extended these identities online. Staying true to the research questions which focused on the online learning network, the analysis looked only at the online representation of Social Presence and only included the textual demonstration of affect, group cohesion, and open communication necessary to establish a sense of trust and, ideally, membership in a community dedicated to joint knowledge construction.

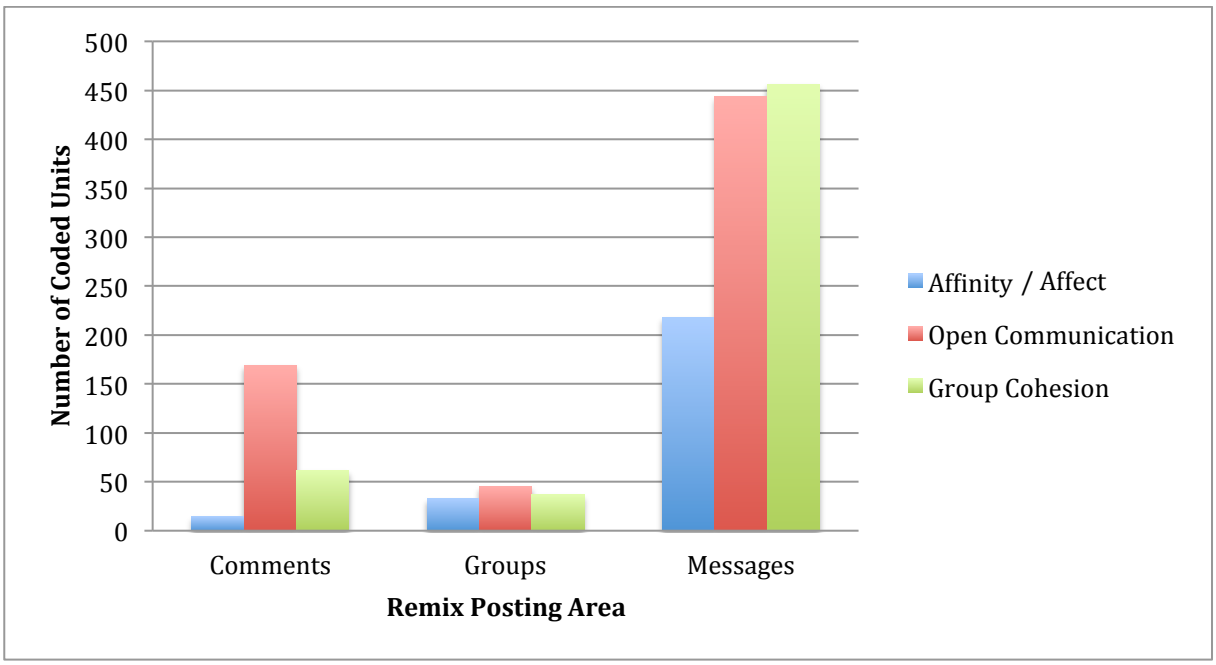
While some might consider Social Presence to be the "unproductive" part of disciplinary engagement, this domain played an interesting role within the Remix platform.

When coupled with academic work that elicited Cognitive Presence, Social Presence proved important in seeing how participants supported each other. While the benefits of the social domain are somewhat ethereal, Bandura (1993, 1995, 2000, 2001) argued that it is often just as important as the cognitive domain in providing the underlying motivation to work and contribute. The social domain is an essential part of feeling as if one belongs to the learning group and influences the degree to which one participates in class. To unpack Social and Cognitive Presence, each post type within Remix is analyzed individually over time and then collectively, while also providing examples from student and expert exchanges.

Highlighted here, however, are the three post areas in which social codes played the largest role within the platform—Messages, Groups, and Comments. Messages, Groups and Comments had the highest number of Social Codes. In aggregate, twelve of the eighteen codes contained over 85% of the social codes for those three categories of posts. While many of the posts were fairly simple, through the lens of CoI, we see a more complex picture of Social Presence, which also subsumed academic work, as is illustrated in the frequency graph above.

Each area in Remix contained its own set of attributes. Figure 4 charts the top three areas for Social Presence. The message area, which was the space used most for social exchanges, consisted of mostly open communication and group cohesion (roughly 40% of the aggregate social codes each). In the CoI model, open communication included the continuation of threads of discussion, quoting others, direct and indirect references, complimenting, the anticipation of work or a response, and clarification. Group cohesion, in contrast, included vocatives (using someone's name, inclusive pronouns, greetings, sharing, encouragements, and requests). Affect included posts that use humor, express emotion or self-disclosure.

Figure 4: Top Three Areas for Social Presence Disaggregated by Subdomain



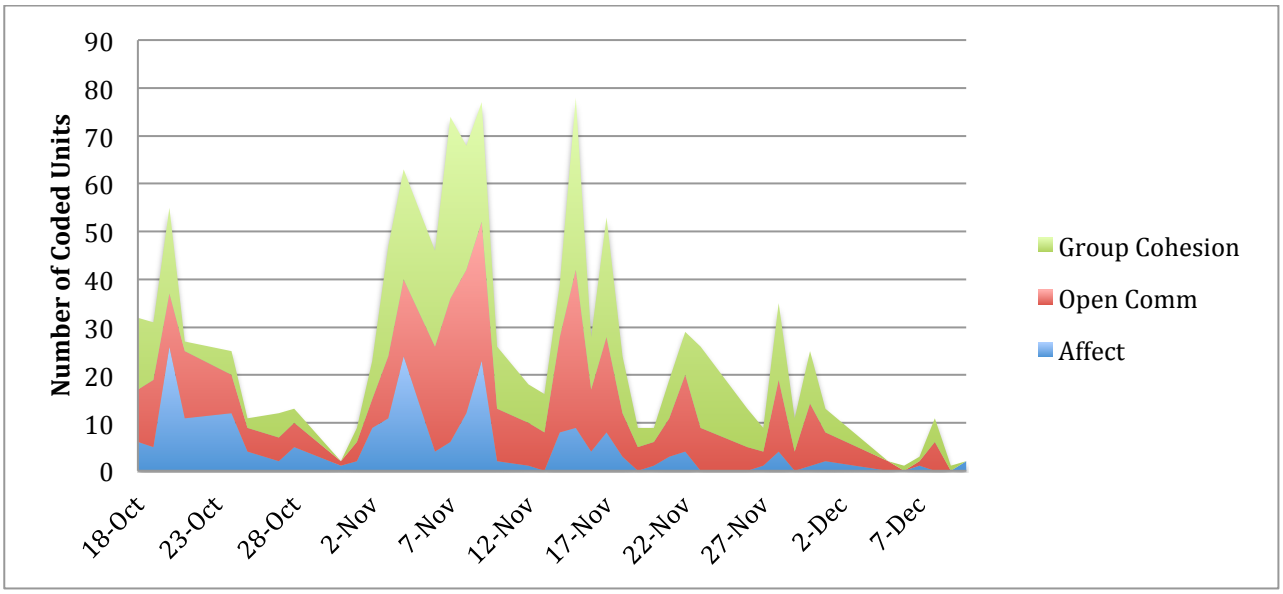
In contrast, the graph below illustrates the percentage of codes within each subdomain that occurred on a daily basis across the unit. When analyzed according to the three subdomains and across the course of the unit, affect codes, which comprised of expressions of humor and emotions, decreased over time, while open communication and Group cohesion grew during exploration, but declined as students worked more independently on their individual arguments. The trend illustrated the increased focus on collaborative behaviors and group work, spurred on by project activities over time according to total percentage share of Social Presence.

4.2.1 How Social Presence Played Out in Messages

Descriptively explained through the lens of the curriculum and illustrated in Figure 5, the period from Oct 18-25 consisted of students becoming familiar with the platform and learning the difference between opinions and evidence-based arguments. They shared links

to opinions in *Teen Ink* and shared with others whether they thought the opinion was well constructed according to the elements of argumentation—the main focus of the unit.

Figure 5: Social Presence Subdomains Across Time



During the next two weeks through Nov 8, students explored one of two case study options by first analyzing and sharing editorial cartoons, using Cornell Notes while viewing newscasts and mini-documentaries, conducting close reads of opposing editorials on the issue through paired and group reading, and individually tracing the arguments of key leaders according to classical argument structure. Students then ended the case study by writing their own argument for or against the issue or by completing a comparison of various opinions presented. The arguments were reviewed by peers and also sent to assigned experts for feedback during the week of November 8. During the case study, roughly on November 3, students also wrote their experts to ask about the merit of potential contemporary issues on which they would build an argument. Most students received comments back from experts roughly one week later.

The change in Messages during the first three weeks could clearly be seen within

the student and expert correspondence. Early in the unit, Messages provided students with a secondary way for them to connect to each other, e.g., “mi casa o tu casa?”; to jibe and rib each other, e.g., “I HAVE MORE SWAG THAN U!,” “you spelt association wrong... obviously your dictionary does not work well. come on, be classy”; and to expressions of emotion and self-disclosure, e.g., “i wanna live in a cave for a week and pretend im a bear” and “love ya.”

While this type of short and informal affect communication occurred throughout the unit as a way for students to bond and express themselves, it decreased over time. With increased engagement in the material through the case study and connection with the experts, the novelty of Messages as a second medium for chatting, was replaced by more academic pursuits among peers and experts. This change moved students from an affect space to one of open communication and group cohesion, which were categories that often overlapped with Cognitive Presence.

The anticipation of future work and the clarification of assignments comprised a majority of the subdomain of open communication throughout most of the unit. For instance, students would often guide experts and provide them with some background as to what was going on in class.

> Hi again, I forgot one thing in my last message, I would like you to read my blog assignment that I did yesterday. before writing our opinions, we chose one of two topics to study how people wrote good and bad articles. The one I chose was on the Race Based Admissions systems in public schools. The blog says it all. Thanks.

In the above example, the student used a conversational tone and started by contextualizing her message within a series of emails. She then asked the expert to review her work through a declarative statement, not a request: “I would like you to read my blog

assignment that I did yesterday." While polite, the statement may highlight how the student assumed that the role of the experts (as a reviewer of work) as a foregone conclusion. This was how experts were positioned within the relationship in classroom discourse. The student also explained what has been going on in class in brief and breezily explained her choice of topics. This message was indicative of the types of correspondence that was sent to the experts by students as a request of service, which is an indicator of group cohesion, the third subdomain of Social Presence.

Often, especially in the initial correspondence, students would simply post a link to their documents to be reviewed or make their requests with minimal context, e.g., "Hi, please review this," despite having been given models to follow and explicit instruction in how to write experts. Although being cued by the teachers about the happenings and objects of the assignments, some experts were left to infer what was being asked when it came the student correspondence. This often occurred in student requests of experts to review work or think through issues or ideas. Taking it in stride, experts nudged students to be more coherent in their requests and to be more professional in their approach. For example, it was not uncommon to see statements of clarification (e.g., "Are you asking me to help you pick one of the three topics? If so…." Such questions were intended to inform the student (perhaps too indirectly) that their request was not thorough enough or surrounded with the social norms required to make an "ask."

In other cases, experts attempted to guide the student into how to practice asking for assistance and extended her commentary into the general presentation of the message from a professional point of view.

> Hi, Bethany, It's nice to "meet" you. I'm happy to help you choose a topic, but first, I'm supposed to remind you that you should ask for my help. Your email here is full of interesting topics, but it doesn't really ask me to do anything. Since we're

> practicing your writing and communication skills, send me another message, and let me know why you're interested in these topics and how I can help you choose one. Then I promise to respond quickly. And I think it's also a great idea to try your best to use the right grammar, so capitalize the words that need to be capitalized. (I don't always do that when I'm texting, so I know how easy it is to forget when you're writing a real email!) This is good practice for a day when you're emailing someone who could give you a job or admit you to college! I hope you're having a good weekend!

Interestingly, the expert in the above message began with recognizing the context of their exchange. "Meet" was put in quotes to signal that the dialogue was happening virtually and that it was perhaps a substitute for a live meeting in which dialogue and personal connections happen more freely. Additionally, through her phrasing, "but first, I'm supposed to remind you to ask for my help," the expert clarifies her relationship with the task—as a messenger carrying out a duty assigned by the teacher to rearticulate the parameters of the exchange. The activity is considered a "practice" for the real world, and this included following the conventions of grammar and mechanics. The expert did try to make personal connections at the same time by recognizing her own grammatical slips exacerbated by texting—making her self appear human. Unfortunately, after this message, the student never reached out to the expert again.

Often experts would reach out to students if confused or if they were anticipating work—often keeping students on their toes:

> Good morning Shana, I was told to expect a request from you to review your blog on either the Islamic center near Ground Zero or Seattle's race-based admissions policy. I have not received anything from you and I was wondering when I might receive

> that request? Thank you. Ms. Mariner

In the above example, the expert's framing of the expectation of delivery through the use of the word "told" established her as following someone else's requirement (the teachers). By outlining the two possible topics, the expert signaled to the student that she knows what is going on in class. The final sentence was blunt and formal, signaling to the student that the expectations of engagement should be timely.

Additionally, with regard to positive exchanges with students around their written products, experts would often preface feedback within a complimentary context that was meant to encourage writers:

> Danny, I just read your blog post--you're a very clear writer. I like your style of presentation. Your arguments are thoughtful and well presented. My initial thought (and I'll try to write more later when I'm not so rushed) is that you've exceeded the requirement to present convincing arguments in favor of a position. That's the first step in writing a persuasive piece, right?

In the above example, the compliments were accompanied with general impressions of the student's work, which albeit vague (e.g., "thoughtful and well presented"), were also qualified by a personal disclosure that contextualized her response within her personal life (e.g., "when I am not so rushed"). The expert provided insight of the person behind the words. She assured the student that he has hit the mark of what was expected, and then sought agreement from the student in an attempt to create a bond with him.

In addition to self-disclosure, compliments, discussion threads, anticipation of work, and clarifications of the process and conventions of student and expert exchanges, instances of self and peer discipline were also found in student messages. While these moments fell under the guise of "clarification" in the coding structure, peer and self-discipline were

noteworthy for their frequency. Students often used Messaging to write to themselves or peers the directions to assignments or abbreviated reminders. For example, one student wrote to herself, "revise blog, post it, write Mr. Jamestone about it," and another writes to his teacher about his assignment, "Note I did have this on Thurs. I just forgot it at home. Tomorrow in class I WILL SHOW YOU MISS. NELSON!" In both cases we saw some students using the Messaging as a way to remind and regulate their behavior and that of others.

As the unit continued after the case study investigation (roughly Nov 15), students considered expert advice about their topics, and then as a class selected a subset of topics to explore in small groups of 2-4 people. In the groups, students collectively built research banks according to certain criteria and then shared their work with information research experts for feedback. They then revised their research as they individually wrote evidence-based arguments following classical argument structure. Their drafts went through peer review and then to their assigned expert in argumentation before being submitted to the teacher for grading. A subset of students then adapted their arguments into podcasts using the elements of argumentation and verbal forms of citation.

Increased sharing and group work are reflected in the Social Presence data. While this close communication and sharing fell primarily in the domain of Cognitive Presence, a social bond also occurred within student communication as well. As part of sharing, there was an increased number of links to resources that directly referenced materials that were to be used for specific parts of student arguments. Furthermore, students who worked on their research bank at a distance as occurred during Thanksgiving break, experienced increased coordination of the bank's assembly through the platform in the Groups area.

Additionally, examples emerged in which research groups were wrangled by experts in order to synthesize and perhaps economize their responses to students. Notice below how

an individual student was redirected by the expert back to his group. At the same time, the expert addressed the student's needs. The student wrote:

> Dear Mr. Lopez, I am in Ms. Bugsby's 7th period class. I have posted a spreadsheet containing my research for my topic (Occupy Wall Street). I would greatly appreciate it if you would take the time to evaluate my sources based on their quality and depth. Hoping to hear form you soon, Jasmyn Groups>Private>Occupy Wall Street (Bugsby 7)>Forums>Occupy the Spreadsheet Jasmyn or http://hematite.iremix.me/forum_posts/107907

As seen in other posts between experts and students, the writer contextualized the message by stating who she was and what the assignment was, as well as the topic. She politely requested that the expert review her work through a statement and anticipated hearing from the expert soon. The entry concluded with a link directly to where the paper might be found. The expert wrote back:

> Hey Jasmyn, Your sources are pretty complete. I'd recommend taking a look at the feedback I leave for everyone in the group, and making some decisions on your own sources accordingly. I've been impressed with everyone's source material thus far. One thing I might suggest, if you're interested in taking the next step in your project, is learning more about the various groups that are involved with Occupy Wall Street (there are many!) and reading about the history of those groups. Also, have you studied much about capitalism and corporate banking? That might be another topic that you could pull from with your work here. Mr. Lopez

In the response, which crosses both Social and Cognitive Presence, the expert began with a quick complement and then redirected the student to comments he left to the group in attempt to economize his work. The move accentuated the collaboration of the group

members potentially leading them to a more unified front.

