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Web Annotation in English Language Arts:  
Online Dialogue as a Platform to Support Student Comprehension of Texts

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy in Curriculum and Instruction

by

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July 2020  
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This dissertation is approved for recommendation to the Graduate Council.

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## **Abstract**

This study explores how web annotation—through a process of online reading, writing in the margins, and replying to others’ comments—influences student dialogue in ways that research suggests are associated with improved comprehension. Viewing data through a dialogic lens, and using a qualitative, multiple case study design to observe two high school English Language Arts teachers and their students, this inquiry was guided by the following research questions: (a) How do English Language Arts teachers use web annotation to support student comprehension of texts? (b) To what extent, if any, does web annotation appear to support student comprehension of texts? and (c) How do English Language Arts teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?

Both teachers in this study implemented web annotation practices with hopes of getting their students to engage in meaningful dialogue about texts, and that goal was evident in how they structured web annotation activities so students could drive the discussion and how they both tried to build upon students’ online discussions during subsequent face-to-face (F2F) class discussions. Despite such dialogic intentions, analysis of web annotations based on indices associated with high-level thinking and textual understanding revealed that, generally speaking, web annotation discussions did not exhibit rich dialogue. Additionally, there was a widespread lack of textual connections—annotations that connected a text to other texts, to the reader’s emotions or personal experiences, or to experiences the students shared as a class—evident in students’ annotations. However, discussions in which the teacher gave specific requirements for the number of annotations and replies and provided specific writing prompts tended to result in a higher prevalence of the indicators related to increased textual understanding. Although web annotation did not generally result in a substantial increase in these measures, findings revealed

that students found great value in seeing and being able to interact with their peers' thoughts about texts and that teachers saw enough benefits for student learning that they planned to continue its use going forward.

Recommendations invite teachers to explore ways to establish a dialogic culture in their classroom and to make intentional decisions for inclusion of web annotation—or any other digital tool—based on sound pedagogy and on the learning goals they set with their students; approaching technology implementation in this way places teachers and pedagogy at the center of the process, helping them to leverage the affordances digital technologies provide.

Recommendations for future research include focused examinations of (a) the thinking and composing processes students undergo as they annotate on the web; (b) the impact web annotations have on specific learning outcomes, potentially using comprehensive reading comprehension assessments; and (c) methods for web annotation use in elementary, higher education, or adult learning settings.

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## Acknowledgements

I remember sitting down with two of my closest English teacher friends, David and Blake, during our time teaching in the same high school several years ago, and one of us suggesting that maybe we should get a PhD. I think someone jumped straight to a triple-dog dare, and the rest is history. To both of you, I am forever grateful for your friendship and I will always cherish and draw upon the memories I have of our time at Fremont High. To Mike, my master's advisor, I owe more to you than I can say here. Thank you for lifting my career off the ground. Your selfless examples of love and sacrifice, both academically and personally, are unmatched. Go to the opera on me (do you have Venmo?). To Seth, Matt, and Will—the PhDudes-turned-PhDads—as we sat in class together these four years, I have consistently felt like I was just a tiny bit dumber than each of you, and that has pushed me to work harder and to be better. I know you will all have success wherever life takes you. To Sean, you have set the gold standard for quality research, writing, teaching, and advising. I am forever indebted to you for taking me under your wing and for your feedback throughout this process that has nudged me to think and write on a higher level. Let's go fishing soon. Chris, thanks for teaching me to “punch the keys!” and to #CESOTW. Vicki, I have never learned more as a student than I did in your classes. And finally, to Sarah: your constant support has lifted me up during the lows, kept me working through the highs, and given me purpose in all I do. Consider this a coupon for three free diaper changes at a time of your choosing.

## **Dedication**

*To English teachers,  
for your tireless efforts and the love you show to students.*

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## **CHAPTER I: INTRODUCTION**

The use of technology in its various forms in education seemingly becomes more prevalent with each passing year, and digital tools are becoming increasingly advanced and accessible, so research that explores the potential roles of such tools in teaching and learning is increasingly valuable. As our world becomes more connected through, and in some ways transformed by, digital tools, it is important that educators prepare students to locate, critically evaluate, synthesize, and communicate information using digital resources (Leu et al., 2011). This emphasis on (and belief in) the importance of digital literacy—defined here as the ability to use digital technology to find, evaluate, and communicate information in purposeful ways—was a catalyst for this study, “Web Annotation in English Language Arts: Online Dialogue as a Platform to Support Student Comprehension of Texts,” which explores the role of web annotation in supporting English language arts (ELA) student comprehension of texts by examining its role in mediating dialogic learning.

### **Statement of the Problem**

Considering the myriad ways in which people interact and converse online, there is a need to more fully understand and employ effective principles for learning in digital environments. Within ELA classes—specifically when reading and discussing texts—there is a strong social dynamic, even if this involves a transaction between a single reader and text (Rosenblatt, 1994). For these classes, which often focus on improving and enhancing reading comprehension and critical thinking skills, the reading process could benefit from becoming more social and more dialogic (Applebee, Langer, Nystrand, & Gamoran, 2003).

Dialogic learning is a process in which students’ comments build upon, extend, challenge, or clarify earlier comments and which strives to ensure that a variety of voices are

heard (Bakhtin, 1981; Fecho & Botzakis, 2007). Put another way, dialogic learning occurs when teachers and students engage in consistent reflective conversations about texts (Fecho, 2011). Although not an essential element of dialogic learning, technology can play a helpful role in the process; digital tools can help facilitate, augment, or even transform the ways in which students and teachers converse about texts, thus supporting social construction of knowledge and creating an environment in which students work toward deeper, more nuanced, more critical textual understandings.

### **Purpose of the Study with Theoretical Framework**

The overarching purpose of this multiple case study was to investigate how web annotation—through a process of online reading, writing in the margins, and replying to others’ comments—influences student dialogue in ways that research suggests are associated with improved comprehension. Web annotation uses internet technologies that enable users to annotate online texts, to see others’ annotations, and to converse with each other through their writing in the margins. To accomplish the goals of this study, I (a) observed how teachers structured and implemented web annotation activities in their instruction, (b) assessed the quality of comments students contributed within the annotation tool using discourse features that research associates with improved comprehension and high-level thinking, and (c) examined student and teacher perceptions of the usefulness of web annotation.

### **Research Questions**

The following questions guided my inquiry throughout this study and informed my choice of instruments, participants, settings, and sequence of data collection phases:

1. How do ELA teachers use web annotation to support student comprehension of texts?

2. To what extent, if any, does web annotation appear to support student comprehension of texts?
3. How do ELA teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?

I framed this study with Bakhtin's (1981) theory of dialogism, which provided a lens through which I analyzed annotations, observed classroom activities, and conducted interviews. Related principles from Vygotsky's (1978) sociocultural theory and Piaget's (1985) cognitive development theory helped to shed light on the relationship between dialogic student talk and reading comprehension. These theoretical foundations thereby provided the backdrop for my investigation of how or whether dialogic features that research associates with productive classroom talk could be transferred into online settings. Specifically, my study investigated one specific avenue for online discussions—web annotation—to understand its potential role in supporting student comprehension of texts through written dialogue. These concepts, in connection with my research questions, informed my methods and instruments, providing rich data for analysis and alignment across all phases of the research.

### **Bakhtin's Dialogism**

The theoretical foundation for this study came from Bakhtin's (1981) work on dialogism. This theory suggests that people learn through participation in social interaction and come to reason and understand through dialogue. Central to dialogic conversations is the assumption that we reason in response to something that someone else has already said and that we negotiate meaning by participating in discussions with people of varying perspectives on the topic at hand. In essence, a dialogic stance suggests that new ideas and understandings are generated as a variety of voices are given space to contribute different perspectives. Sociocultural theory shares

related ideas about learning, such as the notion that speech is a mediational tool for learning and often aids learners in the development of cognitive reasoning as they articulate undeveloped thoughts (Vygotsky, 1978). Viewing speech—especially written speech—in that way, digital platforms that support web annotation can provide spaces for students to produce and share meaningful ideas and engage in dialogue as defined by Bakhtin (1981).

Substantial research (e.g., Alexander, 2008; Applebee et al., 2003; Fecho & Botzakis, 2007; Juzwik, Borsheim-Black, Caughlan, & Heintz, 2013; Mercer & Dawes, 2014; Nystrand, Gamoran, Kachur, & Prendergast, 1997; Soter et al., 2008) has investigated dialogism in classroom settings, and a thorough treatment of those (and other) studies is offered in Chapter 2. These studies provide valuable insights into characteristics of dialogic classrooms and pedagogical moves that teachers can make to facilitate dialogue with their students. In this study, I sought to examine how the principles of effective dialogue as described by these researchers could be implemented in online settings.

### **Online Student Dialogue**

Although various digital platforms have dialogic potential, the realization of such depends upon the manner in which they are implemented in educational settings. My study was informed by research on online dialogue that examines students' online discussions and which identifies pedagogical practices or types of learner interactions thought to support dialogic learning (e.g., Hrastinski, 2008; Kim, Anderson, Nguyen-Jahiel, & Archodidou, 2007; Larson, 2009; Turner, Abrams, Katic, & Donovan, 2014; Uzuner Smith & Mehta, 2013; Wang & Woo, 2007).

My study investigated how teachers and students in ELA classes used web annotation as one such platform to support dialogue about texts. In doing so, I was interested in understanding



how students navigated textual understandings as they read and responded to each other's written thoughts. I also sought to understand how teachers can guide students' use of web annotation, structure online discussions, and bring online comments into the physical classroom setting. Viewing these learning activities through a dialogic lens allowed me to assess the extent to which web annotation supported student comprehension of texts.

### **Research Rationale**

As noted above, extensive research has been conducted on the role of student dialogue in supporting learning; to date, however, this research has tended to focus on face-to-face (F2F) discussion. As advances in technology make it easier for teachers and students to interact with one another and exchange ideas in digital environments, more research is needed on the impact of discussion in online settings (Uzuner Smith & Mehta, 2013). This research helps to address that gap by observing examples of online student interactions and assessing the role that web annotation can play in supporting learning. Moreover, there is a general lack of research on web annotation in high school settings (Novak, Razzouk, & Johnson, 2012). Recognizing such gaps, this study offers valuable descriptions of teacher and student perceptions of the effectiveness of web annotation in supporting their learning goals.

The primary goal of this research study was to more fully understand whether and how web annotation can support ELA student comprehension of texts by examining its role in mediating dialogic learning, wherein student comments build upon previous comments. As such, my findings do not necessarily result in a determination as to whether web annotation should be used in classrooms; rather, this research study provides rich description of two classroom cases as examples of how teachers can implement web annotation with their students to work towards increased textual understanding through dialogue. The study explored deeply the ways that

students responded to and interacted with digital texts in an effort to help teachers identify pedagogical practices they can utilize to help students become more critical readers and participants in discussions of text.

### **Overview of Research Method**

I employed a multiple case study research design (Stake, 2008; Yin, 2014) to attend to my research questions and purposes. My goals for the study were addressed using qualitative data that investigated deeply the classroom contexts, teacher expectations for web annotation, and student and teacher perceptions of the role of web annotation in supporting learning. I also gathered data that described general trends in the frequency and length of student annotations across texts. Through the methods described in detail below, I sought to produce more meaningful, rich, and trustworthy data for analysis from the two cases under study.