The second half of the post was best categorized under the Cognitive Presence domain, since the expert encouraged further exploration of historical movements, corporate entities, and political concepts. As students moved along in the curriculum and increasingly shared work with experts, there was a greater merger of Social and Cognitive Presence within a single post, perhaps signaling the importance of building healthy social relationships within online academic platforms while also engaging in academic work. Clearly, knowing how to write a request, communicate with those who may be perceived as an authority, and learning to conduct and guide oneself toward a goal within a digital network, were considered important skills and practices within the learning ecosystem. The domain of Social Presence within the Messages filled in the gaps around the academic work and figured greatly in how the experts engaged with the student work.

4.2.2 How Social Presence Played Out in Groups and Comments

Different patterns of Social Presence emerged for Groups and Comments in contrast to Messages. While the overall number of groups and subsequent contributions to them was much lower than Messages, there was a more equal distribution of Social Presence codes within the Groups and Comments areas.

In Groups, as with Messages, there was also a decrease in humor and expressions of emotion and an increase in social activities around academic work over time. As mentioned, students could create their own groups. Yet, Group posts in relation to other Remix postings were relatively low in comparison. The Groups that were formed initially, however, took a humorous edge and often acted as identity badges. For instance in the first three weeks of the unit, Groups were formed around 47 topics of all varieties: Military

Supporters, Kids Who Attended Olsen Middle School, The Cross Country Team, The Swag Society, The Breakfast Club, and Tony and Bruce's Bromance, just to name a few. However, outside of the initial set up of the Group and subsequent invitation to join it, there tended to be a lack of activity within this area. Consequently, these spaces tended to be mere affiliations rather than sites of deep engagement in the first three weeks.

In contrast, in the second half of the unit, Groups shifted focus as the activities became more collaborative and concentrated on academic tasks. Specifically, students were asked to work in groups to build a research bank on their selected topic, which needed to consist of certain types of resources, including informative articles to provide background information, three opinions for and against, primary source documents. While some groups simply exchanged work via a thumb drive or email, others used the Group space to share and assemble their work. As a result, the student's academic work took stage, and affect codes went drastically down. For instance, Groups on sweatshops, school prayer, and Occupy Wall Street sprung up. Students used these topic areas to exchange resources and clarify who had found what research. These exchanges became particularly important since some assembly of the resources occurred during a long weekend, which forced students into the online space for communication—rather than live communication in the classroom. Research experts were also pointed to the Group area with varying success to review the collective work of students. Some student groups had trouble coordinating their group work and sent one off messages to experts reviewing only their individual work. Other times experts simply became confused about where to go or how to open various files. Despite these issues, the overall trend with the Group area was to concentrate on collective academic work within this space.

In contrast to the general descriptions of Social Presence in Messages and Groups, the Comments areas of Remix had much less humor and expressions of emotion. Comments

tended to occur as either part of the discussion board or in response to blogs. Also, student portfolio entries mostly focused on peer communication with little joking or expressions of emotion. This may be attributed to how Comments were generally positioned as a response to a peer or curriculum artifact. Consequently, Comments were more academic in nature. As such, Comments were used for three primary purposes –giving feedback to peers, responding to a common artifact (e.g., editorial cartoons), or sharing resources as part of a collective activity. The latter two purposes tended to resurface in class as part of live discussion. However, feedback took place live and in the platform for potential uptake by the students whose work was critiqued or encouraged.

Because Comments were primarily used as a learning tool leading up to students doing independently research and unpack found arguments and other materials, they were most often used during the first half of the unit, and then their use tapered off. Comments were deeply bound to the curriculum and contingent on teacher facilitation. Consequently, these Comments were created less organically than Messages and Groups. They were far less spontaneous and more deeply rooted to class activities. These occurrences could have influenced the contours of the Social Presence as they emerged from Comments. While greater explication of this area of Remix will occur during a discussion of Cognitive Presence, Comments were relatively shallow with only brief nods to academic work. For instance, students often quickly alluded to the concepts related to the elements of argumentation without deep engagement and with most words of encouragement.

> Great details! You really used evidence well to make the reader believe this is a valid argument for both sides. You might want to add a bit more evidence to support your arguments though. It flows really well! Great job! 4/4 stars of course!

Notice in the above example how the student started with overwhelming encouragement

(almost an explosion!), a common technique among the student in this mini-genre in Remix. The student then used the language of unit: “evidence,” “argument,” and “support” were all key words in the unit. However, engagement with the terms was not specific. For instance, there was not specific mention of where more evidence is needed. Rather, the review gave an obligatory mention of evidence, and the comments might even be viewed as contradictory—at once saying the writer used evidence well, but needing more of it. The student also used a star rating system to further accentuate their generalized impressions of the argument. When used within the curriculum, comments like these were often found in a series with one review occurring after the next without dialogue occurring between commentators. Thus, these areas were less like discussion boards in nature, and more like space in which students could dip their toes into the pool of much larger and more complex arguments by simply using the language.

A similar pattern occurred across most Comments, but sometimes with more targeted input. For example, students pointed to specific turns of phrase that seemed to resonate within the piece and for the reader and highlighting the emotion within the argument.

> I really like the "putting a flag on victory" showed what it could make alot of people against it feel. Really nicely written.

Other students coupled encouragement with a more emerging understanding argument.

> You had very clear and strong arguments for bother sides and you had no fragments! :)You made each perspective clear and gave strong, concrete, evidence to support those perspectives. You could of added a little more detail about why it was okay to put the mosque there but you had great evidence already! I give you a.....

In the example above, the student was a little more specific about the elements of argumentation in her peer's work. First she pointed out the clarity and strength of an argument in which two sides are presented and punctuated the statement with praise for proper sentence structure. She then provided drive-by references to key components of argument and good writing. Adding a glimmer of depth to her response, she specifically pointed out the need for more detail about the pro mosque side, only to embed a contradiction "but you had great evidence already." By explaining where more evidence was needed, the student illustrated more depth than the previous response though for the most part skimmed across the surface of argumentation without much extrapolation. Such comments from students seemed to have served two purposes. For the person doing the critiquing, it was a space to demonstrate the adoption of the language used in the unit pertaining to argumentation and to further connect with classmates and encourage them.

Some students went deeply into the logic behind the case study arguments, and they communicated in an open and honest way about the work with peers. In the two examples below, students addressed the mismatch between evidence being used and the claims that were asserted.

> Example 1: The evidence does not work. It shows that there is no correlation-sales increase, crimes decrease- not that violent video games are substitutes.

> Example 2: You said "violent video games provide healthy and safe opportunities for children to virtually explore rules and consequences of violent actions" which is not always the case because some consequences are death or unrealistic events that would not happen in real life. Also, in some games, you get rewarded for violently hurting another opponent.

Within these last two short examples from the Comments area, there was a definite sense

that students were leading into more intellectual work, and subsequently, Cognitive Presence within the Comments area. While analysis showed that open communication and Social Presence best characterized the Comments area in Remix, more complex academic concepts were also integrated into the feedback. The last example illustrated an emerging understanding of whether the evidence matched the claim. Given that most Comment activities occurred during the first half of the unit, it stands to reason that talk about claims and evidence were still developing in students' minds and hence may have been hard to articulate and needed more practice.

To recap, within the three post areas with the highest incidence of Social Presence (Remix's Comments, Groups and Messaging areas), there was a decrease in affect over time, while open communication and group cohesion increased, and this led to deeper intellectual engagement within the platform leading to Cognitive Presence. The trend mirrored the happenings that occurred within the curriculum as interaction with experts and peers increased through joint production and cycles of review and feedback.

4.3 Cognitive Presence and PDE in Argumentation

To further illustrate the happenings that occurred within the platform and deepen the connection to PDE, a second tier of analysis was conducted to unpack Cognitive Presence according to its various subdomains and across the breadth of the unit. Examples of work, posts, and feedback were pulled to exemplify how students' and experts' behaviors and reactions reflected the subdomains of Cognitive Presence: trigger, exploration and integration events. The same set of posts that were coded for Social Presence were recoded for Cognitive. Resolution, the final subdomain of Cognitive Presence, which is defined as the generation and application of new ideas through inquiry to come to a solution, was not

coded since its parameters were beyond the scope of the work students were doing in the class either alone or together. While students crafted arguments, they were not tasked with solving problems, as much as demonstrating competence within argumentation by connecting and integrating ideas. Although a few experts called on students to begin crafting solutions (as will be illustrated), the community of learners did not work toward a group resolution in the production of the final argument or have a joint product as a final artifact. Instead, students worked together only through the integration phase which entailed feedback from peers and experts.

While Cognitive Presence documented a progression from trigger events to the exploration of topics and integration of gathered materials, two further analyses were completed to dig more deeply into PDE, especially as it related student and expert communication. Because Cognitive Presence, when mapped overtime, simply mirrored the typical trajectory of project development or written composition, the additional layers of analysis were intended couple what occurred within the different spaces of Remix with a thorough analysis of the nature of student engagement with experts. Toward that end, the three points of expert engagement (topic selection, case study arguments, and final arguments) were analyzed for the four components that foster PDE according to Engle and Conant (2002):

- Problematizing - encouraging student to take on intellectual problems
- Authority – providing students with authority to address intellectual problems and tasks
- Accountability – holding the student's work accountable to disciplinary norms
- Resources – giving materials and guidance to students in order to do their work effectively

The analysis was further rounded out according to the advice or corrections experts provided students in relation to rhetorical moves, argument structure, personal advice about writing, and references to professional life.

4.3.1 Cognitive Presence Playing Out in Network Spaces Over Time

As was previously illustrated in Figure 3, activities related to Cognitive Presence were distributed more equally through the various areas of the platform than was the case with Social Presence. For instance, there were close to equal distributions between the Message and Notebook areas for academic work, perhaps signaling that students were at times more private in their production of thoughts. At the same time, they were also willing to share and dialogue about academic work through the Messaging. Blogs and Portfolio spaces had close to equal use for academic activity, a point punctuated by the fact that the spaces were used interchangeably as the unit progressed due to confusion about how the spaces were different and due to hiccups with the platform. In the end, both spaces stored academic work as drafts and final products. Comments were used more frequently for academic work than for social exchanges, and finally, the Group area ended up being the least used area for academic work.

In order to concentrate the analysis on robust areas of Cognitive Presence within the platform in which student collaboration with peers and experts is highlighted, making for fertile ground for PDE, special attention was paid to Messages and the Blog/Portfolio areas of Remix. The Group and Notebook areas, consequently, were taken out of the analysis after the initial inventory since Groups mostly contained Social Presence and the Notebook was a private area, which acted mostly as a storage bin. Consequently, the moves students and experts made that would facilitate PDE were not present within the Notebook, but such moves did occur heavily in the Messages, Blog and Portfolio areas of Remix. See

Figure 6.

Cognitive codes associated with exploration proved to be the most prominent activities across the various areas of Remix and activities of the unit. Messages and the Blog/Portfolio areas tended to be the best digital real estate for investigating ideas. Trigger events were found in three of the five areas: Messages, Notebook, and the Blog/Portfolio, and integration codes were found primarily in areas in which students were building arguments of varying degrees of sophistication and complexity primarily through Blogs/Portfolios and Notebooks. These distributions aside, more interesting patterns arose from the distribution of Cognitive Presence codes throughout the course of the unit. When explicated, patterns emerged that demonstrated how the types of activities influenced the trajectory of idea development and growth.

Figure 6: Cognitive Presence Subdomains via Areas in Remix

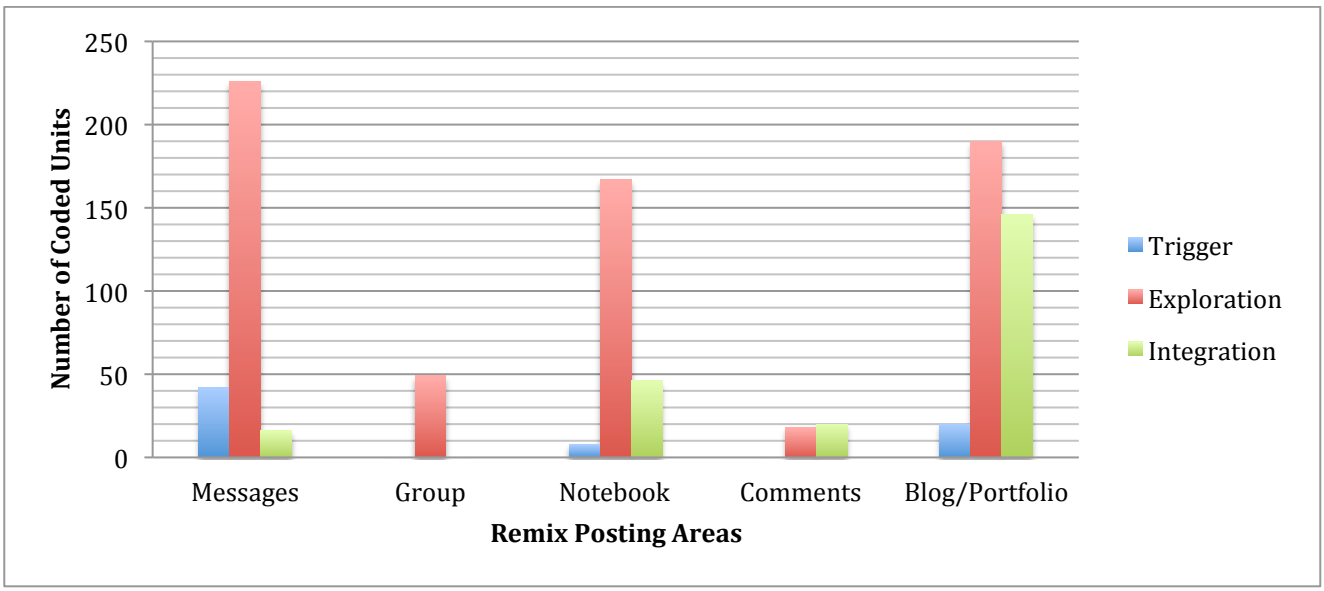
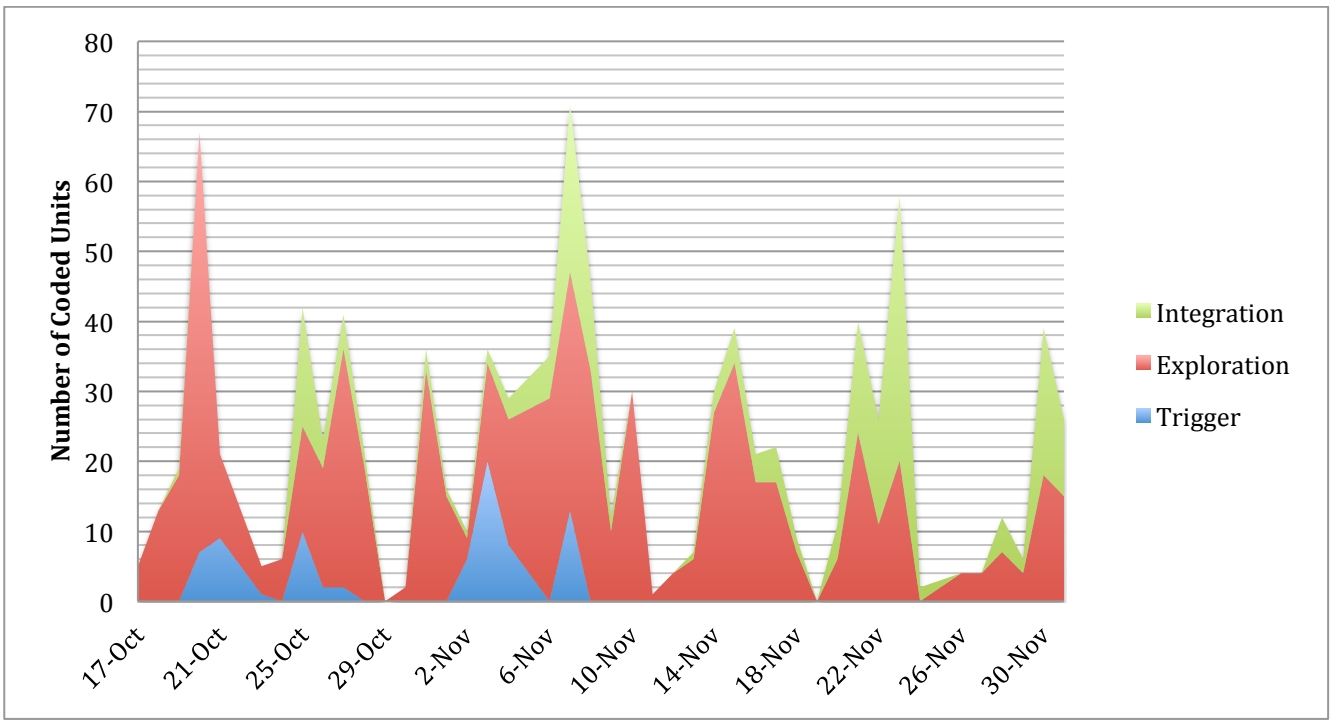


Figure 7: Cognitive Presence Subdomains Across Time



Mapping the three sets of codes over time as depicted in Figure 7, the curricular events of the unit were reflected in code frequency. Just as Social Presence codes illustrated a progression from affect to open communication then to group cohesion, there was a parallel trajectory in the Cognitive Presence domain occurring at the same time. Triggering events, which included codes that identified students' recognition of problems and their puzzlement about them, occurred in four main peaks within the posts of the unit. The first peak illustrated a point in the curriculum in which students found an article on a topic of their choosing and attempted to analyze it for the elements of argumentation: perspective, reasons, evidence, and counter argument. This was followed by a smaller rise in triggering codes as students entered the case study and began to grapple with the topics and texts that were unfamiliar. The third and strongest trigger event of the curriculum occurred as students wrote their experts about topics they were considering for their final projects. The last peak occurred as experts further puzzled over student ideas.

Trigger events occurred at the points of student choice and discovery within the curriculum, thus accentuating perhaps a unique feature of project-based learning with its focus on questioning and discovery. Additionally expert feedback tended to provide an echo of the initial triggering events as they further pondered topics with students, often through further questioning framed as puzzlement, versus as leading students to a particular known end.

In contrast to how trigger events were contained to sections of the curriculum in which students pondered topics, exploration occurred throughout the unit and provided the majority of Cognitive Presence. Since the start of the unit contained mostly teacher generated prompts, trigger events gave way to exploration as students grew in their understand of the parts of argumentation through the identification of its elements in digitally published works (e.g., Teen Ink and on procon.org). Instead of being asked to question the author's assumptions, which would have elicited trigger events, the students were preoccupied primarily with understanding argumentation form. Hence, exploration of the concept of argumentation was key to students' initial learning.

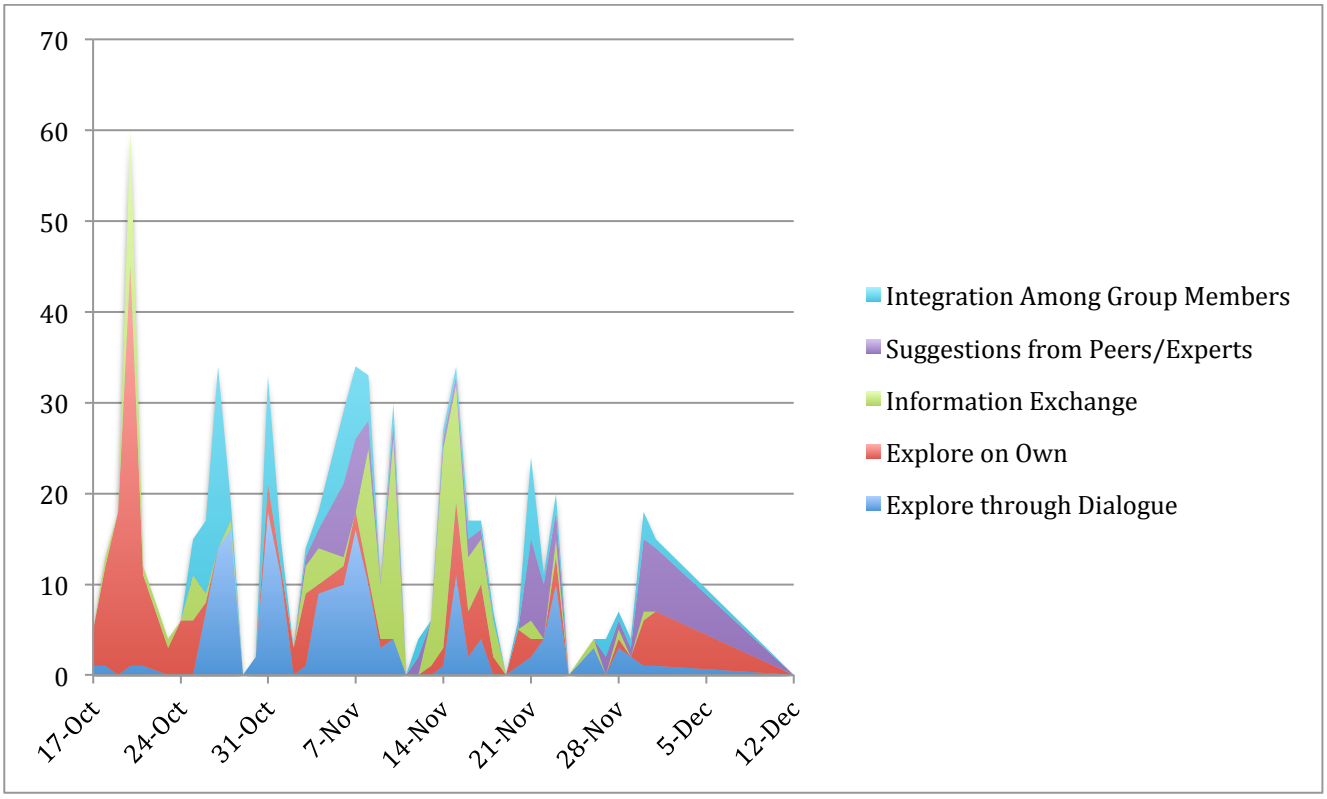
Exploration comprised most of Cognitive Presence. Defining moments of exploration for students occurred during moments of sharing in the curriculum during which ideas and arguments were investigated either in groups or alone and through the distribution of resources, e.g., hyperlinks. During the initial weeks of the curriculum, students were asked to share out opinions and arguments with some personal thoughts about why a particular resource finding was or was not up to formal argument standards. While shared with the larger group, they reflected individual effort. This shifted considerably after the first week as students began working with arguments in pairs and groups.

As in past research, PDE has often focused on the production and sorting through of ideas (Herrenkohl & Guerra, 1998). Under the CoI model, this was best paralleled in the

area of exploration. In an analysis of this domain over time, exploration occurred in many different ways throughout the unit and mirrors the activities within the curriculum. The most layered mixing of various types of exploration occurred when students worked with experts—roughly November 3-7, November 21 and November 28-December 12. In these areas, peers and experts centered their work on presenting ideas and common artifacts. A rather deep level of information exchange also occurs between the point in which students received feedback on various student presented topics and the actual writing.

As the Figure 8 illustrates, exploration occurred individually with peers and experts. It involved dialoguing about various issues and exchanging ides through dialogue. Exploration shifted in nature and scope depending on the task and the students' movement toward a finished final argument. Exploration pushed integration forward and the two often overlapped.

Figure 8: Exploration within Cognitive Presence Across Time



Integration, which will be looked at more closely in the next sections, occurred periodically throughout the unit and indicated areas in which students were making meaning between multiple sources or viewpoints. This occurred during activities related to the case study (roughly November 2) and final argument (roughly November 19). Most integration occurred during the latter as students drafted researched arguments and then revised their work based on peer and expert feedback. Integration entailed justifying and developing a perspective on a current topic, incorporating information from multiple sources into their arguments, supporting claims with evidence, and addressing counter arguments. The activities focused on meaning making and the thoughtful weaving together of ideas.

4.3.2 How Experts Fostered PDE in Argument

In order to understand the value of expert exchanges with students in relation to PDE, a detailed look was given to the three primary events that shaped student/expert interactions—the selection of a topic for a researched argument, the response to the case study, and feedback on the final argument. All the feedback to the twenty-five students was coded and analyzed for the four components that are said to foster PDE. The PDE components were further analyzed for how they elicited various elements of argumentation within the context of the experts' feedback task.

Thus, expert feedback was inventoried according to the comments and corrections they gave students during each of the exchanges. Expert *comments* included textual responses to students, which were parsed by feedback thought-unit. These groupings were determined by how words and phrases held together by argument topic, theme, or point. In contrast, *corrections* entailed expert fixes to errors in the text, such as spelling, misplaced

words in sentences, and grammar issues that were highlighted through track-changes in Word.

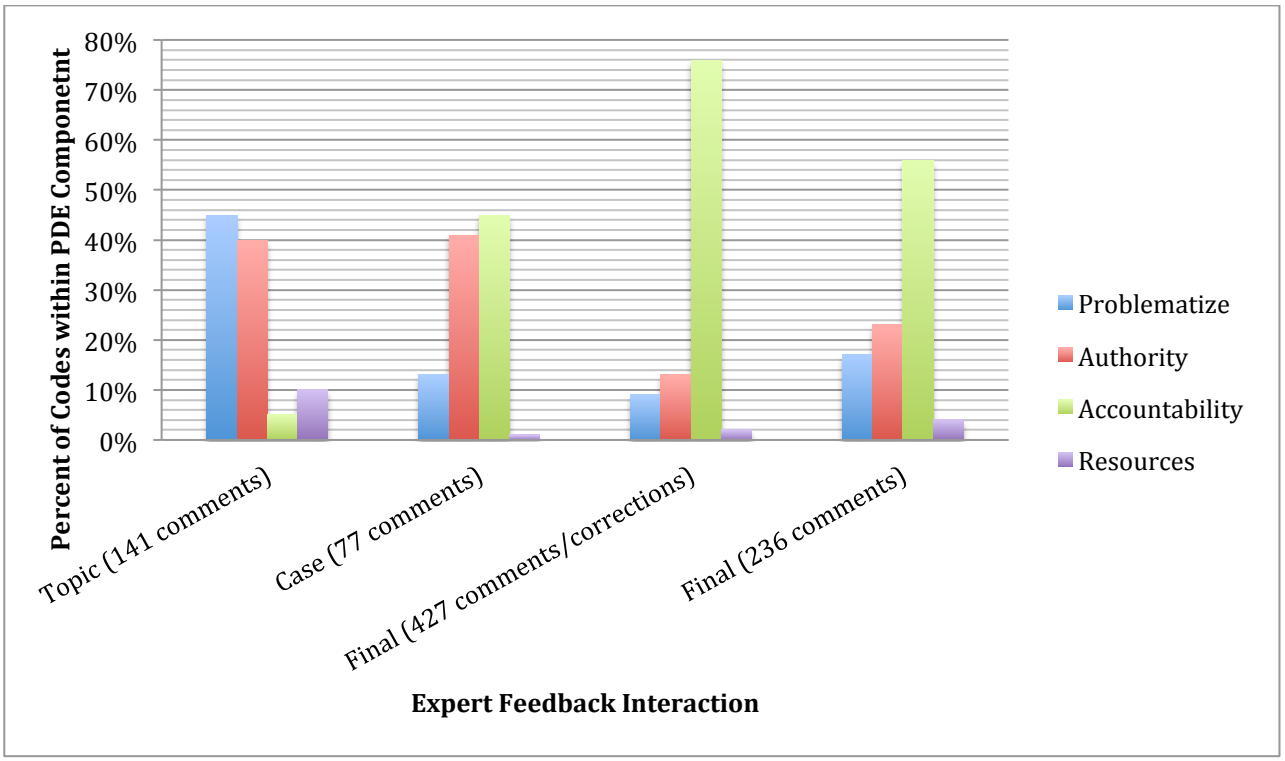
The coding process was similar to the first analysis that used the CoI model for coding, though there was not a prior coding structure that acted as the main source. To begin this second round of coding, three coders analyzed 25 thematic segments of expert feedback for the four components that fostered PDE (problematizing, authority, accountability, and resources) and for the elements of argument. The argument codes were formed based on the objectives of the unit, as well as the work by Voss and Van Dyke (2011). During coding, only one of the four components of PDE could be chosen within a thematic chunk, but more than one code could be chosen with regard to argumentation. After a short training session, the coders initially agreed on 82% of the PDE codes and 62% of the argument codes. The coders reconvened and talked about the disagreements through a follow-up round of coding, and rearticulated the argument codes so they were not as narrow. For instance, claims, evidence, and warrants all fell within a single category. During the follow-up conversation, coders recoded the areas of disagreement and reached 100% on PDE and 87% on argumentation. Continuing on with the coding process, two of the coders each then received 25 more feedback segments and the lead coder received the combined 50. Reliability came in at 95% for PDE and 82% for argumentation. The lead rater then coded the remaining 377 comments.

Beyond coding, the return rate of experts responding to the twenty-five students varied in success. For instance, 52% (or thirteen experts) responded to students' case study arguments. The experts rallied for the second exchange with 92% (or twenty-three of experts) giving advice to students on topic ideas for their final arguments. Lastly, 76% of the experts responded to students on their final arguments. Although two experts simply discontinued their work with students with no explanation, several issues contributed to

the low rate. For instance, there were three instances in which students simply did not submit work. Additionally, for the first interaction, the case study, experts missed emails that alerted them about deadlines for the feedback despite efforts from the researcher and teachers. Experts also had trouble accessing student work because of file-type incompatibility. They would try to download the document and receive an error. The problem was exacerbated by the difficulty of monitoring student and expert deliverables since there were not reporting features built within the platform.

These points aside, an analysis of each exchange between experts and students was necessary to surface the dimensions of the engagement according to PDE. By comparing the percentages of comments and corrections that were given to students, as in Figure 9, rather than the totals because of varying response rates, it became possible to see how the experts facilitated the various components of PDE across the three exchanges in relation to PDE.

Figure 9: Comparison of Expert Feedback Interactions by Percentage of PDE



Each interaction had a fairly unique profile. Problematizing was most prominent in response to topic selection, while feedback related to the case study and final was much more centered on accountability. Authority, which included a lot of supportive comments, was high for both topic selection and the case study but fell drastically in the final comments. To understand just how unique each feedback interaction was based on the types of advice experts provided, two rounds of chi square testing were conducted based on the results presented in Table 2. First, chi square test of independence was performed to examine the differences between the expert feedback and the components of PDE. Only comments on the final argument were included in the analysis (the final category in Figure 9), since interactions around the case study and topic ideas did not include corrections. The chi square analysis indicated that they distribution of feedback types differed significantly across Case, Topic, and Final interactions (6, n = 452) = 118.979, p<.01.

To see if there were specific substantial differences between the case study and final, which were similar feedback interactions since experts gave textual feedback on both and each contained the similar argumentation patterns, a pairwise, independent chi test was performed and the analysis revealed that these interactions also differed based on the components of PDE that comprised them (3, n = 311) = 9.467, p < .05.

Table 2: Comment Count per Expert Feedback Interaction

Interaction	Data Source	Problematize	Authority	Accountability	Resources	Total
Topic Selection	Comments	64	56	7	14	141
Case Study	Comments	10	32	35	1	78
Final	Comments	40	54	133	6	233
		114	142	175	21	452

The results make sense given that the feedback between topic selection and the case

study and final were fairly different. As the percentage comparison illustrated, experts used different PDE components in different proportions depending on the task. Specifically, experts problematized topics prior to writing but did not hold students as accountable to disciplinary norms during the topic selection as they did during their assessment of students' case studies and particularly final arguments. Additionally, experts positioned students to take a role of authority more during the case study in comparison to the final. In summation, based on comment counts, and perhaps return rates, it was apparent that the feedback tasks were sufficiently different in their complexity, and the experts targeted different areas of component concentration depending on the arc of the feedback within the curriculum.