In emphasizing qualitative data, I recognize the need to be introspective and transparent with my personal research philosophies and biases and how they might have impacted the instruments I chose, the observations I made, and the focus of my discussion. As an element of that transparency and introspection, and to provide context for the framework and methodology I chose to employ, the following presents a description of my views of education and research as they related to this study.

### **Researcher Reflexivity**

I align my research philosophy with elements from two major paradigms in educational research: social constructivism and pragmatism. Aligning with a social constructivist perspective, I believe that people's realities are co-constructed through interactions and experiences with others (Guba & Lincoln, 1989). As a result, I seek to work closely with

participants to identify personal experiences that have helped shape their realities, and I openly discuss the values and ideologies that guide their decision-making.

Within the classroom context, a pragmatic paradigm keeps me consistently focused on what works for teachers—and I value that greatly as both a researcher and an educator. Pragmatists seek “actionable knowledge of direct practical value in the context being studied” (Greene & Hall, 2010, p. 138). As a former high school English teacher focused on helping students to develop their critical reading and thinking skills, and now as an English education researcher interested in exploring effective practices in ELA instruction, my research centers on the processes, activities, and tools that support students’ literacy development. More narrowly, I am drawn towards research that examines the use of technology in K-12 schools to understand the different ways in which teachers and students are utilizing digital resources to more effectively consume and produce texts, both in alphabetic and in multimodal formats.

This study was driven by that focus and was further narrowed by my specific interest in understanding how principles of effective classroom discussions can be implemented in online settings. Because relatively little research has been conducted on web annotation in secondary classrooms, this study illuminates potential methods of implementing web annotation or similar digital practices in pursuit of student dialogue that is associated with increased reading comprehension and high-level thinking.

Anecdotally, as I reviewed existing research to gain a deeper understanding of web annotation and its potential relevance to the classroom, and as I observed it in action through informal experimentation with my own students, it was unclear exactly how effective it was as a tool for facilitating dialogue and supporting textual understanding: in the online discussions that occurred in my classes, I wondered whether students were engaging with each other’s ideas and

replying to each other or simply sharing their own disparate thinking for the purpose of completing an assignment; I lacked a framework for evaluating the quality of their thinking and group interactions; in short, I wanted to know whether web annotation was beneficial for students. These questions that I confronted throughout my experiences as an instructor using web annotation led me to design this study and helped to shape my specific research questions. Because my inquiry explored how ELA teachers use web annotation to support student comprehension of texts, I positioned myself as an observer and not an active participant in implementing or facilitating web annotation activities. Both teachers made all pedagogical decisions throughout the study. My only involvement with the students at large was to give initial instructions on how to set up Hypothesis groups, how to activate the Chrome extension on their computers, and how to actually highlight and annotate texts—and that involvement was at the request of the teacher. Outside of that exception, I was strictly an observer in the classroom setting.

### **Participant Selection**

Participants for this study were comprised of two English teachers and 60 high school students in two school districts in the southern United States. As a framework for considering overall research design and specific strategies for gathering data, I used Collins' (2010) description of purposive sampling. Using this method, a researcher (a) makes decisions about samples based on a concurrent or sequential design, (b) identifies the relationship between samples and strands of data, (c) considers combining sampling schemes based on the expected generalizations from the study, (d) ensures the various types of data collected will address all research questions, and (e) determines the emphasis placed on each type of data in forming eventual inferences and implications from the study.

To address the first criterion for sampling—and to move the study forward in addressing my research questions—I used a sequential design, in which data from each phase of the study inform the successive stage. In my case, the sample I selected for the first phase of the study consisted of all participants, and the descriptive strand of data from the survey and annotation analytics helped to inform the subsample chosen for the second phase of data collection. I placed emphasis on the qualitative strand of data as the primary source of rich descriptions that made up the bulk of my analyses and discussions. The following section gives an overview of the instruments I used and my process for data collection and analysis.

### **Instruments and Data Analysis**

Data collection for this study took place between August and December of the Fall 2019 semester. Data collected for the study included (a) all written annotations teachers and students generated using the tool, (b) field notes from classroom observations, (c) student responses to a survey, and (d) semi-structured interviews with teachers and students conducted at multiple points in the study.

**Annotations.** Students in each class annotated eight texts throughout the semester using Hypothesis, a web-based annotation tool that allows readers to highlight and annotate digital texts while viewing and responding to others' annotations. Founded upon the research-based link between student comprehension and dialogue (Bakhtin, 1981; De Lisi & Golbeck, 1999; Piaget, 1985; Wertsch, 1991), I gathered and analyzed all participants' annotations within Hypothesis and used the following research-warranted indices of student learning and comprehension: Authentic Questions; Uptake; High-Level Thinking; Affective Response; Intertextual Response; Shared Knowledge Response; Elaborated Explanation; and Exploratory Talk (Soter et al., 2008; see Table 2 in Chapter 3 for a description of each of these categories). Using these categories, I

coded student-generated annotations and counted the frequencies of each of these indices to infer the extent to which the online discussions appeared to support high-level thinking and comprehension. These data were crucial to my investigating the role of web annotation in supporting student understanding of texts.

**Field notes.** Field notes written during classroom observations helped to explain how teachers prepared students to participate in the web annotation process, the role that annotations played in the teachers' instructional practices and discussions with students, and general perceptions of how web annotation appeared to support text comprehension. As I observed each classroom four times each month, my field notes focused on both the shape and role of discussion in each classroom, providing valuable context for understanding the nature of discussions that occurred via web annotation.

**Survey of student perceptions.** In October, during the second month of the study, I administered a Likert-scale survey to students that was intended to elicit their perceptions of the impact of web annotation on their comprehension of texts (see Appendix A). These descriptive data offered a snapshot of overall impressions from the whole sample of students and allowed me to identify students who felt like they strongly benefited from the annotation process, students who felt like they did not benefit much, and students somewhere in between. I then used purposive sampling (Collins, 2010) to select a sample of three students from each class to interview about their experiences with web annotation. This method of sampling allowed me to capture and represent a broad range of perspectives.

**Interviews.** Over the course of the study, I conducted a series of semi-structured interviews to facilitate a deeper understanding of student and teacher perceptions of web annotation and the extent to which it supported textual understanding. I interviewed each of the

two participating teachers a total of three times. The first teacher interview took place prior to the start of the school year and focused on how the teachers expected to implement web annotation with their students (see interview protocol in Appendix B). It also probed the role that the teachers perceived discussion typically played in their instruction, offering context for my classroom observations and my analysis of student-generated web annotations. The second teacher interview took place toward the end of October, the second month, and followed up on their expectations and goals for using web annotation. This interview also probed the teachers' perceptions of the role that web annotation had played in supporting students' comprehension of texts to that point (see interview protocol in Appendix C). The third teacher interview took place in December, at the end of the fourth month, and provided a final snapshot of their perceptions of the usefulness of web annotation in supporting student comprehension of texts (see interview protocol in Appendix D).

As previously mentioned, I also conducted interviews with a subset of students to investigate their perceptions of the usefulness of web annotation in supporting comprehension of texts (see interview protocol in Appendix E). The student interviews took place in December, at the end of the fourth month. All interviews with teachers and students were transcribed in their entirety, coded, and analyzed using open and axial coding (Strauss & Corbin, 1990). These interview data were then analyzed in connection with the student-generated annotations in Hypothesis, field notes, completed student surveys, and descriptive analytic data.

### **Assumptions**

Because this study involved analysis of qualitative data, it is assumed that findings are bound to the cases from which they emerged. In other words, the interviews and classroom observations produced data that helped me to understand how the participants in this study

utilized web annotation, and whether they perceived it as having influenced their understanding of texts they read. The assumption was that students and teachers gained enough experience with web annotation throughout this study that they could share valuable data through interviews. It also assumed that they were honest in their reporting, both during interviews and in their written responses to the survey questions.

### **Limitations**

Because this study involved a small sample of students and teachers in particular contexts, generalization across all settings is not assumed. The data, through naturalistic generalization (Stake, 1995), can inform educators in other areas of the country or world, but they do not necessarily suggest replicability across all contexts and settings. Still, it is hoped that making the research methodology that I employed transparent and offering readers thick descriptions (Geertz, 1973) of the contexts in which my study took place allows other researchers and educators to gauge the applicability of my findings to other settings.

### **Conclusion**

In the next chapter, I review the body of literature that informed my study. I explain foundational principles of dialogue and, according to research, how they relate to traditional classroom discussions. I then provide a review of studies that highlight dialogue in online settings, followed by an overview of web annotation research. Finally, in light of the research in these areas, I explain the need for my study.



## CHAPTER II: LITERATURE REVIEW

As society is increasingly inundated with new technological devices, platforms, and processes, it is imperative for educators to consider the reasons for implementing (or not implementing) technology in their classrooms. Many school districts in the U.S. have dedicated significant financial resources and large amounts of time to the adoption of digital devices and platforms, but Philip and Garcia (2013) caution against the dangers of a simplistic “just-add-technology-and-stir” (p. 316) approach to implementing educational technology. Research problematizes the assumption that digital technology is inherently transformative for learning or that digital activities are inherently engaging for students in our modern, mobile world (Howard & Yang, 2016; Margaryan, Littlejohn, & Vojt, 2011; Wang, Hsu, Campbell, Coster, & Longhurst, 2014; Warschauer & Matuchniak, 2010). In essence, Philip and Garcia (2013) assert that perfunctory adoption of digital tools can hinder quality teaching:

While we agree...that schools must be more responsive to the possibilities afforded by new technologies and that the very structures of schools and classrooms must transform to truly leverage these capabilities, we are critical of the tendency to assume that technology will fantastically solve the intricate problems of schooling. (302)

They extol the central importance of pedagogy, of the teacher’s role as designer, facilitator, mentor, mediator, and evaluator throughout the learning process. In this light, research into a specific technology tool should focus on “an explication of its particular affordances within a classroom context” (p. 310). Philip and Garcia suggest the following three “Ts” as criteria that researchers and teachers can use to evaluate potential learning benefits from the digital platforms they are considering: text, tools, and talk. What types of new or transformed texts does the technology introduce to students? How might the tool transform the way that students collect, represent, interpret, or communicate information and make meaning? And finally, how can educators support the kind of productive student talk that leads to learning through technology?

Those three “Ts” and the respective questions they provoke helped to guide this research study, which responds to Philip and Garcia’s (2013) call for research that offers “a candid assessment of [a digital device or platform’s] potential and limitations in facilitating rich learning” (p. 302). The purpose of this study was to investigate how web annotation—through a process of online reading, writing in the margins, and replying to others’ comments—influences student dialogue in ways that research suggests are associated with improved comprehension.