To add another layer of analysis, each feedback interaction was assessed independently for the how the four components of PDE were taken up across the codes for argumentation. More specifically, this analysis looked at not only what unique elements of argumentation and writing appeared in the feedback of experts, but also how these elements seemed to differ within the contexts of the four PDE components. For instance, how does evidence when coded under problematizing differ in its form when coded under authority or accountability? To unearth these findings, qualitative textual analysis were conducted within each feedback interaction, and this resulted in the development of a crosswalk that analyzed each feedback interaction in relation PDE and Cognitive Presence. Making a connection to the first analysis, a crosswalk illustrated how the component of PDE mapped onto CoI's Cognitive Presence subdomains. Given that CoI has been used exclusively in online environments to track collaborative learning progressions across time, the merger of the two concepts was intended to illuminate how the components of PDE might differ depending on the expert task. Each of the four components of PDE was defined in relation to the expert feedback provided to students on the three feedback interactions,

thus potentially illustrating the changing nature of the feedback across time, as students skills and practices related to argumentation progressed.

Table 3: Crosswalk of Cognitive Presence Subdomains to PDE Components

		Cognitive Presence		
		Trigger - recognizing a problem through puzzlement and initial ponderings to spur curiosity and frame an issue (Topic Selection) Experts:	**Explore** - seeking to understand the nature of the problem through brainstorming, research, planning and writing-to-learn (Case and Final) Experts:	**Integrate** - weaving together ideas through a focused/structured phase of making decisions on how to connect/synthesize ideas (Case and Final) Experts:
PDE Components	**Problematizing** - encouraged to take on intellectual problems through questioning, complexifying	Questioned and compliciated student proposed topics by highlighting - •arguability •focus/breadth •relevancy of the subject •opposition arguments that help form position •intellectual risk-taking with the selection of foreign topics	Questioned and complicated student writing leading to further investigations based on - •identifying the central argument •providing the proper breadth of topic •narrowing and developing a nuanced perspective •including a variety of credible of sources •identifying reasons/evidence •identfying an opposing argument	Questioned and complicated student writing leading to better integration of ideas by - •matching evidence to claim •integrating qualifiers, depth, and nuance of claim/reasoning •differentiating opinion vs argument •overstated reasons and evidence •making connections with audience through style, tone, word choice •incorporating the stance of the opposition and countering it
	Authority - positioning as budding expert by trusting them and giving them authority to address problems, thus affirming and encouraging their knowledge and giving them profession tricks of the trade and insider lens	Affirmed and encouraged students to be sense makers in response to their proposed topics by: •positioning students as having choice and agency in how they approached the topic •acknowledging and reminded students of their knowledge and personal connection to the topic	Affirmed and encouraged students as writers and investigators in their explorations by: •positioning students as having choice and agency in their investigations •connectioning student writing to professional practices related to planning and research through primary and secondary methods	Affirmed and encouraged student in their integration of ideas by: •positioning students as having choice in taking up advice •connecting student practices to professional writing practices •pressing students into creating solutions
	Accountability -Students intellectual work is held accountable to others for disciplinary norms by directing and informing students of what is inside and outside professional boundaries	Directed and informed students of disciplinary and professional parameters in response to topic selection by : •mentioning confirmation bias •reiterating the expectations related to researching and writing arguments •confirming the proper writing schema or genres (informative vs argumentation)	Directed and informed students of discipline and professional parameters which would lead to further investigation by: •finding a narrow or sharpened perspective through more research in order to marshall claims and evidence •specifying and tightening claims •finding more and apppropriate evidence to support claims •including the opposing argument and potential counter arguments	Directed students to take up disciplinary norms and professional parameters regarding the integration of ideas by: •arranging arguments differently •crafting stronger introductions and conclusions that engage the reader •gaining control overoverstating reasons and evidence •mentioning and citing credible sources correctly and strategically •including reasons that are targeted rethinking logical fallacies such as incorrect analogies and strawmen
	Resources - provided with sufficient resources to do the above	Provided resources to open up student understanding by: •giving links to research •offering their service in trying to find resources	Provided resources to further arguments by: •supplying a link to a site listing pro and con reason and facts	Provided resources to further arguments by: •supplying a link to a site listing pro and con reason and facts

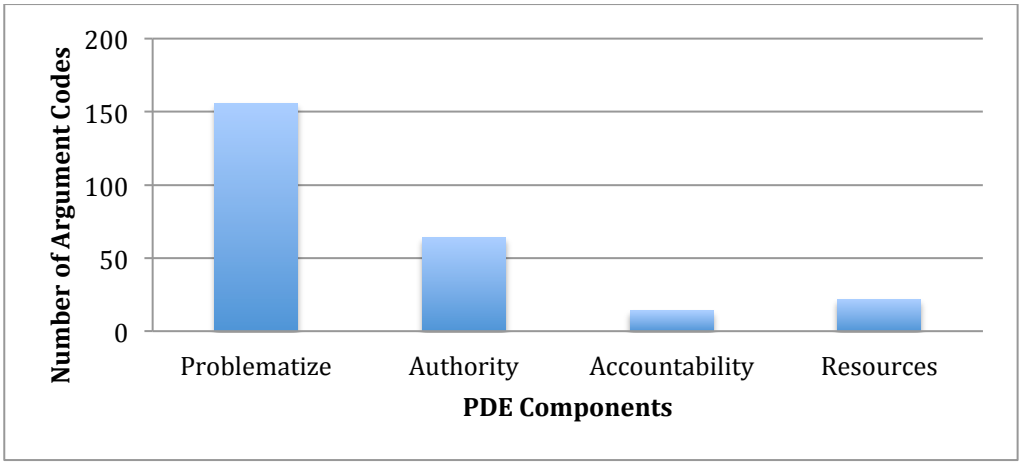
To explain how the crosswalk (Table 3) was developed and to extrapolate the details of expert feedback, the topic selection, case study, and final argument comments were analyzed for PDE components and elements of argumentation.

4.3.2a Topic Selection

To begin, the exchange between student and experts on topic ideas was noteworthy since

the student/expert interaction rate was high (above 90%) and the feedback was fairly rich. This means that when students requested feedback on their topic ideas, experts responded to them over 90% of the time. Layering the codes for argumentation and writing on top of PDE, the analysis revealed that problematizing was a key component of experts' feedback on student topics choices, comprising 61% of the total argument codes. The concept of authority contained 25% of the codes, followed by resources and accountability (9% and 5% respectively). To understand exactly what the argument codes revealed in the context of expert feedback on student topic choices, the analysis continued to dig into the patterns of argument for each component of PDE (see Figure 10).

Figure 10: Total Argument Codes per PDE Component for Topic Selection

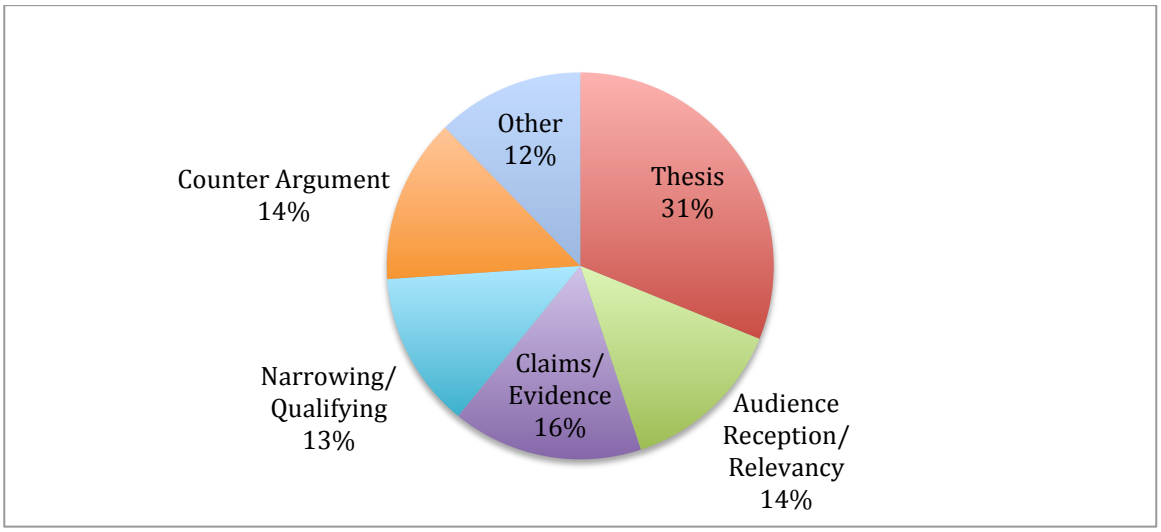


Starting with problematizing, which comprised over half of all comments to students, experts brought up a diversity of issues of which students should be aware as they launched their investigations (see Figure 11).

Given that students presented three topics of interest with subsequent reasons why they chose the topics, references to the thesis (primary claim or perspective) were prominent in expert comments, as were calls for students to narrow topics to make them

either more arguable or manageable. In the case of the former, expert occasionally problematized topic by simply stating that the topic was not contentious enough to make arguable. In the example below, the expert suggested that the student dive into an argument rather than choose a non-contentious interest:

Figure 11: Problematizing Topics (148 Argument Codes)



> I think you need to choose topics that lend themselves to controversy or opposing viewpoints, rather than topics that may be interesting, but do not really offer the chance to formulate an opinion. For example, it is difficult to imagine how you might write about eating disorders without simply saying they are bad and describing them.

In other cases, the experts were craftier about how they might make something arguable, perhaps giving an insiders lens on how to tweak a topic to heighten its interest. In this example, experts modeled how to transform a topic from one of non-controversy to an argument worth pondering through the insertion of nuances. An expert wrote:

> I know it's a very controversial topic. But I think you need to be a little bit more

> specific. What about child abuse would you focus on? For example, what about looking at childhood obesity as child abuse? Or teen pregnancy as child abuse? Do you see how adding that one extra specific topic adds a whole other controversy and narrows your research focus just a little bit more?

Much of the time, however, topics were fairly arguable but had issues of scope. Experts also tried to steer students in a variety of ways that integrated argumentation with audience considerations. For instance, experts directly explained why crafting an arguable assertion or narrowing a topic was important. In this example, the expert shared her reasoning of why honing a topic is necessary in anticipation of the audience's response.

> The key to choosing an essay topic is to make sure that you're topic is specific enough that you can really dig into the issue. You don't want to be too broad or general because it weakens your argument. People can say, "But you didn't even mention this part or that part of the issue!"

Occasionally, an expert would tell a personal story that related the foibles of picking a topic that was too large.

> When I was an elementary school kid, I chose to write my big report on "Astronomy." I was completely overwhelmed by the sheer volume of information available. I would have been a lot more successful if I had chosen, say, "Saturn's Rings." So when you think about your topics, you might find that focusing down on something a bit more specific might help you choose your arguments more effectively.

By supplying an example, the expert tried to relate the potential danger of selecting a topic that could encompass a book or even a library. The expert related that "success" came by taking a slice of a topic.

Experts often problematized the student topic propositions by recognizing the enormity of the subject and then guiding the students to a narrower focus. This led to a

constellation of more manageable topic possibilities. Experts tried to make students see the expanse of their topic selections by peppering him with interrogatives that would lead to a sharpened focus, while at the same time complicating the topic. Below is an example of such an approach in which experts asked mostly historical questions that the student likely did not contemplate. In this example, the expert responded to a student who was thinking about writing an argument on peace in the Middle East.

> So the Palestinian-Israeli conflict: Do you mean today? Do you mean in the case of Gilad Shalit (the prisoner recently released in exchange for some number of prisoners)? Or could you mean the Balfour Declaration (sometime in the early 1900s)? The same could be true for abortion rights--for the woman, the man, the fetus, society, doctors, Planned Parenthood, the back-alley guy? In the middle ages or in 1975? I have to say I don't know a whole lot, if anything, about genetic engineering, but are you talking about eugenics or something else? In what context? See? It can get complicated :).

In closing, the expert spiritedly jibed the student through a litany of questions, potentially to spur him into action "See? It can get complicated :)." While this expert was rather intense in her questioning, other experts were less aggressive but still thorough.

> There are several ways you can approach this, but let me give you some suggestions of questions to think about as you read others' essays about this: 1. If college athletes were to be paid, where would the money come from? Would colleges be expected to pay those players in "non-revenue" sports (such as volleyball, soccer, softball, gymnastics and others that don't generate big TV contracts) as well as the "revenue" sports (football, basketball)? Could their budgets accommodate that expense? 2. What benefits do athletes receive now? (For many, it's tuition, housing, books, tutoring, free health care, meals and some clothing.) What would be a fair

> way to compensate them beyond those? 3. What vested interest do universities have in classifying students as amateurs rather than employees? (Would it make them subject to labor laws, for instance.)

The above expert provided a set of questions that supplied a deep reference point for investigation that also anticipated potential questions that one might get from a skeptical reader. The questions provided a framework for investigation and things to consider as the student made his foray into the research.

Experts also included direct and indirect references to the relevancy of the topic to the audience. For example, the below expert alluded to the cogency of the topic based on a broader audience appeal while at the same time pushing the student toward a sharper focus.

> Globalization. Wow. This is a gigantic topic. This is absolutely a good project, because it ultimately affects all of us. Also, people feel very strongly about this issue, both pro and con. However, globalization is really an enormous issue with some very complex questions. You might consider focusing on just one aspect of globalization, such as immigration, trade tariffs or the redistribution of manufacturing jobs to countries.

The above example made reference to how an audience may be affected by globalization or have strong beliefs about it, but breezily mentioned pro/con arguments, making little reference to opposing viewpoints as a central lens for investigation.

In contrast, other feedback made clear the shape of the counter argument. They pressed students to consider the relevancy of the issue and give more time to counter argument early in topic selection, thus complicating the planning and drafting what lie ahead. In the next example, the expert contextualized the feedback within research literature and the current district policy, pointing out who might disagree with the

student's position.

> I agree with you that the first topic on school start times is likely the better researched. I also believe that [our] school district has looked into this issue. From a medical standpoint, the evidence is pretty clear about the functioning of teen brains. They aren't at their best at 7 or 7:30 a.m. A counter issue is that a later start time for teens often causes issues with school bus routes/schedules. Also, starting later pushes the end of the day later. When this happens, it pinches such things as sports and extracurricular activities. I've also heard that it causes an issue with some teachers. If they teach high school and have children in elementary school, they (the teachers) still are at school when their children are being dropped off at home at the end of their day. Not every parent likes this.

The expert's comments summarized the case well by pointing out a clear fact about start time, but also clearly outlined the position of the opposition. Interestingly, the expert acted as a resource on this topic since he was the editor of the local newspaper and had reported on this issue the previous.

In addition to opposing arguments, experts encouraged the youth to pick relevant topics. Experts occasionally treated the topic almost as capital of which to take advantage, "Cyber bullying is really big right now. There is a huge platform regarding bullying in general." Sometimes that capital was related to students' lives in some meaningful way. For instance, this expert not only commented on the "timeliness" of the topic, but also mentioned how the student would learn "important information" that would be useful for future reference. Beside these points, the expert also problematized the topic as one that is based in economics and supply and demand.

> Lastly, the topic of whether college admissions are too competitive is very timely right now. As opposed to the other two topics, I can actually help be an "expert" on

> this topic because I volunteer with the College Corp program each week and work with seniors at you high school on college admission applications. I think you'll find that the consensus opinion is a firm "yes" it is too competitive – but what can you do about it when there is such a supply and demand problem with the top brand colleges that all students and their parents want admission to? A very interesting topic and one which I think you'll learn quite a bit of important information that could really help you in a couple of years.

Other experts tended to take a personal edge when it came to relevance. Experts sometimes contextualized their advice about the topic selection according to the student and his broader generation and how they "feel" the issue on "daily basis." Experts tried to relate the topics to students' lives or trajectories. One expert, not being satisfied with the topics that students put in front of him and sensing their dispassion, looked at his students' profile pages to get a sense of who the students were and surmised alternative topics. To one student, he wrote:

> I read your profile here on the platform, and I see that you enjoy many sports. I saw the big purple [H] on your profile as well, indicating you're a big [Hawks] fan. If that's the case, I would suggest that you think of another topic -- something like: should college athletes receive compensation, or should it remain as it is today, where universities and others make a lot of money from football and basketball games, but athletes are unpaid amateurs.

In this particular case, problematizing meant starting over with something the student cared about rather than coming up with a response to make the teacher happy or were safe. The approach provided a way for students to be positioned as authorities within the writing process.

Lastly, students sometimes took risks in their topic selection, by picking something

that was not part of their knowledge base. Experts encouraged such investigations, noting that lack of familiarity of an issue was often a trademark of professional work. In the below example, the expert urged the student to follow a glimmer of interest and at the same time opened a window to understanding the controversies associated with vaccine and autism.

> I know you seemed a little lost with Autism. That's ok. Sometimes picking a topic that you don't know anything about is good too. I end up doing that a lot in my research at work. I think you will find that the most controversial aspect of autism right now is the issue of vaccines. There are some people who claim that giving children vaccine is a cause of autism. On the other hand, there are people who say not true.

To recapitulate, experts problematized the topic selections through a number of strategies that often entailed guiding students into making an arguable assertion that were narrow enough to make manageable and relevant enough to make interesting to the students and a broader audience. Questioning was a common track that experts pursued as a method of guidance. Sometimes the questions merely problematized the topic as a way to narrow the field possibilities, and other times, questioning was almost a blueprint for further investigating the topic. Occasionally, experts directly modeled the considerations that should be taken into account when consider a topic and make direct reference to their work thus making the topics relevant from a personal, social and professional standpoint.

Extending the analysis beyond problematizing in topic selection, further analysis was completed on other components of PDE. While PDE components were deeply intertwined, as the above examples demonstrated, analysis aimed to untangle specific, notable features.

First, addressing the component of authority, experts often positioned students as knowledgeable choice-makers and supported students by complementing them for what

they did right. For instance, this expert highlighted the thought that went into the various topic choices and their merit. For example, an expert wrote: “I am very impressed by how much thought you have already expressed about each of your topics. All three topics show potential for good debate and opinion writing.” Others further accentuated the students’ choice, even though the expert had a personal opinion about the topic and what should be selected for further investigation. In this example, the expert welcomed the student and acknowledged the complexity of the idea. The expert ended his response by reiterating that the student has the authority to make their own decisions, but that the expert could also give their personal insight.

> It's great to hear from you! You've picked three great topics. All three are big and complex, which means you should be able to find some pretty strong opinions on either side of the issues. You obviously get to choose your topic, but here's what I think about each issue.

The student’s knowledge of the topic also played a role in how the expert would spotlight student authority. Just as crafting something of personal relevance played a role in problematizing, it also assumed a role in placing the student in a role of authority. In the next case, the expert made an observation about where the student’s passions lied and connected it to early statements the student made about art. The expert targeted the student’s interests as a point of authority while also accentuating its relevancy.

> I noticed when I was reading your paragraph that you seemed to write the most about the possible loss of arts programs in schools. I am sure that this is because you understand from a very personal level what the impact of such decisions would be like for real students. . So.....I think my first choice of a topic would be the last one you mentioned. Not only do you have a real connection to this topic, but it is not like the others.

When it came to accountability, experts practiced restraint, and instead of correcting or commenting on the merit of student writing, they would make references to practices that they were held accountable to in their professions. While a past example illustrated how an expert urged a student to take a risk by selecting a topic they knew little about, perhaps problematizing student choice, the next two examples illuminated another professional practice that often occurs when selecting topics in the world of journalism. In another expert's response to school start times, a caution was flagged.

> School start time is a really interesting idea. Since this is a topic that pretty much everyone can identify with (we've all either been students, are students or will be students), you are sure to find all sorts of opinions. It would be interesting to see how students' opinions compare with those of teachers or parents. One thing to be aware of: It can be challenging to form unbiased opinions about issues that affect us personally. This isn't a reason to choose a different topic. It's just something to keep in mind: If you choose a topic that you already have an opinion about, how will you ensure you're being fair to both sides?

Another expert was a little more direct in her reaction to bias in the students work.

> I would encourage you to stay away from the abortion rights issue. Not because it isn't a fascinating issue - it is. However, you have clearly already made up your mind about it, so it seems unlikely that you would benefit from exploring both sides of the issue, and be able to present both sides in a manner that allowed your readers to think outside of their own ideas. In research and journalism, we call that "confirmation bias," which is when a writer or researcher sets out to prove their own point, rather then genuinely explore an issue.

In both cases, the experts were concerned about the student grappling with the various sides of a topic and making up their own minds rather than building a case based on

previous perspectives. Although this was not part of the parameters of the assignment, these two experts encouraged students to construct a case based on fresh ideas and new arguments.

Lastly, within the PDE framework, the use of experts itself would be considered its own PDE component—Resource. However, given that this analysis was directed at how the contents of expert feedback intersected with PDE, the feedback itself was studied to see how experts referenced or provided materials. As such, experts rarely directly gave students materials as part of feedback for topic selection. Instead, they quickly referenced whether there would be too much or too little to draw from or told students they would help them find resources if needed (especially if a topic engaged the law). Once in a while, an expert would mention where to find evidence, including doing one's own inquiry. This expert suggested, "You could easily interview teachers, your principal, and fellow students to understand their arguments for or against either of these ideas. I think the writer's interest in a topic is very important, but I also think that a successful essay dives deep into the topic and covers it well." Another expert stood out for his generosity by providing his set of assigned students with three-to-five resource links for each the topics they selected.

4.3.2b Case Study and Final Argument Feedback- Overall Differences, Similarities, and Trends

Feedback associated with the case study and final argument proved to be fairly similar according to argumentation codes. This was likely due to the nature of the experts' task, which was in response to the students' writing arguments on a contemporary issue. The case study was positioned as a practice for the final, and experts were asked to respond to students in the comments field of the blog. In contrast, the feedback from the experts on the final occurred directly on student papers via "track-changes" and embedded comments.

As previously stated, differences between the case study and final feedback-exchanges proved significant according to the indicators of PDE. While problematizing dominated codes for topic selection, authority and accountability proved a signature of the case-study feedback. In contrast, authority decreased and accountability increased on the final with more expert attention being placed on correcting and informing as opposed to bolstering students' confidence in relation to their emerging understanding of argumentation.

To further focus the analysis of how experts responded to students on the two similar tasks—the case study and final—a descriptive, comparative analysis of the codes related to argument was completed. This was meant to assess whether the foundation of the feedback was substantially different. For instance, looking beyond the PDE framework and more deeply at the elements of argument, did the experts point out the same types of issues and advise students similarly during the two feedback interactions? In a comparison of code counts and the percentages related to the various elements of argumentation, similar patterns emerged between the case study and final argument feedback.

Table 4: Comparison of Argument Code Counts - Case Study versus Final

	Style/Tone/ Word Choice	Grammar/ Usage/ Phrasing	Audience	Thesis/ Perspectives	Claim	Evidence	Qualify/ Specificity	Counter Argument	Argument Structure	Total
Case Study	11	6	4	6	10	15	6	1	6	65
% Case Study	17%	9%	6%	9%	15%	23%	9%	2%	9%	
Final	37	30	20	15	32	41	13	12	28	228
% Final	16%	13%	9%	7%	14%	18%	6%	5%	12%	

The argumentation codes within the case study and final fell primarily within

problematizing and accountability. Feedback that fell under authority tended to be similar in nature to that which was given to students in response to topic selection, which was less about learning argument and more about positioning students as budding experts and providing them agency and choice in the endeavor. Because resources remained slim, focus was put on problematizing and accountability in context of student written arguments.

Table 5: Code Count Comparisons of Problematizing and Accountability

	Style/Tone /Word Choice	Grammar/ Spelling/ Phrasing	Thesis	Claim/ Evidence	Qualify/ Specificity	Counter Argument	Structure	Audience
Problematizing	3	1	6	49	10	14	1	1
Accountability	48	36	21	98	19	13	34	26

When looking at the codes counts and taking into account the expert response rates between case study and final argument feedback, differences emerged between problematizing and accountability. More specifically, style, tone, word choice, grammar, spelling and phrasing, as well as argument structure, and audience concerns, tended to be attributes of feedback related to accountability. In contrast, the scope, precision, and nuances of the argument tended to be the terrain of problematizing. Often, problematizing feedback was connected to counter arguments, thesis assertions, and expanded reasoning. Additionally, these patterns of feedback were fairly constant between the case study and final argument, which suggested the types of feedback remained constant across time. Consequently, expert feedback was analyzed according to the argument codes in order to understand the contours of the guidance that was given to students as it related to problematizing and accountability in the two feedback interactions reacting to student writing.

Further extrapolating the difference between the two PDE components, experts problematized student work primarily in connection to the refinement and sharpening of the thesis or perspective—similar to that which occurred in responses to student topic selections. Occasionally, the refining was related to claims and evidence, but it was also present in comments related to counter argument. Most often, problematizing took on broader issues that framed the student's position. Accountability ran the gamut of writing and argument codes in fairly high numbers, though it was mostly found in claims and evidence also. The nature of problematizing and accountability was differentiated based on how the expert guided the student. Specifically, problematizing opened up the fissures within an argument without pointing students to a resolution. This was often accomplished through questioning, and it tended to connect deeply to the controversies the students were tackling. In contrast, accountability tended to point to areas that needed correction and were often declarative in nature while problematizing tended to puzzle, question comments, and sometimes even interrogate. Experts alternated between these components as they guided students in their construction of arguments. To illustrate the difference, the feedback was analyzed in context of student work. Below are segments of text from students with expert feedback that problematized the students' writing while eliciting elements of argumentation.

4.3.2b1 Experts Problematizing Student Arguments

As proved difficult for students during topic selection, students also had trouble with narrowing, qualifying, and getting specific about their perspectives both within their main thesis and within claims. In response, many experts problematized the content. In the examples that follow, the experts worked with students on understanding their

contemporary issues while pushing them into being more exacting and precise in their points of view and claims.

To begin, experts assisted students in defining their topics by focusing on why the issue itself was controversial. Although students researched their topics and vetted them with experts, teachers, and peers, some students still had trouble locating the crux of why their issue was contentious. In this example, the expert attempted to guide the student into understanding why people were disturbed about WikiLeaks. In the paper, the student asserted that WikiLeaks was a positive development and claimed that it was an easy way to find unique information. She began her paper as such:

> How much do people really know about their government, and how can they find out more information? Of course, the internet is a great way to find this kind of information especially a website called wikileaks. Though some find wiki leaks to be too graphic it is a convenient website for information and there are lots of other to get information, plus there are not breaking any laws. Wiki leaks is a great place to find out information on governments world wide.

In the introductory sentence, the student seemed to be on a proper path for diving into a discussion about WikiLeaks by questioning how much people really knew about the actions of their government. By the second sentence, the student clearly stated her perspective. However, by the third sentence, the student misidentified the primary reason why the opposition is concerned about WikiLeaks, thus missing the central argument that surrounded the issue. Consequently, the subsequent claims and evidence related to the issue were overlooked. In response, the expert, who was an administrator at Google, wrote after reading her argument:

> I think your essay would benefit from describing other criticisms of WikiLeaks, and why you disagree with those concerns or how you deal with them.

> You mentioned concerns that the material is too graphic, and I think you dealt with that well. But the other concern I have heard is that governments need a certain amount of secrecy in order to operate effectively and safely, especially in conducting military campaigns or wars or in diplomatic efforts.
>
> At the end of the day this is an argument about the right of the public to be fully informed about what its government is doing, and having the government be accountable to the people for its actions, against the right of the government to maintain a certain level of secrecy and privacy in its operations so as to protect the safety of its personnel and its ability to operate effectively.

The expert began his critique on a positive note by stating that it was a good first draft. He then entered into a critique and guided the student toward improvements specifically related to expanding and answering the key criticism of WikiLeaks, beyond being "too graphic." Continuing on as if he had a passing understanding of the issue, the expert articulated why WikiLeaks was controversial—an issue of government secrecy and running governments effectually and securely. He expanded his thoughts by highlighting the foundation of the issue about the rights of the public in government affairs.

In another argument, thesis-level issues surfaced related to specificity of the topic, and hence direction of the argument as a whole. For example, a student, arguing for the legalization of marijuana began his argument:

> Cannabis, known as marijuana, is a plant that can get you high off of a chemical it contains called THC. Marijuana is said to be really dangerous and bad for you as most people would say but it is actually one of the most harmless drugs there is. Over the past few years this topic has been a huge conflict in the United States between people who do and don't want to legalize it. In this essay, I will explain the pros and cons of legalizing marijuana and over all why it should be legal.

The expert, who wrote grants for medically related nonprofits, clued into a nuance in the student's introduction and responded, "I don't think the big controversy is specifically about how dangerous it is but rather whether or not it should be legal. So you might want to be very clear about what you mean by "this topic" in this sentence." Given that the student's argument was not exclusively based on the drug's danger, but focused on the economic benefits, taxation revenue, and the reduction of organized crime, the expert problematized the student's introduction in relation to the rest of his argument. In the process, the expert attempted to move the student into crafting a more targeted introduction that would lead the reader into a more rounded set of reasons—beyond just reacting to a generalized position by the opposition.

Other acts of problematizing by experts occurred within the thick of student arguments. This often occurred when experts highlighted logical fallacy as students tried to construct arguments. For example, while explaining one reason why he is in opposition to genetic engineering, a student wrote:

> Genetic engineering is wrong because if one looks around, almost everything is man-made and if we allow cloning and altering people, man will just become another man-made thing. Just like other man made items, the cloned human would be deprived of its right to live equally. The clone would be seen as a fake and as such, wouldn't be respected as a normal person. Just think of a world of robots that live along side humans. The robots wouldn't be set free into the world; they would more likely have to be bought. So when people buy them they own the robot. It would be the case that a robot would not have complete freedom and would instead be used by the buyer. The same would apply to a clone who would be controlled by whoever created it. "No longer will a child be considered a blessing from God, but rather, a product manufactured by a scientist."

As the student made an argument based on the value of human life and its uniqueness, he turned to a tenuous analogy about robots and property ownership that did not necessarily work well. The expert pointed this out and asked for clarification: "I don't understand the connection between robots and clone—a robot is not a living breathing life form like a clone. You need to explain why you are making this comparison and why it is valid." Clearly, the student was making a few assumptions about how a cloned being might be treated. The expert attempted to move the student into a deeper consideration of the issue by challenging him to explain the connection more thoroughly.

In another example, the expert problematized the student's argument by directly challenging the student's synthesis of a key idea within her argument. More specifically, while taking a stand against prayer in school, she conflated prayer with learning morals, perhaps in response to a quote related to the opposition. Reacting to comments from Laura B about school prayer as a gateway to morality, the student wrote:

> Laura B stated, "Without religion in our schools, where is morality supposed to come from?... [Religions] also help to nurture [student's] souls by reinforcing the values they learn at home and in their communities. I believe that one of the best ways we can help our schools to do this is by supporting students' rights to voluntarily practice their religious beliefs, including prayer in schools." (B. Laura) But why is it the school's job to teach morals? Morals are important, but why can't students learn it at home? Students should be able to voluntarily practice their own religious beliefs, but not during school. School is a place to learn so we not only understand the world around us, but be able to get jobs and have an income to support ourselves. Teaching morals is not the job of the classroom teacher, but of the parents who take care of their children and teach them what is right or wrong.

The expert, a lawyer, problematized the student's position with a retort of the student's

logic. The expert reaction proved to be a moderate interrogation:

> Watch the opinions given here. These are far too sweeping, and unsupported, and contrary to what I think you and classmates believe – i.e. morals includes knowing that cheating is not right; that you should be kind to others, and help people less fortunate than yourself. Those are morals. Why aren't those lessons ok in a classroom? You can learn many lessons without religion in the classroom. Just because someone has a moral compass does not make them a religious nut. Rethink the tone on this paragraph. It is too shrill, overbroad and ineffective. You have ample reasons to oppose religion in public schools, but one of those is NOT because students don't need to learn morals, i.e. what's right from wrong. Of course they do, and teachers help all of us learn that each and every day in the classroom, as well as at home. It's called proper socialization, basic human interaction, people skills.

While the expert's style might be considered off-putting, the scope of his response was interesting. He wove together advice about argumentation by focusing on the "sweeping," "unsupported," "shrill, overbroad and ineffectual" nature of the paragraph. However, he also made somewhat personal commentary about the student and her classmates, hence questioning whether the student really believed her position. He continued to unpack the difference between morality and religion for the student, and punctuated his point by stating that morality is about "socialization" and "people skills," not religious fanaticism. Clearly, the statement was meant to problematize the students understanding and push her into a more nuanced interpretation of the issue.