An understanding of the connections among student dialogue, online discussions, and web annotation processes necessitates a description of the various concepts and theories involved and an overview of existing research. In this chapter, I first introduce the concept of dialogism and examine how it applies to learning in a classroom, identifying the benefits and challenges associated with dialogue in traditional F2F educational settings. Next, I offer a more focused review of research that examines how teachers and researchers have cultivated student dialogue in online environments. I then define reading comprehension and offer a theoretical warrant for linking it, as well as high-level thinking, to dialogic discussion. The concluding section details existing research of web annotation across educational settings and discusses potential gaps in the literature that my study sought to address.

## **Learning through Dialogue**

### **Bakhtin’s Dialogism**

The idea of dialogism as something different from—or more than—simple conversation can be attributed in large part to the work of Bakhtin (1981). His work focuses on learning through participation in social interaction and assumes that everything we think or say, as manifestations of learning, is inherently dialogic; thinking and knowing occur through dialogue. Dialogic conversations involve students reshaping, or reconsidering, the meaning(s) of texts as

they present them in the light of their own understandings, contexts, and purposes. As opposed to a transmission model of learning, where a single expert presents knowledge to a group of learners, dialogism promotes the coexistence of various perspectives that are of equal importance and which come in contact with each other in the course of a conversation. The plurality of contexts, voices, speech genres, languages, and worldviews in which our utterances are embedded is called *heteroglossia* (Bakhtin 1981). Also referred to as polyphony (a term borrowed from the field of music), the multi-layered, context-dependent nature of heteroglossia signifies a multiplicity of voices “coming together to create meaning and foster understanding” (Collet & Ciminelli, 2017, p. 243), suggesting that new ideas and understandings are created as a variety of voices are given space to participate in learning dialogues. Bakhtin asserts that “truth is not born nor is it to be found inside the head of an individual person, it is born between people collectively searching for truth, in the process of their dialogic interaction” (1984, p. 110). The plurality of voices and the negotiated search for, or construction of, truth through dialogue is central to Bakhtin’s theory.

Bakhtin’s (1981) theory of dialogism contends that when people reason, it is as a response to something that someone else has already said. In this way, others’ voices are always embedded in what we say, think, and write; when we join a conversation, our thoughts are inextricably linked to previous conversations. Past utterances inform current ones; current dialogues extend, enhance, or reshape previous understandings, while at the same time providing a foundation for new understandings. Although language operates within *centripetal* forces that pull linguistic markers and speech genres inward to formal rules and processes, *centrifugal* forces of language operating in heteroglossia serve to deepen, widen, and stratify understanding and overall learning (Bakhtin, 1981).

Bakhtin describes dialogue as either external—between two or more people—or internal—“between an earlier and a later self” (Bakhtin, 1981, p. 427). Internal dialogue involves the development of one’s ideas about the world or about specific concepts in dialogue with authoritative discourse, essentially coloring our utterances with the utterances of others (Bakhtin, 1981). An individual’s internally persuasive discourse informs, and is informed by, his or her external dialogues; people reshape and hone their past understandings as they share them with others and consider alternate viewpoints. Although language is, in this sense, dialogic in nature, classroom discussion is often monologic (Nystrand, Gamoran, Kachur, & Pendergast, 1997), reflecting a singularity of viewpoints and a belief that knowledge can be transmitted from one person to another. When this is the case, rote recitation, rather than rich meaning making that occurs through internally persuasive discourse, is the norm (Greenleaf & Katz, 2004).

As learners engage in the struggle—the constant tension—between internally persuasive and authoritative discourses, they experience ideological development, an “ideological becoming” (Freedman & Ball, 2010), as they seek for understanding among various points of view and across various contexts. When given space for this development in educational settings, ideological becoming results in a widening or deepening of overall understanding, results in no final word, and reveals “ever newer ways to mean” (Bakhtin, 1981, p. 346).

Discussions that allow room for exploration of thought and negotiated understanding can expand thinking and result in co-construction of knowledge (Bakhtin, 1981). Vygotsky (1978) posits that speech not only accompanies learning but often *is* learning, because undeveloped thoughts can be shaped and clarified as speakers articulate them. Moreover, he viewed written speech as a powerful tool for learning, especially in young children; as they develop the ability to

understand written language, letters and words on a page become more than just symbolic representations of oral language—they transform the learner’s world. According to Vygotsky:

Written language becomes direct symbolism that is perceived in the same way as spoken language. We need only to try to imagine the enormous changes in the cultural development of children that occur as a result of mastery of written language and the ability to read—and of thus becoming aware of everything that human genius has created in the realm of the written word. (p. 116)

When one views written speech from this perspective, it is possible to understand digital programs or platforms as spaces where students can produce and share meaningful ideas and engage in dialogue as defined in this section. This research study sought to understand how ELA teachers used web annotation as one such platform for dialogue, allowing students to negotiate textual understandings as they read and responded to each other’s written thoughts. It also aimed to examine how teachers guided students’ use of web annotation, structured discussions, and brought online comments into the classroom setting.

### **Research on Dialogue in Traditional Classroom Settings**

Various educational researchers have drawn on Bakhtin’s theorization of dialogism to explain what *dialogic teaching* is and to describe the shape it takes in classroom settings. Mercer and Dawes (2014), for example, define dialogic teaching as a process wherein teachers and students engage in discussion that helps drive student thinking forward and which positions students in an active speaking role. Alexander (2008) adds that dialogic teaching involves more than just speaking; he asserts that it provides space for students to question, to explore, to suggest ideas which are then responded to and built upon by the teacher. These discussions are highly contextual and connected to students’ cultural understandings and lived experiences. In a dialogic discussion, students compose responses to each other while considering various perspectives, with the understanding that “learning is under construction and evolving rather than

being reified and static” (Fecho & Botzakis, 2007, p. 550). The understanding that dialogic discussions evolve, and that teachers should strive to situate instruction within students’ lived experiences, suggests that dialogic learning is driven by students who are thinking actively and flexibly. The following research provides examples of dialogic learning environments that may necessitate a shift in how teachers think about their students and how they approach classroom talk.

**Dialogic learning.** Reflecting sociocultural principles of learning, dialogic teachers cannot view themselves as having ultimate possession of and control over knowledge; instead, they allow students to co-construct and reshape knowledge in their interactions with them and with each other (Freire, 1970). This supports a perspective of learning in which expertise and authority are distributed more evenly among teachers and students in learning settings (Lankshear & Knobel, 2007) and promotes active participation and engagement from students as opposed to passive reception of knowledge. A teacher’s role in dialogic teaching is thus to stimulate dialogue, to structure and facilitate discussion, and to encourage participation and engagement (Alexander, 2008; Teo, 2016). Dialogic teaching helps students learn not *what* to think, but rather *how* to think (Reznitskaya et al., 2009), emphasizes depth of learning over breadth (Applebee, Langer, Nystrand & Gamoran, 2003), and is interactive and egalitarian in nature (Teo, 2016).

Student speech, both written and spoken, can be either designative, a sign from which we can make meaning, or expressive, a tool that helps transform rough thought into meaning (Wertsch, 2000). When student speech results in ideas formed in the context of their own lives and experiences, it can be a tool to stimulate new thinking in others (Smagorinsky, 2013). As students process thought through conversation, they are likely to make meaning—especially

when engaged in dialogue where comments build upon, extend, challenge, or clarify earlier comments and in which all voices can be heard and acknowledged (Bakhtin, 1981; Fecho & Botzakis, 2007).

A classroom comprised of unique individuals from different backgrounds and with different beliefs and abilities is a potentially fertile learning environment. Conceptual conflict among a group of diverse discussants often leads to collaborative learning (Mercer & Howe, 2012). Likewise, actively negotiating meaning involves a combination of giving and taking, extending, redirecting, dismissing, reinterpreting, modifying, and conforming (Wenger, 1998). This type of environment, one that welcomes student verbalization of in-process thinking, may necessitate a conscious effort by the teacher to talk less. If classroom talk is always dominated by teachers or is only facilitated through the use of “test questions” (i.e., questions that allow for only one correct answer, thereby maintaining teacher control of the discourse; Christoph & Nystrand, 2001), students logically will search for *the* correct answer or simply try to guess what the teacher is thinking. Exploratory discussions, on the other hand, seek to broaden student thinking and allow for reasoned subjectivity (Mercer & Howe, 2012). This notion is supported by Graseck (2009), who argued that students should be regularly exposed to multiple perspectives based on credible information and encouraged to wrestle with ideas respectfully so as to formulate their own conclusions on a topic.

In an ethnographic study that examined open-ended, exploratory F2F discussion of literature in English classes, Miller (1995) concluded that student-driven discussions fostered creative and critical thinking, resulting in new and complex understandings of the text under study. Because texts are open to multiple interpretations, discussions included various conflicting perspectives and possibilities. As students participated in the F2F discussions, they were able to

find and support their own stance within these various perspectives (Miller, 1995). In a dialogic classroom, students and teachers have the opportunity to learn from each other and discuss topics in a safe space to help broaden and diversify their thinking, ideally allowing them to participate in more respectful, and critical, civic dialogues when they finish school and enter into adulthood.

The aforementioned research presents dialogic teaching and learning as a process, that is, as a set of beliefs, practices, and procedures that deepen and enrich student learning. Measurable outcomes, including an increase in reading comprehension levels, have been shown to improve as a result of participation in dialogue that follows the principles outlined above

(Anagnostopoulos, Smith, & Nystrand, 2008; Applebee et al., 2003; Mercer & Dawes, 2014; Nystrand et al., 1997; Nystrand & Gamoran, 1991). Notably, “non-mainstream students—low achievers, children experiencing poverty, and second-language learners—perform better when they are able to describe what they understand, discuss and refine ideas with each other, and connect new material with what they already know (Applebee et al., 2003, p. 688). Therefore, it is helpful to consider various practices and characteristics found in dialogic classrooms.

**Common characteristics of dialogic classrooms.** In a traditional, monologic (Nystrand et al., 1997) classroom setting, a teacher initiates discussions, presenting prompts or questions for students to consider. Students respond by offering what they believe is the answer to the prompt or question. The teacher then evaluates the response, praising, correcting, or otherwise confirming the students’ comments. This pattern has been called Initiation-Response-Evaluation (IRE; Alvermann & Hayes, 1989; Cazden, 1986; Mehan, 1979) or Initiation-Response-Followup (IRF; Sinclair & Coulthard, 1975) and it reinforces the tradition of the teacher as the ultimate possessor of knowledge and evaluator of student comments.



Because the IRE model (or something like it) has predominated in educational settings over the years (Burbules & Bruce, 2001), it is probably easier to identify specific features of classrooms that are representative of it, as opposed to dialogic classrooms. However, many research studies have explored the types of things teachers do and avoid in the pursuit of productive dialogue. When teachers believe in students' ideological development and personal voices, they are more apt to design learning activities and make instructional moves that encourage student talk and incorporate ideas that connect with students' lives (Phelps & Weaver, 1999). The following sections describe three beliefs that underlie dialogic pedagogy as reported in the literature: students are active and equal; questions and answers are building blocks; and teachers listen, nudge, and care.

*Students are active and equal.* Organizing and engaging in productive, consistent dialogue in the classroom is not an easy task for either teachers or students. It requires students to be responsible and prepared to keep the discussion alive, to manage turn-taking, to ask questions and evaluate answers, to introduce new ideas, and to follow or adapt accepted procedures throughout (Reznitskaya & Gregory, 2013). These processes help transform students into active meaning makers and the classroom into a learning community where participants are treated as equals and have roles and responsibilities related to communication, engagement, and construction of knowledge.

Alexander (2008) describes five trends he attributes to dialogic classrooms: discussions are collective, with teachers and students accomplishing learning tasks together; they are reciprocal, as teachers and students listen to each other, share experiences or beliefs, and promote alternate ideas; they are supportive, so students feel free to share without fear of being wrong; they are cumulative, as everybody builds on others' ideas, linking discussions together;

and they are purposeful, with teachers planning and guiding discussions with curricular goals in mind. All of these attributes promote metacognitive development and require appreciation for both the product and processes of learning (Reznitskaya & Gregory, 2013).

*Questions and answers are building blocks.* Reporting on their use of video response to support dialogic teaching among secondary English teacher candidates, Juzwik, Sherry, Caughlan, Heintz, and Borsheim-Black (2012) list the following practices as characteristics of dialogic classrooms: at least 30 seconds of sustained open discussion driven by students; discussions center on topics of conflict or tension; student ideas are elaborated upon through questions; verbal or written speech uses clauses that show sequence and progression of ideas; and students are organized into collaborative groups (e.g., peer evaluations of writing).

Alexander (2008) further identifies the types of questions that teachers and students ask during dialogic interactions. Questions are formulated to provoke thoughtful answers or clarify ambiguity, and answers to such questions are seen as building blocks, not ends. The back-and-forth among students and their peers or between a teacher and a student is linked to previous and future points of discussion, exhibiting what Collins (1982) calls *uptake*: evidence that “questions incorporate [some] part of an immediately preceding answer” (p. 432); or, “What I say responds to what you’ve said” (Juzwik, Borsheim-Black, Caughlan, & Heintz, 2013, p. 13). Questions in this vein should be open and divergent, allowing for uncertainty to some extent; they are not designed to test students’ knowledge but instead invite them to practice inquiry, essentially guiding them into higher-level thought processes that necessitate their exploring and constructing knowledge (Reznitskaya & Gregory, 2013).

*Teachers listen, nudge, and care.* In a discussion of moves that teachers can make to cultivate dialogue with their students, Shor and Freire (1987) emphasize the importance of

patience, respect, and caring for students. They recommend consciously using conversational tones instead of didactic or interrogative ones, listening intently when students are talking and asking other students to do likewise, and asking students to say more after they finish their first sentence instead of immediately jumping in to elaborate or clarify. A teacher might ask, “How did you know that?” or, “Can you say more?” or simply, “Why?” (Mercer & Howe, 2012). Further, Shor and Freire (1987) recommend a delay in teacher response when asked by a student for their opinion, deferring instead to other students. Finally, they remind teachers to start the next class session with answers to student questions from the previous one, showing that the teachers care about the inquiry and dialogue in which the group is engaged.

Langer (1995) sums up dialogic teachers as ones who (a) view all students as capable contributors, (b) use discussion to build understanding and not simply to test what students already understand, (c) view questions as part of the process for understanding and not necessarily as evidence of confusion or misunderstanding, and (d) teach students that engagement with multiple viewpoints enriches overall understanding. Similarly, Nystrand et al. (1997) extol the use of authentic questions, which he defines as questions that do not have definitive answers or that show the teacher is interested in what students think and what they can add to the discussion. They also call for more time devoted to open discussion and more frequent use of uptake, where a teacher’s questions build upon student comments. These are goals in the pursuit of dialogue that must be employed intentionally and regularly so that they become part of a classroom’s environment, expectation, and identity.

The preceding principles and practices have been shown to promote dialogic interactions in traditional F2F classroom settings. As teachers and students increasingly use technology for communicative purposes, one might wonder: are the same principles and practices applicable to

online environments? How can teachers use digital tools or online discussions to facilitate dialogic learning, where all voices are heard and appreciated? How might teachers promote dialogue through questions or prompts they provide in online settings? In the next section, I examine research studies of online discussions that help to answer these questions and provide examples of online activities that cultivate student dialogue and collaborative construction of knowledge.

### **Characteristics of Online Dialogue**

In educational circles, the conversation concerning best practices for learning with technology is an important one. Considering the myriad ways in which people now interact and converse online, there is a need to more fully understand and employ the most effective principles for social learning in these environments. Text-based conversations taking place on the internet between teachers and students are not new — for instance, online discussion boards have been in use since the 1980s, when internet use became more accessible within universities and other public settings (Herring & Stoerger, 2014). However, digital platforms and structural possibilities have increased in quantity and quality in recent years. As digital technology continues to evolve, echoing Philip and Garcia (2013), it is imperative that teachers critically examine specific technologies and practices to ascertain whether they are equipped to address the goals for student learning; in the case of online discussions, teachers could consider how the technology allows for new types of texts, transforms the ways students organize or represent their learning, and structures student talk where all voices can be heard and considered.

Online discussions are, of course, foundationally different from academic conversations in a traditional F2F classroom; they have been shown to lack the kind of deep, abstract thinking and sharing of ideas that leads to knowledge construction (Wang & Woo, 2007). The research

studies that follow have analyzed online discussions in various educational settings and with a variety of participants.

Wang and Woo (2007) studied the differences between asynchronous online discussions and typical F2F discussions among graduate students in a blended university course. The researchers gathered field notes from the F2F meetings and analyzed the written discussions from the online forum. Online discussions, based on their results, need to be clearly written and understandable; clarification of questions and thoughts is much easier in F2F settings, so clarity and concision in online discussions is crucial. Wang and Woo also concluded that online dialogue allows participants more time to consider ideas, conduct research, and prepare responses; this benefits those who need time to articulate their comments or who may struggle to keep up in standard F2F conversations.

Larson (2009) examined online discussion boards with a group of fifth graders. Rather than reading and responding to literature in a traditional F2F discussion, these students read from e-books and responded with online journals and group discussions. Having collected and analyzed students' electronic journals and the online discussion transcripts, among other data sources, she concluded that online message boards can produce rich conversation in response to literature where students value the replies they receive from classmates. Students were not given strict requirements for length or content of their posts, but they established their own norms and expectations for online conduct and proper discussion. Although encouraged to use school-appropriate language, students naturally resorted to the use of emoticons, abbreviations, acronyms, and other forms of *digitalk* (Turner, Abrams, Katic, & Donovan, 2014). Larson (2009) viewed this phenomenon as a dialogue enhancement because it reflects student voice and authentic expression. She concluded that online dialogue can be beneficial because it provides an

opportunity for all students to be heard without interruption, it encourages deep student response to literature, it promotes the sharing of ideas with others, and it requires careful consideration of multiple perspectives and opinions.

In a discussion of online dialogue, Kingsley (2011) suggests several benefits of bringing conversations online: first, a large group of students can simultaneously respond to and engage in discussion about multiple questions. Online conversations allow students time to conduct research to support their statements, and a large number of people can consider and reply to an individual peer's comment, thus providing each member of a learning community the opportunity to learn how to defend their ideas in the face of diverse opinion. Moreover, reluctant or shy students can enter a conversation when and where they feel comfortable, perhaps easing some tension inherent to F2F conversations. Contributions to an online dialogue can often be made when convenient for both students and teachers, and these conversations can transcend geographic and demographic barriers inherent to traditional classroom discussion. Finally, Kingsley mentions the value of having a written record of dialogue, which online platforms provide for collection and analysis.

In a study examining preservice teachers engaged in transnational conversation using online platforms, Zong (2009) sought to assess the students' understanding of the nature and import of global education. She analyzed online postings from a threaded discussion, reflective essays, and other artifacts from the course and categorized them into development of student understanding of global education and aspects of technology that facilitated such development. She found that computer-mediated communication can effectively expose students to a broad range of differing ideas and perspectives, can produce authentic learning experiences, and can result in meaningful public dialogue.

Kim, Anderson, Nguyen-Jahiel, and Archodidou (2007) analyzed the discourse of children during online discussions guided by a collaborative reasoning model, and they provide examples of practices that benefit online discussions. They encourage dialogue that shows a cooperative searching for the best solution to a problem posed by texts or earlier conversations. As students engage in these discussions, Kim et al. (2007) contend that students recognize and adopt argument strategies used by other peers (for example, placing oneself or others in the fictional story on which the discussion is based, or personalizing an argument and extending the world created in the text). The authors conclude that the use of a collaborative reasoning model results in strong arguments, counter-arguments, rebuttals, evidence, and formal argumentation strategies.

Mortensen (2008) examines several strategies behind the creation of blogs and the dialogue they can facilitate. First, she suggests that online posts should show some level of openness and vulnerability; there is value in writing and making public ideas which may not be fully formed or academic. She recommends using blogs as a sort of digital memory bank of ideas that can be returned to later by the author or by other participants. In essence, Mortensen extols the use of blogs because they tear down preexisting barriers of communication: through introducing blogs, a classroom of students can discuss topics with anybody around the world, enabling virtually anybody to become a discussion participant or a learning peer.

Hrastinski (2008) offers a definition of online participation that aligns with dialogic learning: "Online learner participation is a process of learning by taking part and maintaining relations with others. It is a complex process comprising doing, communicating, thinking, feeling, and belonging, which occurs both online and offline" (p. 1761). Students in dialogic classrooms are active participants, and it should be no different in online discussions: they need

to be involved, engaged, and motivated to interact. One step towards this ideal is for teachers to allow students to explore and present their thoughts without feeling the need to perfect everything before posting. Not all discussions should be a polished, “final draft” piece (Smagorinsky, 2013), especially in the early stages of discussions as students are trying to construct ideas and build upon prior knowledge.

Uzuner Smith and Mehta (2013) evaluated whether online discussions typically produce *educationally valuable talk* (EVT) and whether students feel like they actually learn from these conversations. Participants in their study constructed group norms for online discussions and conducted self-evaluations throughout the semester. The researchers found that most comments labeled as EVT could be broken into five main categories: (a) explanatory, (b) informative, (c) implicative, (d) exploratory, or (e) argumentational. They concluded that in assessing EVT, the quality of original posts and responses must be assessed, not simply the quantity. In addition, their data show that learning occurs more readily with EVT in an online environment if critical reflection is woven throughout. Finally, they stressed the need for more research on “talk quality” in online platforms (p. 132), a call that my research study aimed to heed.

Online discussions should push students beyond surface level thought and into elaborative explanations that explain why they believe what they believe, how they came to a certain conclusion, or other possibilities that may exist beyond their initial thoughts (Mercer & Howe, 2012). In this vein, Whipp (2003) identified various levels of reflection within comments made by preservice teachers engaged in online discussions. Using Hatton and Smith’s (1995) framework to evaluate student reflections, Whipp (2003) found that 15% of posts were non-reflective, 46% were descriptive reflections, 28% were dialogic reflections, and 11% were critical reflections. According to her explanation, descriptive reflections largely share



information; dialogic reflections show multiple perspectives and thoughtful connection of ideas; and critical reflections question established practices and contextualize the learning within social, political, or other hegemonic powers.