Problematizing also occurred in response to students' ability to define the opposition's stance, and it was in trying to define that stance that experts aimed students toward clarification of their main perspective. For example, in response to an argument defending the institution of marriage, an expert believed that the student was somewhat

off-target in her assessment and had developed a straw man. The first hint of her misdirected aim came in her thesis: "I believe that marriage is important to have and should never be destroyed." The expert, sensing the all-or-nothing language of "should never be destroyed," replied with an attempt to rally a more specified thesis: "It would help your paper if you could clarify your perspective and argument you are trying to argue against in this first paragraph." This point was taken up later, when the student more clearly asserted, "marriage should never be taken away" to which the expert rejoined: "I don't think anyone is seriously arguing to "legally abolish" marriage or taking away anyone's "right to marry." Rather, what I think you are arguing against is the diminished importance that society is placing on marriage." As seen in previous examples, the lack of specificity and student's misdirection left a fissure in the argument, allowing the argument to be cracked open for problematizing. At this point, the student was left to consider exactly what she meant to argue and how she might approach revisions. Did she mean what the expert thinks she meant?

Lastly, experts often pressed students to propose solutions to the issues that they were addressing. In doing so, the expert problematized the content for the student to untangle or dive more deeply into, potentially leading to a more targeted argument. For example, in an argument against increasing the cost of college, the student crafted a fairly honed argument but circled back to the same reason twice, thus only repackaging it. Specifically, his first reason centered on the huge amount of debt one can accrue during a four-year degree ($23,186) and how hard it will be to pay off. The third reason echoed the first though it was contextualized within the aggregated American debt ($875 billion). It again made the argument that this would be hard to pay off, but added that debt can make people anxious and sad. The expert, a retired school district administrator, lightly touched on the repetition, but she primarily redirected the student's gaze:

> I think the biggest thing you have missing is that you don't offer A) you don't acknowledge that the cost of running a college are rising (salaries, insurance, etc.) and most importantly B) how the US could lower tuition costs without bankrupting many colleges. This is the $64,000 question. So what do you propose?

Although the advice focuses on the opposition and potential solutions, the expert's comments were intended to assist the student in rounding out the argument. Furthermore, by engaging the opposition and proposing a way to save post-secondary education, the student would be led to further investigations that would spur more reasons to support the reduction of college tuition. This would also help him craft a counter argument.

The above expert was not alone in calling students to think about solutions. In an other example, and in response to a student that argued in support of the Occupy Wall Street movement, the expert urged the student to think about the complexity of the issue as it related to economic systems, not just the values of the movement:

> Maybe you should say what they [the protestors] want instead. In our economic model, capitalism, the economy depends on creating goods and services for profit. The wealthy tend to own the businesses that do this; that's how they become wealthy. In an alternative model, the government owns business, but that's just what you've been arguing against. So to help your reader understand the protestor's argument, an example of an acceptable economic model would be great!

By focusing the student on economic systems through a brief tutorial, the expert urged the student to think about a situation in which the protesters were proposing an acceptable pecuniary arrangement that would be fair to the 99%--something the movement itself has not explicitly done. Of course, such direction would lead to more research into high level thinking about society, money, and ethics. If the student were to take up this challenge, she would potentially project a stance with a voice rather than just standing behind the ideals

of movement.

4.3.2b2 Accountability in Expert Feedback on Student Arguments

In contrast to the examples of problematizing provided above, when it came to utilizing the component of accountability, experts gave more direct feedback that tended to define what was in and out of bounds regarding argumentation. Their feedback demonstrated that accountability was the gatekeeper of what an audience accepted or expected. While track-changes corrections of grammar, spelling, and awkward phrasing were considered a form of accountability, comments were equally used, including references to style, tone, sources, and evidence. Using the same set of student arguments referenced above, the following examples provided insight into the contours of accountability.

Interestingly, the comments related to style and tone fell within the area of accountability much more than the other three components of PDE. This area was related to audience reception of written work and how the student text was read, and it often included issues of engagement and pacing. For instance, experts on a number of occasions commented on the use of questions as a way to lead the reader and called it out as ineffectual. One expert warned, "Questions are not helpful in a discussion such as this. Present your point, support it and move forward. The questions make readers want to challenge you, and it is not a convincing way to communicate. Some questions are ok, but this uses far too many to be effective." Another expert commented, "As a reader, reading these questions right up front isn't that engaging to me. I would try to find a better way to lead your reader in. You could try including a shocking fact, a story, or a statistic that surprised you." In both cases, the experts did not simply direct the students to eliminate the questions. Rather they explained why questioning is not a good technique and provided

alternatives to it.

While more traditional comments related to style and tone were noted, such as "avoid 'to be' and 'to have' which just connect words thinly," experts also directed students to write with more fortitude, precision, and clarity. For instance, an expert explicitly guided the student to stay way from phrases like "as you can see" and "in my opinion," commenting that "if the argument is strong, your readers see just what you want them to see, and they already know that this essay is your opinion because you are writing it. Stay away from phrases like that and stick with the evidence, which makes your essay stronger." Another expert called this, "writing with conviction," and urged the student to "just say what you want us to consider."

Additionally, comments related to style and tone focused on pacing, which sometimes coincided with grammar and structure. For instance, one expert advised, "Whoa! Slow down here—you have a compound sentence with some run-ons and some colloquial language that doesn't belong in a formal essay." Such feedback often included rationale for why a writer might take up the advice. For example, an expert recommended, "Look to write strong, short sentences at the ends of your paragraphs that tie up the progression you made since the paragraph's topic sentence. Think of it as a place where you can really slam home your best points you used in that paragraph and get the reader ready for the next block of evidence." Others took up this point as well and noticed that students were tiring as they continued. For instance, and expert observed, "it is apparent to me that you focused most of your attention on the first portions of your essay, and you ran out of gas or repeat yourself towards the end. I think your essay would be stronger if you revise it to consolidate points that you seem to repeat, and make your conclusion less tired. Finish strong!" In both cases, the expert contextualized his advice within the scope of audience, potentially sensitizing the student to think about how the work is perceived by a reader and

the style in which they presented their thoughts.

References to structure were also a recurring theme of feedback related to accountability. The advice from experts was fairly conservative in nature, perhaps sensing that the students needed reminders of essay structure basics. These basics, however, ran the gamut of difficulty. For instance, some experts requested that students take care of "rambling" paragraphs that were "easy to fix" using "first, second and third" in order to lead the reader through the argument, and they suggested the "five paragraph essay structure" to coherently demarcate one claim from the next. Other advice was potentially more difficult, but still fairly common, yet essential. For example, this expert directed the student rearranging text for coherency: "Try to think of each paragraph as a mini-essay in itself. What is the "job" that each paragraph needs to accomplish? At present your second and third paragraphs are very similar, and you might find that if you set yourself up with a clear topic sentence at the beginning of each paragraph that you'll see some thoughts and evidence belong in a different spot." Another expert connected the argument structure with its strength and suggested rearranging based on the best arguments: "I think these economic arguments will be much more compelling to the average reader than the one you lead with, about it not being bad for you or impairing behavior. I would consider flipping the order. It's VERY hard to disagree with the economic arguments but some people might disagree with your reasoning about it not impairing judgment."

Being specific, clear, and measured with one's treatment of evidence was a common refrain within expert feedback, and it proved to be a key characteristic of accountability. At a basic level, experts requested that evidence be used to move students beyond opinion. As one expert warned, "This seems a bit strong on feelings though, vs. solid facts." Experts also insisted on locating evidence within a legitimate source, as this example depicted: "I think you need to cite your sources. When you say smoking can increase the chance of stroke by

two to four times, you should say, 'according to the Centers for Disease Control' or whichever source provided that information to you." Additionally, students often drifted to opinion and unsupported statements. Experts steered students back to developing an evidence base. Sometimes, the expert alerted the student about opinion versus argument and told them to make clear transitions between these two areas. For instance, an expert informed the student that he needed "to transition from the factual argument into the opinion argument somehow, setting the reader up for getting the wind knocked out of him/her when you bring out your opinions following." In other examples, the expert directly identified the location in need of evidence, and he accentuated its importance: "Sure seems that evidence showing such fact, or not, could sway folks to take your position, or convince you to change your mind. See what facts show. Tell the reader what those facts are, and use them to support your position."

Besides simply including and citing evidence, experts also guided students in the treatment of evidence and its connection to the broader argument and its relevancy. Noting the shifting nature of evidence and its currency, experts questioned students' evidence as a means of holding students accountable. For example, this expert pointed out how evidence sometimes has a shelf life: "When was the poll conducted? This info is important because public opinion changes over time." The expert pushed students into thinking about the "date stamp" of the facts they found. Other times, students' evidence-base was incomplete or out of focus. For example, this expert stated:

> You need more evidence about why teen smoking is particularly bad. A lot of your evidence about health risks and second-hand smoke refer to all smokers, but you want to identify why it's particularly bad in teen smokers. You might try to find out if people who start smoking in their teens have a harder time quitting later, or suffer more health problems earlier in their lives.

The student needed to be exacting in the evidence he found in support of his particular argument related to teens. It was a matter of being precise and targeted in argument approach. Consequently, experts kept a close eye on the precision with evidence by also holding students accountable to evidentiary contradictions. In the case of the student who wrote on cloning, the expert wrote,

> You previously stated that Dolly died of unknown causes so you can't conclude it here as the result of cloning. You will need to find evidence of a cloning case where the clone died prematurely due to cloning complications. There were plenty of failed lab experiments prior to Dolly that you can cite.

The expert pointed out a discrepancy and told the student to find a better piece of evidence more fitting to the example.

Relevancy also extended to adding visuals that were meant to lend credence and support to an argument. While tables and graphics can offer a quick way for the reader to get information, an expert advised, "I can't see the graph so I can't comment on it but even without seeing it, I can say, you don't need a graph in your essay. All you have to do is discuss it, which you started to do, which will help convey the rising costs of tuition."

Overplaying or misapplying evidence was also mentioned a number of times by experts. This form of accountability highlighted the importance of appropriately applying evidence to claims. In this instance, the evidence related to the overall perspective, causing the expert to write:

> You want to be careful that you don't overstate the facts and state conclusions that aren't supported by the research cited in this paragraph. I think the research you've cited shows that many, perhaps even most, people derive mental health benefits from marriage, it doesn't say marriage is better for everyone' health.

In another case, the expert suggested that the student check the quote since something did

not add up. He wrote: "You are quoting the US Census, but then say it means that 'half the world.' You need to see if the research is talking about the US women or women from all over the world." The expert tried to divert an overstatement by the student that could potentially make the reader discount the writer as imprudent. Since incorrect or misapplied evidence had the potential to sway the audience based on a falsity, the expert called the student out on the incorrect information.

To quickly recap, the analysis of expert feedback on student writing of their arguments spotlighted the top two components of PDE. The first, problematizing, tended to open up underlying assumptions of the issues and required students to rethink their arguments in substantial ways, often leading to more research or to the re-articulation of reasoning. This was frequently facilitated through questioning, and often included narrowing and qualifying the students' perspectives. Many times experts asked students to think more deeply about the opposing arguments in relation to their own perspective. This was also connected to audience reception and the claims that were being made. In contrast, accountability acted as the gatekeeper for the details of the argument and for the writing itself (e.g., word choice, tone, style). Often, accountability consisted of directive phrases that required students to revise based on norms related to argumentation.

Chapter 5

DISCUSSION

5.0 Summary of Results

Given the above analysis that looked broadly through CoI analysis and narrowly through a grounded analysis of expert feedback via PDE, how do the results relate to the research question that was originally posed?

> *When an academic social network is brought into a project-based English Language Arts classroom in which students are focused on learning formal argumentation, how is Productive Disciplinary Engagement (PDE) shaped over time and what are the contours of interactions that allow such engagement to flourish?*

Productive Disciplinary Engagement was the thread that ran through the Community of Inquiry analysis of student posts, as well as the close analysis of expert feedback on student arguments. Messages were the most frequent type of post within Remix; hence, it was the primary location for engagement. However, various other areas of digital real estate within the platform were also used differently depending on the task. The analysis showed that Social and Cognitive Presence were of equal magnitude within the platform as students communicated with each other and experts. Additionally, when the two domains were parsed according to subdomain and played out over time, shifting patterns emerged. Within Social Presence, affect codes decreased in frequency, while group cohesion and open communication gained a greater share of social presence as the unit progressed. As realized in practice, this transition from affect to group cohesion and open communication reflected

a movement from expressing emotions, using humor, and disclosing informal information about one's self to operating as a class in an online space by continuing threads, quoting others, complimenting peers, addressing each other, expressing disagreement, and sharing resources and ideas. This pattern reflected the happenings of the curriculum as students at first learned about argumentation through episodic tasks and gained their communication "legs" through informal uses of Remix. As the unit evolved into the project—the construction of an argument based on students' interests—open communication and group cohesion grew. Group work and the exchange of writing seemed to foster open communication and group cohesion since their work was centered on a common goal and some of the tasks were distributed across the group. Social Presence was an instrumental component of PDE in that it acted as a catalyst that lead to deeper engagement with argumentation, perhaps laying ground work for allowing students to disagree and be comfortable with difference.

Within Cognitive Presence, which occurred concurrently with Social Presence, trigger events dotted the first half of the unit, and exploration was the predominant activity of the unit. Integration grew and faded depending on whether students were composing arguments at the time. Triggering events included students and experts recognizing, discovering, musing, and puzzling over various controversies. They reflected four points in the curriculum that involved student choice—finding and parsing a controversy within an online teen magazine, unpacking the elements of argumentation related to the case studies, writing their assigned expert about three topics they were considering for their final arguments, and finally revisiting their topic choices based on the expert feedback.

In contrast, exploration was the primary activity associated with Cognitive Presence and occurred steadily throughout the unit. It was found within each of the platform areas, and it highlighted the points of sharing that occurred within the curriculum, as well as

students' independent investigations of the content and activities associated with learning argumentation. Exploration included partaking in the crafting of ideas through research, planning, and drafting; plotting out positions; making initial assertions; and developing points worth considering.

Overlapping with exploration, integration was reflected in students knitting together ideas, responding to arguments, synthesizing arguments and source material, and justifying claims. Because people learn through writing, differences between exploration and integration were slightly difficult to discern on occasion, but in relation to the feedback experts provided students, the distinction was clearer. For instance, when experts urged further investigation, they clearly tapped exploration, whereas when they referenced the intricacies of the students' argument and its rhetorical approach, there was an accentuation on integration.

The CoI analysis of student posts provided a broad brushstroke by which to view PDE across time. While examples of Social Presence showed the topography of interpersonal behaviors and provided the connective tissue of communication and demonstrated how students moved into more focused communication after a perhaps necessary phase of humor, expressions of feelings, and other light communications faded, Cognitive Presence primarily illustrated the arc of the unit from an academic standpoint. Since Social Presence was woven into Cognitive Presence within a single post, the communication that occurred with the academic social network integrated various types of discourses depending on the goal. Domains were not exclusive, but rather they reflected the natural way people communicate who were working within a system toward common and similar objective.

A second analysis was completed to understand how the four components that foster PDE revealed themselves in the expert feedback, a particular subset of Cognitive Presence

posts and an important part of the unit design. While correlations between CoI's Cognitive Presence and the four components of PDE were not run because of the nature of the data, a descriptive crosswalk was provided, and it revealed that trigger events generally mapped onto problematizing. Integration was most related to accountability. Exploration was connected to both problematizing and accountability. Additionally, authority, the third component of PDE, was noted as part of the experts' encouragement of students. However, it was primarily a derivative of the pedagogical approach that was designed within the unit since students were positioned as budding experts and given agency and choice in the decisions they needed to make. The fourth PDE component, resources, was low throughout expert feedback, though the experts themselves could be considered a resource from a curriculum design standpoint. The component was low throughout expert feedback perhaps because the curriculum was assumed to have supplied resources and other materials to the students.

Significant differences were found between the three interactions that experts had with students illustrating that each interaction type had its own PDE blueprint. Feedback related to the topic selection (a key built-in trigger event) was high in problematizing. The case study responses were high in authority, though highest in accountability. And the feedback on the final argument was relatively low in authority in contrast, but high in accountability and moderate in problematizing.

Analysis of PDE through related elements of argumentation was further developed in the context of student work. In short, the elements of argumentation acted as the raw material that fueled PDE, and depending on the type of feedback-interaction the student had with the expert, the four components of PDE shifted, as did the elements of argumentation. Connected to this shift in PDE and working at a subterranean level, the elements of argumentation changed depending on the feedback task. The component of

problematizing, for instance, which proved highly connected to the process of topic selection, tended to address perspective and thesis level concerns and was highly connected to counter argument and specificity. Accountability, in contrast, was related to grammar and phrasing, as revealed through the experts' corrections, and to claims, evidence, and structure, as revealed through commentary feedback on the final.