Whipp (2003) concludes that dialogic conversations—those in which students take up others' comments and build new ideas upon others' ideas—help to move discussions from surface reflection to critical analysis. She recommends experimenting with the use of assigning specific student roles and responsibilities within discussion groups and ensuring a range of student ability within groups, when possible. Moreover, Whipp's study highlights the need for instructors to explicitly require connections to practice and to the assigned readings in student posts. Rather than challenging ideas, responses in her study typically gave more emotional support, and comments tended to focus on personal experiences rather than broader ethical teaching issues.

Along the same lines, Jarosewich et al. (2010) explored the potential of online discussions to extend learning and deepen engagement with teachers in an online professional development course. Based on their findings, the following elements produced higher online discussion quality and promoted dialogic principles: (a) discussion prompts that require both reflection and connection to course content, (b) student posts and responses to others that connect practice to course content, and (c) modeling of high-level discussion posts by the instructor.

Juzwik et al. (2012) share several suggestions that may help teachers who are interested in using digital technologies to facilitate dialogic conversations. They sum up their study by calling for practices that make discussions more visible, flexible, and feasible. For example, because online conversations are dialogue that has been made visible to the group, teachers need

to find ways to build trusting teacher–student and student–student relationships. Depending on the classroom context, and without feeling a sense of safety and community, some students may experience participating in visible online discussions as embarrassing. Juzwik et al. (2012) reiterate Smagorinsky’s (2013) point that not all discussion contributions need to appear like a final draft; rather, ideas can be rough and unfinished while still pushing the conversation forward.

The preceding studies highlight several characteristics of online discussions that show potential for dialogue, high-level thinking, and deeper understanding of texts, but those results are not achieved without purposeful instructional design. These studies also attest to the importance of teachers’ introducing learning activities that require students to explain, to explore, to reason, and to reflect; they indicate that students should be given opportunities to express their voices in authentic and safe spaces; and they suggest that the quality of online discussion hinges upon clarity of teacher expectations and allowance for freedom of thinking. In essence, going back to Philip and Garcia (2013), pedagogy should inform technological implementation, and not the other way around.

Although online platforms provide potential learning benefits, Juzwik et al. (2012) recommend that teachers consider the challenges associated with learning new technologies and the frustration that students may experience. It takes time and effort to adopt new dialogic tools and platforms, so they should be incorporated purposefully. In the next section, I examine research that identifies potential challenges or problematic trends with online dialogue, and which teachers should take into consideration when structuring online discussion environments.

## **Challenges with Online Discussions**

In an examination of online learner participation, Hrastinski (2008) conducted a review of 31 studies and identified six levels of online learner participation, which range from low- to high-level: accessing the e-learning environment, writing, quality writing, writing and reading, actual and perceived writing, and taking part in a dialogue. His analysis of the included studies also reveals that participation in online discussions has frequently been assessed by the number of words or posts a student contributes or by the number of times they access the online platform. He suggests that these are low-level measures of participation because they fail to account for the fact that learning also occurs through observing others' written interactions and through individual, internal thought processes that may not be reflected in written contributions to the discussion; additional research (Romiszowski & Mason, 2004; Wise, Speer, Marbouti, & Hsiao, 2013;) has reiterated that online participation is complex and should not simply be measured by the amount written. Hrastinski calls for more research that uses Vygotsky's (1978) social perspective on learning to explore high-level conceptions of online learner participation.

Jarosewich et al. (2010) and Whipp (2003) found that the majority of student postings responding to someone else's initial post were simply encouragement or emotional support without addressing course content or building upon important concepts. Similarly, Kim et al. (2007) observed that online comments were not connected to previous comments; instead, many students posted isolated ideas without interacting in dialogic ways. At least in preliminary stages of online discussion, teachers may need to establish guidelines for what a dialogic response looks like and what does and does not constitute productive dialogue.

In an investigation of the attributes and potential value of asynchronous online discussions among a group of university staff, Hammond (2000) found that online discussions

were lacking or challenging for a few reasons: new digital platforms were challenging to learn, comments in online settings took longer to compose because expectations were high, and online interactions were more naturally focused on personal, informal topics that did not provide the deep learning the participants had hoped for. It was not easy for participants to build dialogic conversations, even though they recognized the potential the online forum had for such discussions. Hammond suggests the need for clear instructions and guidelines regarding the purpose and value of online discussions in educational settings.

Murphy and Coleman (2004) studied graduate students' perceptions of online discussions and found several challenges associated with text-only online communication: a tendency for students to misinterpret what someone wrote, a lack of vocal and bodily expression, a struggle to determine the purpose of discussions, and a perception of low quality but high quantity of student comments simply to meet grading requirements. They stress the need to provide more structure to online discussions, to model best practice, and to explore new technologies teachers are using for online dialogue.

These studies highlight the complex nature of online learning contexts and the challenges inherent with discussions in those environments. Within the secondary ELA setting and using a digital annotation tool, my study aimed to identify challenges teachers and students faced as they navigated the complex nature of online learning contexts. My research also answers Uzuner Smith and Mehta's (2013) call for more research that evaluates the quality of students' online dialogue. However, the end goal of my study was not simply to cultivate student dialogue with a web annotation tool; rather, it was to investigate whether dialogue that occurs in the context of web annotation activities is characterized by indices that previous research has associated with

improved comprehension of texts. The following section describes the relationship between dialogue and reading comprehension and provides a rationale for this study.

### **Dialogism and Reading Comprehension**

Reading comprehension, at a surface level, might be defined as the level of textual understanding achieved by a reader. For the purposes of this study, in a focused examination of the broader range of activities and discussions surrounding texts, a more nuanced definition is helpful. *Reading comprehension* is defined by the RAND Reading Study Group (2002) as “the process of simultaneously extracting and constructing meaning through interaction and involvement with written language” (p. 11). The RAND Reading Study Group also emphasizes that the text is an important but insufficient element of reading comprehension; rather, reading comprehension is affected by the interactions among the reader, the text, and the activity in which one participates. With that definition as a backdrop, this section describes research into the role of dialogue in supporting students’ reading comprehension and high-level thinking.

### **Theoretical Foundations**

There is a strong theoretical warrant for the role that student dialogue can play in supporting improved reading comprehension. According to Piaget (as cited in De Lisi & Golbeck, 1999), social interaction that includes the considering of multiple perspectives and which attempts to resolve conflicts is integral in the development of individual reasoning. Central to Piaget’s (1952) theory of cognitive development are the concepts of assimilation, accommodation, and disequilibrium. *Assimilation* is described as the integration of external ideas into the learner’s existing knowledge structure; with regards to dialogic student discussions, this entails a consideration and incorporation of ideas that can build upon or connect well with existing ideas about the topic at hand. *Accommodation* is described as the adjusting or changing

of internal structures to accommodate characteristics of some external object or event; within a dialogic discussion, accommodation occurs as students recognize that their current understanding of a topic is insufficient, prompting them to shift or transform their thinking on the topic.

Discussions that exhibit these elements cause *disequilibrium*, where a learner “becomes aware of the fact that he or she holds two contradictory views about a situation and they both cannot be true...they are then ready to reorganize their thinking on a more logical level” (Gredler, 2009, p. 277). In other words, cognitive development and the ability to reason and construct knowledge about the world or about specific texts relies upon conflict and negotiation of ideas in social settings.

Sociocultural learning theory also supports the idea that dialogic student talk, as a mediational tool, can expand student thinking and deepen their comprehension of texts. Viewed through this lens, language is a culturally-constructed tool which mediates learning using words to explain and elaborate upon concepts (Vygotsky & Luria, 1996). Indeed, language is “the premier psychological tool” in the sociocultural school of thought (Hull & Schultz, 2001, p. 581). Tools like language that are used regularly and extensively within a society are developed over time by a community of people that agree upon the purpose and meaning of the tool (Basmadjian, 2008; Grossman, Smagorinsky, & Valencia, 1999). Gavelek and Whittingham (2017) further define tools as both physical (like a hammer) and psychological (like language, algebraic systems, or mnemonic techniques).

Also central to sociocultural theory and Vygotsky’s (1978) research is the idea that knowledge is socially constructed—especially through language—and that people gain and develop literacy by participating in literacy-rich environments and interacting with more knowledgeable others, such as teachers, parents, or peers. Within a theory he calls *sociogenesis*,

Vygotsky explains the relationship between social and individual levels of learning as intermental and intramental: intermental activity (interactions with others) often leads to new intramental (individual) abilities and ways of thinking. Sociocultural theory supports the idea that a group of learners produces outcomes that are above and beyond what any individual student in the group could achieve on their own (Murphy, Wilkinson, Soter, Hennessey, & Alexander, 2009; Wertsch, 1991). Additionally, this theory posits that cognitive growth “is more likely when one is required to explain, elaborate, or defend one’s position to others, as well as to oneself” (p. 158), suggesting that students’ learning outcomes benefit from their participating in dialogue. In this sense, dialogic talk is a psychological tool for student learning because it expands their understandings and encourages them to support their thinking.

The ways in which digital tools mediate student dialogue is of increasing importance as our society develops and as digital platforms expand the potential for social interactions. As digital technologies become more ubiquitous, the onus is on educational researchers and teachers to evaluate their purpose and meaning within educational contexts (Philip & Garcia, 2013). My study sought to address this need by examining how teachers implemented web annotation as a mediational tool and exploring teacher and student perceptions of the role web annotation played in textual understanding.

### **Role of Dialogue in Supporting Comprehension**

Focusing on studies that assume a sociocultural stance on learning, Nystrand (2006) conducted a review of research that examined the relationship between classroom talk and reading comprehension. He concluded that the existing body of research—which included a broad range of approaches to whole-class and small-group discussions of texts over several decades—provided useful examples of teacher questioning techniques, patterns of interaction,

and approaches to student talk that “strongly support the potential of classroom discussion to enhance reading comprehension instruction” (p. 401). The following sections describe eight examples of such interactional patterns, or what Soter et al. (2008) call indices of classroom talk, that research suggests are associated with increased understanding of texts and higher-level thinking. These indices are *authentic questions*; *uptake*; *high-level thinking*; *affective response*; *intertextual response*; *shared knowledge response*; *elaborated explanation*; and *exploratory talk*.

**Authentic questions.** As explained earlier, Nystrand et al. (1997) define test questions as questions that seek a pre-specified response. In contrast, authentic questions are questions that are open-ended, with no pre-specified answer, and for which the inquirer genuinely seeks an answer. Although they concede that such questions do not always result in rich response and deeper learning, Nystrand and his colleagues argue that authentic questions open the door for students to contribute new material, control the topic of a discussion, and hence exercise some measure of control over their learning. Their study also found that student achievement was higher when teachers regularly employed authentic questions about literary texts. However, they noted that they observed far fewer authentic questions than they did “test” questions.

**Uptake.** Nystrand, Wu, Gamoran, Zeiser, & Long (2003) studied classroom discourse in more than 200 eighth- and ninth-grade classes to observe elements of effective talk, and they reported two factors that are especially relevant to this current study. First, they investigated the amount of uptake—contributions to a discussion that respond to something another participant has said—evident in classroom discussions. Nystrand and colleagues argue that uptake often occurs in response to authentic questions and adds coherence to the discourse. Additionally, they note that uptake is valuable as students and teachers ask follow-up questions, allowing the conversation to go where students lead instead of a prescribed discursive path. In other words,



the dialogicality of classroom talk is enhanced and deeper learning occurs as teachers and students follow an authentic path of discussion, as opposed to the teacher controlling the discussion in order to meet a predetermined goal or objective.

**High-level thinking.** A second factor related to class discussion and to this study that Nystrand et al. (2003) investigated in their research is high-level thinking. According to their definition, high-level thinking is characterized by ideas that go beyond summarizing or reporting and into analysis, generalization, or speculation. This type of thinking incorporates the speaker's unique perspective, a contribution beyond routine application of knowledge, and it is characterized by a willingness to attend closely to a text or topic of discussion. Nystrand and his colleagues examined questions and responses that demonstrated these characteristics of high-level thinking, and they concluded that student dialogue is more likely to occur when a discussion is spurred on by questions or comments that elicit high-level thinking.

**Affective responses.** When readers connect texts with their feelings or personal life events, they are constructing an affective response. Described by Rosenblatt (1994) as an aesthetic stance toward the text and by Jakobson as an expressive stance (Jakobson, 1987), affective responses are emotional, spontaneous reactions or thoughts that emerge from and build off of the reading experience. Soter et al. (2008) argue that these types of responses are commonly found in literature circle discussions, and they regard them as an indicator of discussions that support increased textual understanding.

**Intertextual response.** Readers engage in dialogue with texts by connecting current readings with past ones and with expectant future texts (Bakhtin, 1981). Effective readers are cognizant of this process and utilize intertextuality to construct meaning from the text at hand. Intertextuality signifies some connection across literature (e.g., juxtaposing different texts) but

also, more generally, is a lens through which researchers can examine the social nature of learning (Bloome & Egan-Roberston, 1993). Allington and Johnston (2002), in their study of fourth-grade classroom discussions, found that teachers commonly encouraged students to make connections between the text under study and other texts (including art, media, television shows, news, etc.). They provide an example of how this might look in practice: “Mary asked her class, ‘Do any of the characters in the books you’ve read remind you of Alan Brewster?’ Responses included *Sheila the Great*, *Fudge*, and *Sarah Ida*. Mary asked each respondent why” (p. 176). Intertextual responses are related to high-level thinking because they require students to go beyond reporting on the individual text; instead, they place the current text in dialogue with other ones, leading to richer comprehension and increased capacity to construct meaning from texts (Lenski, 19998).

**Shared knowledge response.** Edwards and Mercer (1987) cite the importance of designing discussions where learners develop and build upon common understandings, sharing knowledge of some kind. Participants engaging in shared knowledge responses exhibit an understanding of implicit ground rules for classroom talk and connect content to broader contexts. Edwards and Mercer suggest that effective student communication is based on these mutual experiences, which effectively “carry the weight of future discourse” (p. 6) in the classroom; moreover, responses that connect shared knowledge with new knowledge are thought to help to “construct through discourse a continuity of experience which is itself greater than their individual experience” (p. 6). Along with intertextual and affective responses, shared knowledge responses are identified by Soter et al. (2008) as *extra-textual* to highlight the fact that they require students to go outside or beyond the text under study.

**Elaborated explanation.** Chinn, O'Donnell, and Jinks (2000) describe elaborated explanations as discursive contributions in which students or teachers elaborate on an idea by putting forward an assertion and supporting it with specific reasons. Elaborated explanations engage learners in a process of clarifying and organizing (or reorganizing) ideas and are linked with higher levels of learning and reading comprehension (Bargh & Schul, 1980). Webb (1992) asserts that elaborated explanations from students to their peers not only help the people hearing the explanations understand the content more fully, but the act of explaining something helps the speaker understand it better as well.

**Exploratory talk.** Mercer (1995) distinguishes exploratory talk from these other indices by describing it as conversations “that require that the views of all participants are sought and considered, that proposals are explicitly stated and evaluated, and that explicit agreement precedes decision and actions” (p. 105). He adds that exploratory talk is aimed at consensus through conversation and that it hones students’ ability to be clear, accountable, and constructive. In other words, exploratory talk is co-reasoning where students build knowledge over turns through a collective consideration of others’ thoughts.

**Investigating approaches to scaffolding talk about texts.** In an effort to identify specific characteristics of classroom discussions that exemplify quality dialogue, a group of researchers conducted a meta-analysis of studies that have investigated a variety of research-based approaches designed to scaffold student discussions about texts (Murphy & Edwards, 2005; Murphy et al., 2009; Soter et al., 2008; Wilkinson, Murphy, & Soter, 2003). They identified nine different discussion approaches that employed either an expressive stance (emphasizing the reader’s affective response to a text), an efferent stance (emphasizing the acquisition of knowledge from a text), or a critical-analytic stance (emphasizing an interrogation

or evaluation of the implicit arguments or assumptions found within a text). Using this framework, the researchers evaluated specific examples of student discussions from each approach in an effort to identify discourse features that applied to all nine approaches, and for which there was strong theoretical warrant and evidence from empirical studies linking them to high-level learning and textual comprehension.

Using a total of 36 discussions that transpired in classrooms ranging from third to ninth grade, Soter et al. (2008) coded discussions for the features of student talk described above, all of which have been linked to high-level thinking and comprehension: authentic questions (open-ended questions in which a speaker genuinely seeks an answer); uptake (contributions that respond to something another participant has said); high-level thinking (contributions that include analysis, generalization, or speculation that extends thinking beyond existing knowledge) (Nystrand, Wu, Gamoran, Zeiser, & Long, 2003); questions that generate an affective response (connecting text with feelings or personal life events); questions that elicit an intertextual response (text-to-text connections); questions that elicit shared knowledge (connecting to knowledge constructed in previous class discussions) (Applebee et al., 2003); questions that elicit elaborated explanations (thinking explained in detail through an assertion supported by evidence; Chinn et al., 2000); and questions that lead to exploratory talk (co-reasoning where students build knowledge over turns, considering others' thoughts and thinking collectively; Mercer, 1995).

In relation to the three reading stances (expressive, efferent, and critical-analytic), Soter et al. (2008) found that students showed more control over discussions oriented in the expressive stance, teachers showed greatest control over discussions oriented in the efferent stance, and students and teachers shared control of discussions oriented in the critical-analytic stance.

Approaches that exhibited critical-analytic and expressive stances showed evidence of greater comprehension of texts and a high frequency of authentic questions, uptake, high-level thinking, elaborated explanations, and exploratory talk. Discussions that leaned toward an expressive stance exhibited higher frequencies of exploratory talk but fewer elaborated explanations, while discussions that leaned toward a critical-analytic stance exhibited higher frequencies of both elaborated explanations and exploratory talk. These researchers concluded that productive student dialogue needs to be structured but not dominated by the teacher, giving students ample time to drive the conversation and ample space to explore their thinking through open-ended, authentic questions and uptake of others' ideas.

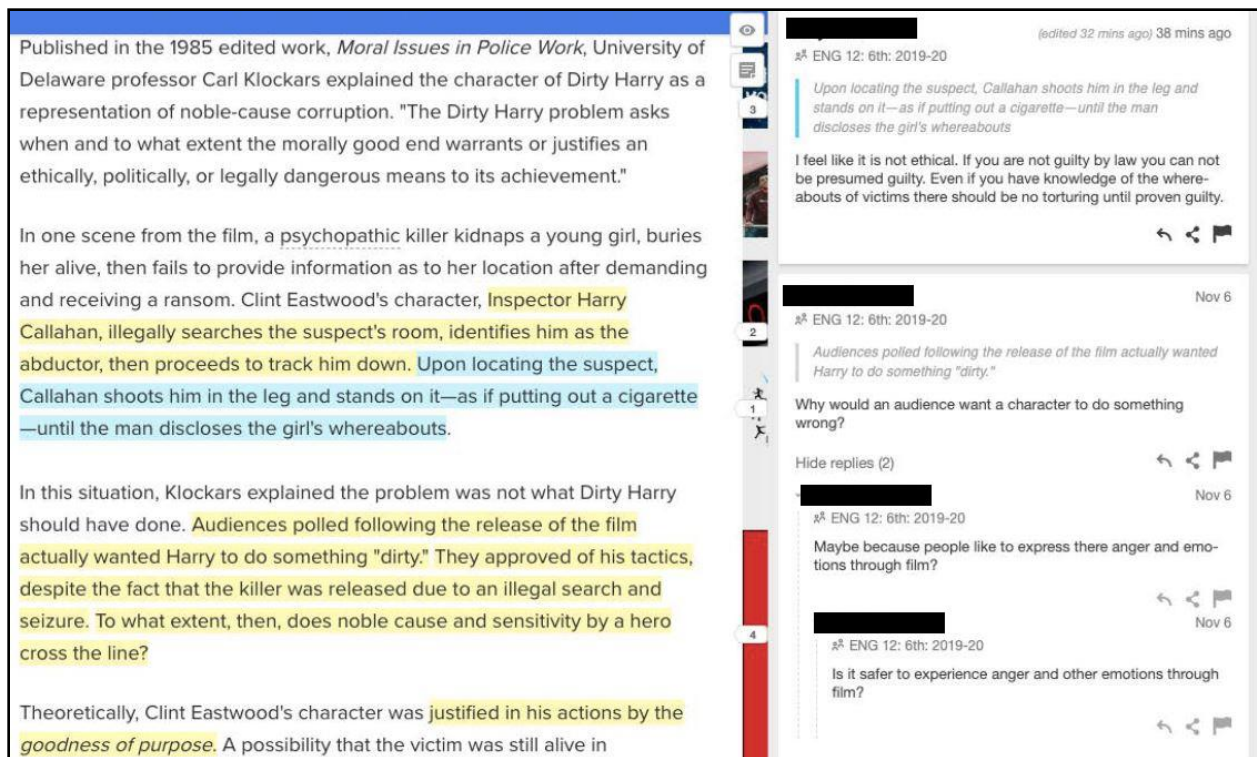
The theories and extensive studies described in this section have explored and sought to identify the role that student dialogue can play in supporting reading comprehension. In doing so, they provide an impetus for teachers and researchers to consider ways to implement dialogic talk in the classroom. Moreover, these studies offer theoretical frameworks and indices for assessing the quality of classroom talk in terms of its potential to support comprehension and high-level thinking, goals toward which ELA teachers presumably aspire. Significantly, the indices provided by these studies in F2F settings have yet to be applied to online platforms, an increasingly relevant area of study in our modern, digital world. My study sought to address that gap in the literature by examining web annotation as one potential application of the dialogic principles and characteristics of quality talk described in this chapter. Further, this study was the first to my knowledge that specifically investigates the role of web annotation tools in supporting online text-based discussions amongst high school ELA students; it also extends the literature by evaluating those online discussions based on proximal indices of high-level thinking and

understanding. In the next section, I provide an overview of research into web annotation, highlighting its use in educational settings to address and improve various learning outcomes.