5.1 Conclusions

The findings of the study and the various methods for analyzing PDE within a digital environment have implications on classroom practice, especially as K-12 schools move toward learning management systems and increasingly use technology practices to construct and consume digital content. The findings also enliven and fill in the spaces left bare in the literature on feedback in the "wild" (versus experimental conditions), social networks in schools, time-lapse understandings of PDE, and the marshaling of experts and mentors for the purpose of learning.

Despite the calls from thought leaders and policy makers for increased technology in schools, more relevant academic practices connected to professions, and redoubled efforts to use experts and mentors with students, very little practical research or guidance is provided to the people on the ground, specifically teachers, volunteer mentors, and student. While teachers often want to connect their students to the outside world and to peers, there are few documented cases that detail what one can expect during such an approach. Teachers are left to think through with little guidance as to how to create, maintain, and grow academic social networks that fosters PDE within a blended learning situation. The current study attempted to answer these perplexities.

Just as Cognitive, Social, and Pedagogical Presence (the last of which is not covered in this study) occur in "real" classrooms among teachers and students in varying degrees

over time (and perhaps in cycles as the curriculum plays out) so too do these domains occur online. Social networks extend and amplify the communication that occurs live. Consequently, digital networks need to be tended and thoughtfully constructed in classrooms. This is especially required in situations of blended learning where digital and live are often positioned as battling environments, as opposed to complementary. As scholars who study teens and education have pointed out (Madden, et al, 2013; Alvermann, 2008), because we communicate more now both verbally and textually than in the past, we must embrace and figure out how best to integrate the two spaces in sensible ways to encourage learning. This integration becomes more pressing as the nature of education moves into a hybrid landscape of live and virtual communication. Educators must know how to operate in both spaces, beyond learning how to use the technology—though that certainly can help. Without the knowledge, anticipation, and orchestration of both academically productive and informal digital practices, the technology can be rendered worthless and misguided, a point made in past research (Kohler & Mishra, 2009). As many scholars of online learning have noted, Social and Cognitive Presence are important domains of which to be aware when designing and assessing education experiences, and they can be leveraged in service of developing and monitoring PDE within blended classroom contexts.

5.1.1 Social Facilitation in Networked Environments for Learning

In relation to the current study, the concept of online presence as outlined by the CoI model was helpful in thinking through how the actors within a blended learning environment "live" online in contrast to "real" classroom activities. Social Presence proved to be an essential component within the platform, and while socializing within the online space was

looked upon with suspicion by two of the teachers, affect measures decreased over time as projects and engagement with controversies grew and as the novelty of the platform faded. Social Presence was an essential function of the communication between the students and their peers and experts. This is not to say that less serious behaviors ("goofing-off") did not occur online, but there was no evidence that it occurred any more or any less than what happened in the class generally through talking and notes. In fact, open communication and group cohesion, subdomains of Social Presence, took a greater proportion of the Social Presence codes as the unit progressed. The growth signaled that students were increasingly working toward a common goal both collectively and individually.

As the data illustrated, Social Presence afforded students an opportunity to collaborate, coordinate, support, organize, disagree, and cheer for each other and themselves. These results were not part of teacher instruction, though reminders of being a good digital citizen were certain at play. Such behaviors pointed to the productive practices of an online community, which went beyond learning how to operate digital tools, such as learning how to copy and paste or identifying a URL—areas of which some ninth grade students clearly needed help. While many believe that today's students are super tech savvy, there are a number of students who are not and who fall off the precipice of the digital divide. This tech digression aside, all students needed to explore and develop the skills, practices, and discourses associated with authentic online communication—not just tech know-how. The platform within the context of the unit provided that space.

With the infusion of experts as part of the review process of student ideas and products, the students had to adopt practices of professionalism. The adoption was not without its mishaps. First, fissures in the process illustrated that students needed more guidance in how to engage each other and experts around artifacts related to argumentation. A few models were offered to students as suggestions, but these came off as

a bit formulaic according to two experts. Just as students must practice interpersonal communication in speech, they must also practice the style and format of semi-formal textual communication, such as requesting feedback or engaging in a conversation about contemporary issues.

Second, when placed within a power differential between student and expert, such communication potentially proved daunting to students. When coupled with new ways of working within a platform and with an outside audience, the social communication with experts was not as fluid as that which occurred between students. Rather, student communication with experts followed curriculum suggestions and was rarely naturalistic, which made for episodic, utilitarian, and decontextualized messages from students to the experts. Consequently, student communication often lacked the smoothness that generally happens within other social media tools outside of school or perhaps what would occur between a knowledgeable other and an apprentice in a Community of Practice (Lave & Wenger, 1991) or through sponsorship (Brandt, 1998).

Third, while the network afforded students the space to experiment and try out new forms of communication within the context of school and beyond, sometimes to the urging of the experts, this did not sit well with students, who did not completely understand why the experts were involved, let alone know who they were. Questions like, "So, this is a real person?" floated over the class as they prepped their messages and arguments—perhaps thinking they were about to engage with an automated tutor or a single puppet-master behind the scenes. Other times, students became disengaged after an expert expressed dissatisfaction with how the student asked for a review. Since students were not graded for the social practices that lie between their formal argument submissions with experts, and since some students did not understand why the experts were involved, they were potentially not putting their best foot forward. These rough spots aside, students did

generally engage their experts as directed, and the practices around communication with experts were good enough for the experts to guide students accordingly.

When experts attended to student submissions, their posts contained Social Presence. However, it varied by degree and shape depending on the expert—a point that is easily lost because of how the analysis was presented above, which focused on understanding the shape of student and expert interaction via an inventory. It was not a comparative study of expert response. But according to communication with the experts, the factors leading to the different levels of Social Presence from the experts were the amount of time experts had to devote to their group of students, their commitment to the process, and their sense of whether the student was engaging with his or her argument and the process of learning. To illustrate the scope of expert social communication, as was covered in the analysis, some experts took a proactive stance and read student profiles, activity feeds, and discussion boards in order to get to know students and provide them with the proper guidance and motivation to write. Some even reached out to the teacher to gain more information about the student in order to engage the student properly. Experts who acted with agency tended to contain personal salutations, compliments, humor, expressions of agreement or disagreement, and personal advice. In contrast, some expert communication associated with Social Presence was breezy (if not simply obligatory), and rather than being actors with agency in the platform, they positioned themselves more as reactors. They were more likely to simply responded to students with feedback, and they included very little social engagement or effort in getting to know the students. Whether these experts were more or less successful with students was not measured; however, it showed that students should be prepared for all types of experts who will engage with students at different levels. And from an expert perspective, it illustrated how the expectations of the interaction both socially and academically might better be defined for

members of the network.

The differences between how some students and experts approached communication is perhaps striking when put in relation to the literature on the types of technologies that have facilitated student writing processes, as well as the role of online mentorship. First, mentorship entails a much broader base of support for students in which adults take a more active and nurturing role. When experts assumed this stance, it translated to not only more communication, but also more Social Presence, which eased into the facilitation of teaching argument through dialogue within the network. In such cases, the expert was more than just a reviewer of work (human replacement for automatic feedback tools), but a person with a shared interest in the topic and a deep tacit and explicit knowledge of argument, perhaps forming a type of "Pedagogy of Collegiality" as discussed by Chavez and Soep (2005). Past research in the informal uses of social networks in which social and targeted feedback are interwoven has demonstrated similar effects though within different genres (Black, 2007). This does not mean that those who included Social Presence were low in Cognitive Presence. Rather, experts evoked Social Presence to different degrees and with different tones. The degree that Social Presence influenced or fostered PDE on behalf of students is not completely clear based on the analysis. However, much of expert feedback related to Social Presence was definitely aimed at engaging students through conversation that was both informal and often inviting. It connoted interest in the student behind the words thus accentuating the extra social benefits of working within the network. They had the human touch.

5.1.2 Facilitating Cognitive Presence within a Learning Network

Between students, communication ran the gamut from pure banter to academic work with

focus, and the degree to which it reflected Social and Cognitive Presence largely depended on the curriculum activities in relation to the platform spaces. While group cohesion and open communication gained a greater share of Social Presence over time and became more reflective of the course work as the unit progressed, some areas of Remix proved more authentic, naturalistic, and academically oriented for communication, and this could shift depending on how the task was established and purpose it served. Often, it was the activity or practice that was being asked of students that made a particular digital space robust or flat. For instance, Discussion Boards and Comments proved to be relatively shallow when the artifact under consideration was provided as part of the curriculum and required a reaction. However, when the boards were used to share objects such as articles and cartoons, the postings were much more engaged, though the commentary thread that followed was relatively thin with only passing references to argumentation. This could have been a result of how the Discussion Board posts were treated in class. For instance, given that the boards were reviewed in class, students may have thought there was no need to dialogue about the post other than through comments of affirmation or support.

The amount of time given for responding could have been another factor. Or it could have been that the students were not pressed or expected to dive more deeply into the posted content. There was not a probing teacher or slightly antagonist voice to provoke conversation. Consequently, it was a lost opportunity to dig more deeply into the practices of argumentation, moving beyond "you need more evidence," to pointing to specific areas in which evidence would be helpful or reviewing the types of evidence might be beneficial. Experts modeled this (but toward the end of the unit), and they might have been leveraged more effectively within these spaces to question and complicate student feedback with the goal of having students think and consider each other's postings and commentary more carefully. Regardless of expert use, responding to work and nurturing online dialogue is

foreign territory for teachers and students. Teachers would benefit from learning how to manage discussion boards and other dialogical mediums in blended classes, and students should be given instructional modeling and provided with opportunities to practice this particular genre of academic discourse.

From a design standpoint, being aware of the trajectory of Cognitive Presence when designing and teaching in blended environments might prove beneficial to teacher practice and student learning since these markers help frame the intentions of the activities, especially if working in a project-based learning environment. It also highlights the general pacing of a unit and the proportions of student products devoted to certain tasks. While it would be incorrect to say that every unit should follow the same set trajectory in the same proportions of triggering, exploring and integrating, the practice of outlining the cognitive arc of the unit would potentially assist a designer in understanding where students are spending their intellectual energy as reflected in their products.

In the current unit, students spent a great deal of time exploring argument and issues with less time devoted to integration, and resolution never even factored into the curriculum goals. In retrospect, the exclusion of resolution seemed conspicuously absent given the goals of project-based learning, and integration seemed like it could have held a greater share of Cognitive Presence allowing students more time to write and revise. This point is particularly reflective of the context of the study and the unit being halted by two of the three teachers directly after expert feedback with little or no time devoted to unpacking the feedback in substantive ways or robustly revising text accordingly. What should have been at least a three-day activity was truncated to one with after school support. If more time was devoted to revision, integration would have risen substantially at the end of the unit and held a greater share of Cognitive Presence. Although such trajectories might simply be the result of talented teachers and designers who do their work well, Cognitive

Presence provides another lens through which to view units and to focus on how students respond to trigger, exploratory, and integration events over time. With an illustration of the footprint of Cognitive Presence, savvy educators and curriculum designers might begin to connect the various communication patterns to student success indicators and then change time accordingly for various phases on production…that is if teachers are allowed that type of flexibility.

5.1.3 Facilitating Expert Engagement in Argumentation through Productive Disciplinary Engagement

With Social and Cognitive Presence as a backdrop, expert feedback took center stage in the analysis and provided insight into how students were guided to think through argumentation. The breadth of the feedback cut across the components that foster PDE. By putting the components within the context of three feedback tasks that occurred at different times, they illustrated how problematizing and accountability shifted depending on the feedback task. For instance, complicating and questioning, the characteristic associated with problematizing, were most prominent in responses to students thinking through controversial issues for further investigation, thus illustrating how curricular trigger events were ripe opportunities to Problematize student thinking.

In contrast, accountability had a different trajectory. Accountability was very low in expert feedback on trigger events, as one might expect when students are just beginning to develop ideas for argumentation. Accountability rose dramatically as students became more versed in argumentation. By the third interaction, the experts' comments were overwhelmingly about directing students to disciplinary norms and how best to integrate ideas into a coherent and well-supported argument with a proper scope.

The other two components of PDE showed less variability between feedback tasks. The result may be because authority, as a construct, may be defined as more of a stance toward students and a trust in their capacity to tackle rich, relevant problems. Authority came through the positioning of students as experts, validating their voice, and giving them agency and license to carry out investigations as they saw fit. Authority was relatively high in response to the case study, in comparison to the final argument, its counter part. This difference might have been the foundation of the chi-square significance between the case study the final argument comments. One explanation for this might be because experts' recognized that students were still learning how to argue during the case study and praised them for their efforts in trying to understand and argue difficult controversies. Thus, experts legitimized students' efforts and encouraged them to continue their efforts. In comparison, the final argument acted as an artifact of student knowledge at the end of the unit. Thus, experts directed students more and held them accountable to disciplinary norms on the final in comparison with the case study. The component of resources was least referenced in expert feedback most likely because students were asked to do the research and find sources as part of the unit. Other resources, such as graphic organizers, were part of the curriculum.

The findings suggested that depending on the task and the location of the student in their learning trajectory, certain PDE components are more appropriate than others when responding to students. Additionally, two of the components, problematizing and accountability, were fairly malleable and were shaped based on the stage or phase of student learning and production. Triggering events seemed to be particularly potent for problematizing in expert interaction. The openness of the task supplied a clean slate from which experts could guide students in a natural presentation of ideas. They reacted to ideas and students' connection to them in service of fine-tuning a perspective. Accountability was

a strategy that served the purpose and expectations of the final argument since it directed students rather than opening up a lot of possibilities.

The elements of argumentation that were mentioned in the feedback and undergirded the PDE components reflected a shift over time. This shift illustrated how the disciplinary content of the feedback changed in tandem with the promptings associated with the components of PDE, particularly problematizing and accountability. For instance, problematizing during topic selection (a trigger event) consisted mostly of questioning and complicating student perspectives to make them arguable, narrow, specific, and nuanced. Experts articulated concerns about audience reception and opposing arguments. Later in the unit and in response to student writing, problematizing was tied to complicating students reasoning, as opposed to directing them to the right answer.

In contrast, accountability in feedback occurred mostly in the case study and final, which were products of integration, and consisted mostly of declarative statements about how and why to fix issues in the students' arguments. Issues with the integration of claims and evidence into the argument became more prominent, as did feedback on argument structure, style, tone, and word choice. While the feedback was related to the task and phase of writing the arguments, it also revealed the elements of argumentation that experts found in need of improvement in student writing. Thus, students received individualized attention based on perceived need. Acting as an authentic audience of student work, experts highlighted the area of argumentation they viewed as important to the success of the students work, thus giving merit to the idea that audience shapes the value of the argument (Eemeren & Grootendorst, 2004), and in this case, the audience tried to intervene accordingly based on their professional knowledge.

Besides the authenticity of an audience of experts, the value of this form of connected learning demonstrated merit. Although the situations described in the analysis

and the scope of feedback are likely to ring true with a good many teachers, perhaps even being considered "old hat," the amount and frequency of the feedback would likely be hard to match with one teacher to 150 students. Additionally, the explication of expert feedback might be of benefit to those less familiar with how to facilitate argumentation in class and how to guide students along the way. This point is poignant if we are to believe the reports of teachers' content knowledge in argumentation and time constraints (Hillocks, 2010; Shanahan & Shanahan, 2008; Kellogg & Whiteford, 2009). The trajectory from problematizing to accountability and the subsequent accentuation of elements of argumentation would be beneficial for thinking about how to shape instruction, approach peer-to-peer activities, and target various activities within the curriculum that might make use of social networking during writing processes.

The current findings have a place in relation to the literature on feedback and mentoring. Clearly researchers have looked at a number of variables related to the effectiveness of feedback within experimental conditions. For instance, they have looked at how lags in response time effect take-up, how positive versus critical feedback influences student performance, and how rating systems impact student work (see Hattie & Timperly, 2007). But this study was unique since it analyzed feedback in the natural context of classroom work and through they eyes of expertise rather than through student uptake. In doing so, it spotlighted how professionals who work with argumentation guide students, and it suggested that there is a progression for some of the components of PDE across time that were contingent on the task and phase of the project. It leads to more questions about how PDE might inform the generation of feedback, how to optimize feedback interactions, and what PDE components tend to be most useful in influencing student reaction to feedback. For instance, would feedback interactions be more or less effective if feedback high in accountability were stressed before problematizing (or vice versa)? Would

privileging accountability stifle student work at an early stage and would problematizing at a late stage be considered frustrating? Additionally, one might also ponder how the PDE framework might offer teachers a method for more actively thinking about the types of feedback they give students and when. Might the four categories provide a framework for the types of written responses that are given to students beyond when to give positive feedback and when to take out the red or blue pen? These questions in relation to PDE would shed new light on the nature of feedback and how it might best be framed in relation to student learning and how professionals might guide students.