### **Web Annotation**

Traditional annotation, where a reader highlights or underlines text and records their thoughts or questions in the margins, is a literacy practice that is commonly used in school contexts to enhance one's understanding of texts. These interactions between reader and text can help to clarify or evaluate the text or connect new learning to the reader's previous experiences and understandings (Bazerman, 2010; Jackson, 2002). Research has shown that annotating can improve reading comprehension (Lomicka, 1998; Porter-O'Donnell, 2004; Tseng, Yeh, & Yang, 2015), recall and depth of cognitive processing (Wolfe & Neuwirth, 2001), and help students become more critical thinkers and consumers of information (Adler & Van Doren, 1972; Johnson, Archibald, & Tenenbaum, 2010).

Whereas traditional annotation with pen and paper is typically done on an individual basis, advances in technology have opened the door for two or more readers to annotate together, socially negotiating the meanings of texts. Web annotation allows readers to make their thoughts visible to others across the globe. Foundational to web annotation is the ability for multiple users to highlight and annotate specific passages or sections of online texts and to see and respond to others' annotations (Novak et al., 2012; see Figure 1 for an example).



**Figure 1.** Example Web Annotation with Hypothesis. Note: the text to be annotated is on the left, and the Hypothesis web annotations are on the right. Student names are blacked out, but it shows their private class group, the text they annotated, and what they wrote as an annotation.

Web annotation is a process that enables students to share a space that houses their written responses to readings in the margins of a text, providing one avenue for reader response on digital platforms and allowing users to engage in conversations and share insights from articles or other readings (Kalir & Dean, 2018). Most web annotation platforms allow for private groups and the possibility of either synchronous or asynchronous discussions around a text. This process provides a space for dialogic conversations—classroom talk in which students respond to, build upon, reference, or otherwise extend others' comments (Bakhtin, 1981)—which help students to negotiate shared understandings of classroom content and construct knowledge together through critical reflection (Silvers, 2001).

When annotations are shared, considered, and responded to, students are better able to critically evaluate texts and build upon others' ideas (Beach, 2012). Moving this conversation

online can also be a more comfortable venue for students who are shy, unsure, culturally marginalized, or who otherwise struggle to participate regularly in F2F conversations (Larson, 2009). Teachers could benefit from seeing how web annotation technology can support thinking and writing that is dialogic and which demonstrates inclusion of diverse thoughts and cultural perspectives (Kalir & Perez, 2019). The following section details how web annotation has been employed in educational contexts to cultivate discussion of ideas and develop shared understandings of text.

### **Web Annotation in Educational Settings**

Kawase, Herder, and Nejdil (2009) investigated how web annotation affected the learning process as compared with traditional paper-based annotation. They categorized annotations from both analog and digital environments and examined strategies students employed during reading and discussing the texts. They discovered that students were reading for one of four purposes: for writing, for learning, for reviewing, or for miscellaneous reasons. Additionally, they found that web annotation was a challenge for students because navigating the technology required more effort to learn and they were more comfortable reading from paper instead of on a screen. A comparison between online and paper-based annotations revealed that digital annotations were shorter and less frequent. However, these researchers reported that students benefited from seeing others' perspectives on texts, allowing them to shape their own ideas and build knowledge in collaboration with their peers. Lebow and Lick (2004) found similar benefits for students: students participated more, were more engaged, and developed active reading skills through the web annotation process. In addition, they felt accountable to the group and completed the reading and discussions with promptness and regularity.



Hwang, Wang, and Sharples (2005) conducted a quasi-experimental study that explored web annotation with college students in a F2F class supplemented with online activities. The experimental group used a web annotation tool to read and annotate individually, then in small groups, and finally as a whole class. The researchers then surveyed students for their feedback on the process. They found that students in the experimental annotation group performed better on tests than those in the group without web annotation at both the individual and group annotation phases; additionally, students perceived that the annotation system improved their reading comprehension, their interest in the subject matter they were learning, and their interactions with others. Other studies, however, have found no significant improvement of reading outcomes due to web annotation practices (Johnson, Archibald, & Tenenbaum, 2010; Razon, Turner, Johnson, Aرسال, & Tenenbaum, 2012). Still other research (Gao, 2013; Gao, Zhang, & Franklin, 2013; Sun & Gao, 2016) has used web annotation in higher education to examine students' perceived learning, not actual learning outcomes.

Because web annotation may involve technology and processes that students aren't familiar with, they may experience a learning curve. Archibald (2010) found that the use of web annotation correlated to a decrease in reading comprehension initially, followed by a significant increase in reading comprehension, critical thinking, and metacognitive skills. He recommends that teachers allow students more time to become trained in and comfortable with web annotation tools before expecting deeper thinking and comprehension. Kawase et al. (2009) also addressed this learning curve, suggesting that the tool should be easy to access, require as few steps as possible, and promote interactions directly in the text.

In a meta-analysis of web annotation studies in higher education settings, Novak et al. (2012) concluded that web annotation tools can lead to learning gains related to critical thinking,

metacognitive skills, and reading comprehension; however, they emphasize that empirical research in this field is sparse: “The integration of [web annotation] tools in education is evolving without sufficient evidence whether their use indeed enhances learning and motivation. Moreover, there is little understanding under which conditions and within which contexts these tools should be implemented” (Novak et al., 2012, p. 49). Their observations underscore a need for more studies like the one that serves as the basis for this dissertation.

Novak et al.’s (2012) review of web annotation research provides valuable insight into the useful features of various web annotation platforms and how they have been implemented in higher education settings; however, they focus their study on the affordances and limitations of the digital tools, not necessarily on student understanding of texts. They suggest that more research is needed on web annotation technologies and their effects on learning outcomes.

The studies cited thus far, including all of the studies addressed in Novak et al.’s (2012) meta-analysis, were conducted in higher education settings, excluding K-12 as potential sites of interest in web annotation research. Castek, Beach, Cotanch, and Scott (2014) explored how sixth grade students used web annotation to discuss science texts, finding that most annotations were either questions, claims, or requests for evidence from peers. Their study focuses on how such processes can enhance argumentation practices or inform future argumentative writing activities. Brahier (2006), in an examination of ways teachers can use web annotation as formative assessments, highlighted benefits for vocabulary learning and planning for future instruction. These studies provide valuable insight for teachers but do not directly investigate how web annotation activities may support comprehension of texts.

In an examination of fifth grade Taiwanese students, Chen and Chen (2014) found that web annotation resulted in statistically significant increases in reading comprehension. They also

suggest that web annotation facilitates high-level thinking and more focused discussions. Their results were based largely on a paired sample t-test comparing scores on tests that included multiple choice, fill in the blank, and short responses after reading an article. They suggest the need for research on web annotation with other age groups, specifically junior and senior high students, and with various types of texts. A few other researchers have anecdotally described web annotation in K-12 settings, such as Turner (2017) and Beach (2012), but it is generally agreed across the majority of the cited studies that more research on the potential impact of web annotation on reading outcomes is needed across the board.

In summary, the aforementioned web annotation studies reveal several benefits that come from students seeing their peers' thoughts and having the ability to engage in online discussions with each other, but they also highlight the need for empirical research that adds to the body of evidence as to whether web annotation enhances learning outcomes. These (and other) digital tools are often marketed to educators as ways to benefit students and aid in learning, so my study sought to address that need by providing a close examination of potential ways that web annotation can support student talk characterized by discourse features that research has linked to high-level thinking and comprehension of texts. Further, my study took place in two high school classrooms, an understudied population across web annotation research. Finally, the research study presented in this dissertation sought to understand how high school ELA teachers implemented web annotation tools in the service of supporting discussion between students.

## **Conclusion**

In this chapter, I have provided a review of literature on dialogism, along with related educational research, detailing moves that teachers and students can make to cultivate dialogic talk in both traditional and online settings. I then examined theoretical frameworks and empirical

research studies that point to a relationship between dialogue and reading comprehension, highlighting the need for more research that examines text-based discussions in online environments. Finally, I provided an overview of web annotation research and argued that there is a need to more closely investigate the role it plays in supporting student learning. Collectively, my review of the literature examined in this chapter provides a compelling rationale for a focused, sustained investigation of how web annotation impacts ELA student comprehension of texts through a process of online reading, writing in the margins, replying to others' comments, and overall negotiations of understandings. If productive student dialogue is linked with increased reading comprehension and high-level thinking, as I have argued in this chapter, it provides impetus especially for ELA teachers to explore ways to cultivate dialogue in instructional activities that are designed to support reading. And considering that participation in our modern, digital world means interacting and conversing online, there is a need to more fully understand and employ effective principles for learning through dialogue in digital environments. This study explored web annotation as one potential avenue for student dialogue, high-level thinking, and comprehension of texts.

In the next chapter, I present the methodology that I used to conduct this study. In doing so, I examine the research questions, setting, participants, methods for collecting and analyzing data, and step-by-step procedures that I employed.

## **CHAPTER III: METHODOLOGY**

This research study, titled “Web Annotation in English Language Arts: Online Dialogue as a Platform to Support Student Comprehension of Texts,” explored the use of a digital text annotation platform that allows students to see and respond to their peers’ highlights and comments on shared class readings. The purpose of this study was to investigate how web annotation—through a process of online reading, writing in the margins, and replying to others’ comments—influences student dialogue in ways that research suggests are associated with improved comprehension. By attending to these practices, the study examined the role of web annotation in mediating dialogic learning, wherein student comments elaborate upon, clarify, affirm, challenge, or otherwise respond to previous comments. To accomplish this, I (a) observed how teachers structured and implemented web annotation activities in the classroom, (b) evaluated the dialogic quality of the comments students generated within the annotation tool, and (c) examined student and teacher perceptions of the usefulness of web annotation. My study was guided by the following research questions:

1. How do ELA teachers use web annotation to support student comprehension of texts?
2. To what extent, if any, does web annotation appear to support student comprehension of texts?
3. How do ELA teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?

### **Research Design**

Because this was an exploratory study designed to understand how two ELA teachers and their students use web annotation to support student comprehension of texts, and because my research questions required thick description (Geertz, 1973) of both online and in-class

interactions, a multiple case study design was most appropriate (Stake, 2008; Yin, 2014). Within this design, each ELA teacher and their students constituted one case for investigation, allowing me two separate settings from which to explore my research questions and consider alongside each other. I was not particularly interested in relationships among variables or in causal explanations for research results; instead, this research design helped to explain, as true to participants' perspectives as possible, the role that web annotation played in the context of two high school English classes; because case study research in education assumes that students' and teachers' experiences are shaped by the complex society around them (Dyson & Genishi, 2005), this study required rich description of participants, research environments, cultural or systemic ideologies, and other external factors that had the potential to shape my findings.

### **Research Sites and Participants**

English teachers from high schools in the northwest quadrant of a state in the southern US were recruited through a listserv established to support educators participating in a local writing institute sponsored by the National Writing Project. Two teachers interested in using web annotation with their secondary ELA students ultimately volunteered to participate in this study, invited me to observe class sessions in which students used web annotation or talked about texts they had annotated, and agreed to give me access to the online annotation groups so that I could export and analyze all student comments made within the platform.