5.1.4 Facilitating PDE through Academic Social Networks

The study suggested that online spaces need tending to facilitate PDE, and ideally, these interactions should occur naturally among students and between students and experts. Social Presence plays a part in this since it acts as the connective tissue to deeper communication and personal relationships. Networks need nurturing, and they are complex to grow. Promoting Social Presence through blended curriculum design and instructional practices can enliven the network, making it an active hub for productive and engaged interaction and disciplinary feedback. If not, these networks risk becoming just a fancy folder structure for retrieving content or a portfolio system by which to store work.

The results demonstrated that the academic vibrancy of a network seems to be dependent on or reflective of the interactions and practices that occur within it. If the activities that occur within the network are not trusted nor facilitated, modeled, monitored, personally connected, or referenced in class, they can suffer the fate of being just another thing teachers, students, and experts must take care of, or worse, ignore. Just as some experts tended to reach out to students in order to guide them appropriately and act as corroborators in the development of argument, it likely behooves teachers to be visible in

their online spaces evoking both Social and Teacher Presence—pedagogical lurking without engagement is not enough. That does not work in a live classroom, and it does not work virtually. Consequently, in conjunction with finding and implementing technology in the classroom, deep considerations must be given to the affordances of such environments and how best to nurture PDE within them. While it is easy to fall back on typical classroom talk in blended classrooms, the affordance of an academic social platform can amplify teacher goals. However, the teachers must be aware of how to create community within virtual spaces, less people lose out on the true benefits of technology investments.

From an instructional, blended-design perspective, the various areas within the platform should be assessed based on existing and potential classroom practices. Otherizing the technology as some sort of foreign space is not helpful. Instead, teachers can lessen their concerns about off-task online behaviors by giving clearly defined expectations, reminders of good citizenship, and random monitoring. They should also clearly evaluate how tools within the platform will function and how the tools might aid learning and leverage efficiency. Such an assessment would likely lead to a deep consideration of proactive practices that allow for a more fluid and deep exchange of ideas. For instance, what might be gained by leveraging discussion boards as part of class discussion and when might they be best used within? How might the board or comments areas be used to prime or follow up on class discussions? How might threads be instructionally facilitated and modeled so students feel invited to contribute beyond simply posting reactions? How might one dive more deeply into the discourse practices that are being learned in order to move students beyond responses like, “You need more evidence” or “I like how you say….”? As educational environments both digital and live become more commonplace, more consideration should be placed on their use in secondary education and teaching students how to respond with more specificity and thoughtfulness.

When working with groups outside of the classroom virtually, teachers would be aided by metrics to move the student/expert/mentor exchanges along. As mentioned, during the case study and final, there was a dropping off of experts. Given the shear number of experts and students in the system, it was difficult to track whether experts responded to students or if students sent the appropriate requests to the experts. The platform was not transparent enough for the operations to be tracked easily since there were no reporting functions built into this particular version of the network—a point later adjusted by the developers. While in-class tallies worked as a proxy, the practice of self-tracking became more muddled as the number of interactions increased. Hours spent going into the system to see which students sent work and received feedback became daunting, and while a 21st Century goal is to teach students to be proactive and self-sufficient in their communication with the outside world, this disposition does not happen automatically. It takes practice, and the appropriate technology can help foster the relationship as the teacher monitors the exchange to make it meaningful for the student and expert. Through this fostering and integration, PDE will likely take hold. Given the indicators and trajectory that was seen in this study, the use of PDE is helpful for guiding feedback and CoI is useful in thinking about course design and objectives as realized within the network.

5.2 Limitations

The study has several limitations that afford more opportunities for further research. First, the sample of 25 consented students, though produced through stratified random sampling, was still slightly skewed because of the consent process. It might be argued that those who agree to take part in the study and return forms are also more likely to be academically minded in general. Since an analysis was not done on students who did not consent, it is hard to tell if this set of students was less productively engaged in the

platform than consented students. Given the spread of the number of posts per students with some students not posting much and not working with an expert, there is some faith that the behaviors and experiences of the consented students is realistic and reflective of the experience.

Second, the study did not describe the impact of feedback on student work, the primary motivator for engaging with experts. While focusing on how experts fostered PDE is a strength of the study and makes it unique, there is a second half of the story that requires further investigation. Other analysis, outside the current study, illustrated growth from the case study to the final in the areas of organization and the use of evidence (McCutchen, Teske, Hung, Kuo & Evans, 2014). Also a third informal analysis showed students taking up easy and moderately difficult feedback. These gains and take up levels aside, the process of revision was cut short during the unit's enactment due to time. While students did engage with activities to understand and process the expert feedback, the revision process was not part of the students' grade, and it was relegated to an after school activity. Thus take-up of feedback was slight, moderate or completely neglected. By analyzing the impact of feedback, student work (or arguments more specifically) would be looked at more closely, something the current study does not do.

Third, the current study spotlights online postings for indicators of PDE. Posts included document storing, discussion threads, messages, and comments. Many of the posts were not dialogic in nature, but rather products of in-class activity, which involved both individual and group work. Consequently, the examples of PDE presented in the study are only half the story. A more rounded investigation would have looked at PDE as it occurred live in the classroom through conversation among students and teachers. Such an analysis would have likely clarified how blended environments function, how such systems volley between live and digital activities, and how PDE was nurtured or cut short as students

conversed across spaces. The analysis would have demonstrated the role of the teacher within the system, since in the current study, they did not have an online presence and were largely invisible. A natural, blended environment led without the hand of the researcher, may have also produced more activity, and hence presence, by the teacher since they would have had to direct and facilitated the network activities.

5.3 Opportunities for Future Research

Given the academic areas that the research study covered—feedback, high school argumentation, the use of experts, social media as a classroom tool, and established analytical structures being used in new ways—the research acts as springboard for a number diverse studies that could influence in-class decisions.

5.3.1 Classroom Practices

At a macro level, more information is needed on how teachers and students work in blended environments. While a number of models have been proposed (Staker & Horn, 2012), the practices in which teachers and students engage with content and each other in hybrid environments is largely unknown. Perhaps because there is not one model of blended learning, there is no road map to consider when deciding which form of blended learning is better than another. Nor is there much scholarship that details the practices within blended learning that are beneficial or fruitless. Guidelines would be helpful. As education invests in digital spaces and its practices become wired, educators will need more information on how to foster PDE through live and digital instruction, activities, and projects, which reflect how people construct meaning and collaborate in the world. By further analyzing how relationships and activities are formed and carried out across live

and digital spaces, greater insights on the relationships between Social, Cognitive, and Teacher Presence might reveal insights on how best to facilitate PDE.

5.3.2 Teacher Practices

Analyzing how teachers build and make sense of curriculum and their plans for guiding instruction within a blended space is also another area worth exploring. Given the affordances of academic social networks, how might teachers change the processes and steps they go through in building and facilitating content? While there has been a fair amount of research on teachers' dispositions to technology, there is less information on how teachers integrate technology and the processes they go through when thinking about how to leverage digital tools. For instance, some might think of technology primarily as a content resource while others might think of it as a tool of production or exchange. Teachers might also be swayed by their students' use of technology and try to leverage popular platforms. Other teachers might have a heightened awareness of data in relation to traditional assessments, engagement surveys, and metrics associated with platform use, and thus they might adjust practices accordingly. Other times, it might be they have little choice about the technologies they use. Understanding the teacher perspective toward and use of these tools would allow people to better anticipate how technologies are adopted in practice in educational spaces.

5.3.3 Student Practices

From the standpoint of student practices within academic social networks, more research is also needed to extend what is known about how social networks facilitate, extend, and amplify student voice and activities as they relate to learning. More specifically, further attention might be made as to whether networks assist students who are generally not

reached or whom others eclipse during live conversation or activities, thus providing them with an opportunity to have deeper engagement with others. Given what the data in the current study suggests about the benefits related to Social Presence, differences between engagement in live and online communication might illuminate how to best serve students based on their social-emotional and academic needs. By doing social network analysis coupled with survey, observational, interview, and academic data, a better picture of the influence social network facilitate PDE and for whom. While the current study, looked at how social networks foster PDE, more detailed information is needed about how various types of students communicate through these technologies and how their expectations of these tools match school-based learning. Such information would potentially lead to better personalization of learning and social experiences within classrooms.

5.3.4 Expert Practices

The use of experts within classrooms was a key feature of the study. However, an analysis of expert use and coordination was far from complete and leads to more questions for future research. While the feedback in the context of student arguments is of sound interest, the degree to which experts felt comfortable, flexible, and knowledgeable enough in taking on a pedagogical role was not explored within the paper's scope. With a nod to Schulman's (1986) concept of pedagogical content knowledge, experts likely have the proper knowledge base to give feedback on argumentation. However, they may not know the proper pedagogical moves needed to get the students on track. While passing glances of this disconnect were sprinkled throughout the analysis with examples of experts pushing students sometimes to ill-effect, the comfort level and success of experts taking on the teacher's role were not covered. Having teachers read and discuss the feedback might prove to be an interesting way to surface pedagogical disconnects between experts and students.

These points also relate to a key question about the students and experts buying into the relationship. While the expert presumably had an interest in helping the student since they volunteered, the meanings they attached to student messages and work altered how they built a relationship or not. For instance, experts' perceptions of how hard the student tried factored into their feedback according to interview data. When coupled with poor spelling and grammar, sometime because of ELL issues, experts misread student effort. Additionally, from the student perspective, future research will also look at how students viewed the experts. For instance, under what conditions, dispositions, and understandings might students take up the authority of an expert? When and why do they disengage with an expert? In observation and interview, these factors are related to disposition toward school, not being exposed to a culture of critique or even review, and not understanding the purpose of building a relationship with an expert. While some students seemed to understand the purpose of the expert, it totally confounded others despite direct talk about it. This understanding seemed to be more of a matter of discovery.

Additionally, within the research, the experts' relationship with teachers was not plumbed. How experts view the institution of school or the role of the teacher (or vice versa) was not revealed in the analysis. However, when considering how "live" volunteers are commonplace in many classrooms, how their contribution outside school ceremonies often go unnoticed, and how their tasks tend to be repeated or totally organic in response to the days events, one might wonder how the distancing effect of digital mediums effected expert motivation and commitment. For instance, did the experts believe their feedback task require their expertise to answer? Did their involvement provide them with a lens to see inside of the world of a teacher? Conversely, did teachers learn from experts? Did teachers view experts as more bother than they are worth? These are just few questions that might shed light on the perceived value of experts and how to facilitate work with outside group

through social networks within learning environments.

5.3.5 Social Media as Facilitator of Argumentation

While the last two years have produced more empirical research on the affordances of social media in schools (Greenhow, 2011a, 2011b), much more information is needed on how to effectively use them to reach learning goals. With regard to high school English Language Arts, there is little empirical research in which a teacher, curriculum developer, administrator, and even software developers might take hold in order to see the benefits of or advise them in using or designing such tools. While Beach (2011) offered up the use of role-play with in social networks to facilitate the learning of argument to good affect, more researched practices in the teaching of argumentation are needed, particularly with its emphasis in the Common Core. Social media platforms such as Facebook frequently house perspectives that run the gamut of quality. Mixed with unsubstantiated banter on current controversies are also posts that are backed with reason, evidence, and counter arguments, illustrating that the medium is ripe for argument through substantive dialogue, beyond "thumbs up" and "likes." Capturing what could be the lively spirit of online argumentation and nurturing the use of evidence and well-structured arguments, academic social networks hold a good deal of potential for learning, practicing arguments, and facilitating productive disciplinary engagement.

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APPENDIX

Appendix 1: Map of the Unit

Week	Focus	Key Activities
1	• Argument versus opinion • Elements of argumentation	• Watch Enrique Cerna video about evidence-based opinions • Think about arguments and opinions in everyday life • Use "time for telling" strategy to surface the parts of argument: perspective (thesis), reasons (claim), evidence, and counter arguments. • Search for perspectives, reasons, evidence and counter arguments in Teen Ink and ProCon.org
2-4	• Case Study – Islamic center near Ground Zero or race-based admissions to public schools	• Use Cornell notes to on a series of newscasts and mini-documentaries on the issue • Unpack the issues from editorial cartoons representing various perspectives and documenting background knowledge • Read and highlight for perspectives, reason, evidence, and counter arguments within various op-eds, blogs, and informational articles. • Read an argument from a prominent official, commentator • Craft an evidence-based argument on the topic • Engage assigned experts on topic ideas for final argument AND send them the link to a craft of the case study
4-5	• Research and source credibility	• Learn about, discover, and use research and quality sources • Build research bank as part of a team
5-6	• Final arguments	• Plan, draft, revise final arguments using classical argument structure
6-7	• Podcast	• Revise arguments • Understand podcast tone/style and create one

Appendix 2: Social Presence from Community of Inquiry Model

(Adapted from Shea, et al 2010)

Subdomain	Code	Definition
Affective	Expression of Emotions	Conventional expressions of emotion
	Use of Humor	Teasing, jokes, irony
	Self Disclosure	Details about life outside of class
	Use of Unconventional Expression	Unconventional use of punctuation
	Expressing Value	Expressions of personal values and beliefs
Open Communication	Continuation of Thread	Reply to a thread
	Quoting Other Post	References to other posts, directly
	Direct Reference to Another's Post	Make reference to other posts
	Asking Questions	Ask others questions
	Complimenting	Complimenting others
	Expressing Appreciation	Expressing appreciation to other within the platform
	Expressing Agreement	Expressing agreement with others
	Expressing Disagreement	Expressing disagreement with others
	Personal Advice	Offering advice, outside of academic work
Group Cohesion	Vocative	Referring to people by name
	Inclusive Pronouns	Address the group as we, us, our
	Greetings/Salutations	Express greetings
	Social Sharing+	Sharing links and other materials
	Anticipation*	Reference to upcoming events
	Clarification*	Asks for clarity
	Encouraging*	Encourages others
	Requesting*	Requests something from someone else
	Group and Self Discipline*	Reminders to the group or one's self

* added to the coding structure; + altered to fit context

Appendix 3: Cognitive Presence from the Community of Inquiry Model

(Adapted from Shea et al. 2010; Garrison et al, 2000)

Subdomain	Code	Definition
Trigger Event	Recognition of a problem, issue	Presenting background information
	Puzzlement about a problem, issue	Asking questions or pondering about topic
Exploration	Exploration within the online community	Exploring a topic by sharing different ideas with a group through active and passive dialogue.
	Exploration within a single post	Different ideas presented in a post
	Information exchange	Share personal stories, as well as resources
	Suggestions for consideration	Explicit reference to the exploring either in group or individually
	Leaping to conclusions (taken out)	Offers unsupported opinion
	Consolidating ideas	Accumulating ideas through dialogue
Integration	Integrating ideas from a single prompt	Justified, developed, defensible, yet tentative perspective
	Synthesizing/connecting ideas	Integrating information from more than one source
	Drafting arguments	Writing using a structure with the intent of it being read by an audience

Appendix 4: Productive Disciplinary Engagement Components and Elements of Argumentation

(PDE from Engle & Conant, 2002)

Domain	Code	Description
PDE	Problematizing	Students are encouraged to take on complex problems
	Authority	Students are positioned as experts given the agency to explore and take intellectual risks
	Accountability	Students are held accountable to the norms of a discipline and to others
	Resources	Students given the proper resources
Writing Argumentation	Word Choice/Style/Tone	Related to word choice, clarity/appropriateness, loaded language/dog whistle
	Phrasing/Grammar/ Spelling	Awkward phrasing, issues of grammar, usage, mechanics
	Audience Reception/Social Relevancy	Mention of audience/reader expectations; likes/dislikes; guiding; addressing; AND the work in relation to greater society
	Relevancy to Self	Mention the writer's personal connection to the work
	Thesis/Perspective	Addresses the writer's thesis, point of view or perspective
	Claim/Evidence/ Warrants	Addresses the logic of the argument as it relates to claim, evidence, warrants
	Qualify/Narrow/ Specificity	Whittling, sharpening or honing to make more clear, precise
	Counter Argument	Address counter argument or opposition and how to handle
	Structure/Organization	Mentions overall or paragraph structure or organization
	Resources/Credibility	References the resources that were used or not; makes suggestions or points student in a direction; can mention credibility of the resource