**Participant characteristics.** Mrs. Reynolds (all names are pseudonyms), who identified as a White female, was teaching 9th grade honors ELA at Fairview High School, a comprehensive public high school in a suburban community in the southern US. Students at this school were also predominantly White (68.8%). Hispanic/Latinos made up 12.1% of the school population, while 9.2% were Black, 3.3% were Asian, 6.0% were multiracial, 0.2% were Native

American or Alaska Native, and 0.4% were Pacific Islander. Twenty-nine percent of the students at Fairview qualified for free or reduced lunch. Mrs. Reynolds was in her 6th year of teaching at the time, and she participated in this study because technology was a big part of what she did with students on a weekly basis; she felt that students needed to have experiences with digital tools for educational purposes so they would be prepared for an increasingly digital future. She enjoyed being around her students, and she was heavily involved in extracurricular activities at Fairview, serving as an assistant coach for both the golf and swim teams.

Mrs. Reynolds chose to implement web annotation with her 9th grade honors ELA class because all of these classes at the school were required to do annotation activities to prepare for exams, and she felt the digital aspect would be valuable for them and helpful for her. In total, there were 30 student-participants from Mrs. Reynolds' 9th grade honors ELA class section involved in this study. As the school year began and Mrs. Reynolds became acquainted with the students, she characterized the class as intelligent students who wanted to learn and who were accustomed to success in ELA class, with many identifying as readers. Early on in my observations, it became clear that most discussions followed the IRE model, with Mrs. Reynolds driving the conversation and asking questions that led students toward the ideas she wanted them to focus on.

Mrs. Jorgensen, who identified as a White female, was teaching 12th grade ELA at Highland High School, a comprehensive public high school that serves grades 10-12 in a rural community in the southern US. Students at the school were predominantly White (45.0%), with the next largest population being Hispanic/Latino (39.6%). Pacific Islanders made up 8.8% of the student body, while 2.6% were Black, 1.4% were Asian, 2.1% were multiracial, and 0.6% were Native American or Alaska Native. Fifty-two percent of the students at Highland qualified for

free or reduced lunch, the marker for low-income households. Mrs. Jorgensen was in her 22nd year of teaching and in an interview that occurred at the start of the study, she stated that she was always searching for new ways to get students talking with each other, using new tools, and reading texts in meaningful ways. She had been at Highland for most of her 22-year career, and she focused much of her efforts as a teacher on the social and emotional well-being of her students. She always sought to find ways for student voices to be heard, especially the large population of English language learners in the school.

Mrs. Jorgensen chose a specific section of English 12 students because it was her largest class and it had a wide range of student ability and linguistic backgrounds. In total, there were 29 student-participants from this class section involved in this study. As the school year got underway and she began to get a feel for the class, Mrs. Jorgensen characterized the class as fairly representative of the school regarding racial and socioeconomic demographics, and as having a large portion of students who do not identify as readers or who do not typically excel in ELA classes. After a few visits to observe discussions with this class, it was clear that there were a select few students who volunteered ideas within a discussion but the majority of the class did not actively participate without encouragement or requests from Mrs. Jorgensen.

These teachers were, in part, convenience samples (Henry, 1990) because their schools were close enough in vicinity to make observations feasible and because they both volunteered to experiment with web annotation. Fairview High and Highland High were different enough in student demographics, both racially and economically, that I felt each case could illuminate something valuable and, potentially, unique for my study. Additionally, Mrs. Jorgensen and Mrs. Reynolds provided contrasts in their teaching experience (22 years and six years, respectively), in the age of their students (12th and 9th grade, respectively) and in their goals for the study



(described in detail in the following chapter). And just based on sheer quantity of annotation data, I recognized that two classroom cases could provide more reliable data than one for this study because it, in essence, doubled the number of student annotations to examine and provided two examples of teacher implementation of web annotation. As volunteers for this study, I perceived both teachers as eager to experiment with web annotation activities in their classrooms; this, I felt, made them valuable participants for the study who would help to produce rich sets of data for analysis. I also considered the need for in-depth and prolonged observation to gain an understanding of the contexts of each classroom and the role web annotation served in class discussions, necessitating that I spend large amounts of time in these research settings. Therefore, in consideration of my sampling strategy and the need to balance feasibility with depth, I chose to constrain my research to these two classrooms.

**Protection of human participants.** A proposal for this research design was submitted for approval to the Institutional Review Board at the University of Arkansas and to the two school districts in which the study took place. No major risks were anticipated for any participant. Confidentiality and anonymity were maintained through the use of pseudonyms throughout all descriptions or quotes and the removal of student or teacher names on screenshots of annotations. Participants received neither monetary compensation nor any other direct benefit from this study.

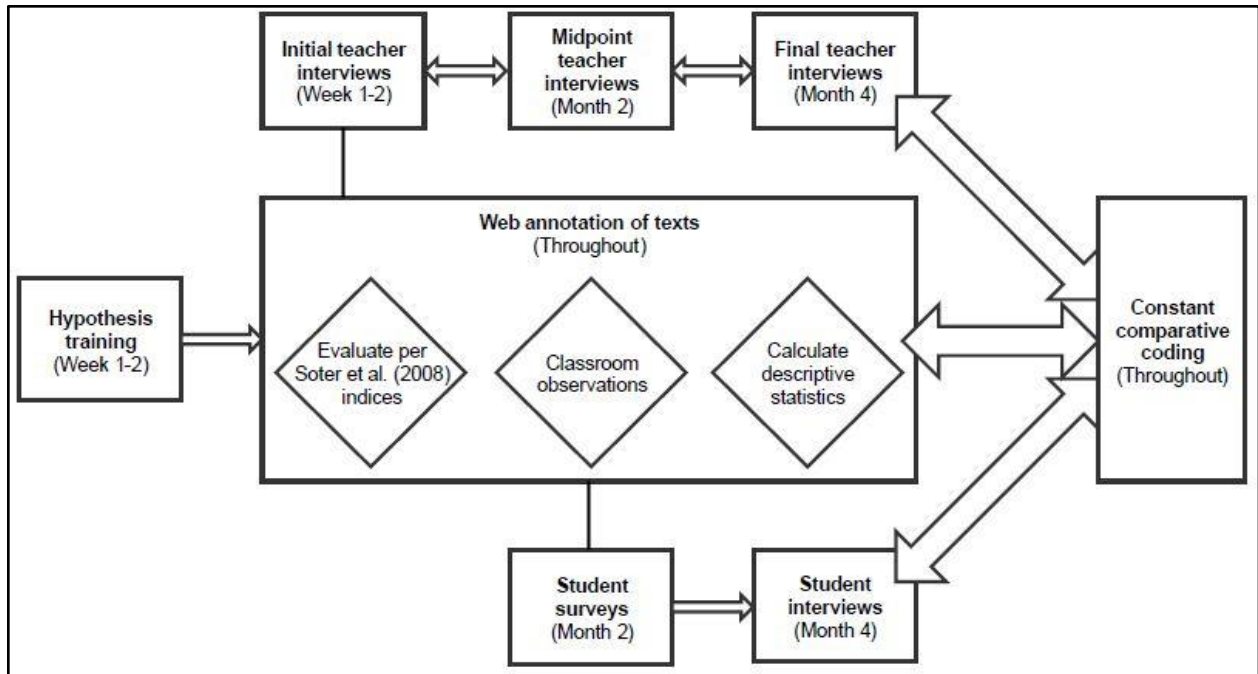
### **Data Collection**

As a framework for considering overall research design and specific strategies for gathering data, I used Collins' (2010) description of purposive sampling. In a multistage purposive sample, a researcher (a) makes decisions about samples based on a concurrent or sequential design, (b) identifies the relationship between samples, (c) considers combining

sampling schemes based on the expected generalizations from the study, (d) ensures the various types of data collected will address all research questions, and (e) determines the emphasis placed on each type of data in forming eventual inferences and implications from the study.

Aligning with that process, this study used a sequential design, where data from one phase of the study informed a successive stage. For example, initial samples were a combination of purposive and convenience, because the pool of potential participants was limited to the schools and teachers that were locally available for observation and willing to participate in this study. On the other hand, restricting my research sites to two schools allowed me to spend significant time observing each class, thereby gaining a better understanding of the culture that characterized each classroom and the nature of discussions in each setting.

Towards the beginning of the study, I sat down with each teacher for an initial interview to collect important contextual information about the teacher and her students. Following that, between August and December, I visited each classroom once a week to observe each class, during which I maintained field notes to document the nature of F2F discussions, to observe how each teacher implemented web annotation, and to become familiar with the culture of the classroom generally. Halfway through the study, in the final week of October, I conducted interviews with each of the teachers, and I administered a Likert-scale survey to measure student perceptions of web annotation. Then, in the final week of the study, in mid-December, I conducted interviews with a subset of students in each class, as well as a final interview with each teacher. Throughout the whole process, from August to December, students were annotating texts assigned by their teacher and I was measuring, based on Soter et al.'s (2008) indices, the extent to which those annotations exhibited discourse features associated with high-level thinking and textual understanding (see Figure 2 for an overview of the research process).



**Figure 2.** Overview of Procedures.

This study emphasized the qualitative strand as the dominant data source to address the research questions, but Likert-scale survey data helped to illuminate student perceptions of the process and stratified student responses so I could select a strategic subsample of students to interview. A careful consideration of the research questions presented above informed the data collection instruments used. The research methodology, procedure, and instruments used are explicated in more detail in the following section.

### **Data Collection Instruments**

Data for this study were collected between August and December of the Fall 2019 semester. Data for this study included (a) semi-structured teacher interviews (conducted at the beginning, midpoint, and end of the study); (b) annotations within Hypothesis, the web annotation tool; (c) field notes from classroom observations; (c) student responses to a survey; and (d) semi-structured interviews with students. In the following section I describe in greater

detail how I collected data for my study, and how my data corpus allowed me to address the research questions that framed my study (see Table 1 for an overview).

**Table 1**

*Alignment between Research Questions and Data Collected*

<b>Research Question</b>	<b>Data</b>
How do ELA teachers use web annotation to support student comprehension of texts?	Teacher interviews and field notes.
To what extent, if any, does web annotation appear to support student comprehension of texts?	Web annotations evaluated according to Soter et al.'s (2008) indices.
How do ELA teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?	Teacher interviews, student survey, and student interviews.

**Teacher interviews.** Semi-structured interviews with each of the teachers facilitated a deeper understanding of how and why they implemented web annotation practices with students, of student and teacher perceptions of web annotation using Hypothesis, and of the their perceptions of the quality of thinking or depth of textual understanding that students demonstrated. The first teacher interview (see Appendix B) took place the week prior to the start of the school year, in early August, and focused on how the teachers expected to implement web annotation with their students, including their expectations for students, and how they planned to determine the level of student understanding. The interview protocol also prompted teachers to describe the role that discussion traditionally played in their instruction, providing additional context for my classroom observations. These initial interviews lasted around 15 minutes.

A second interview (see Appendix C) with each of the teachers took place toward the end of October, the halfway point of the study, and followed up on their expectations and goals for student learning, exploring their perceptions of the role of web annotation in supporting students' comprehension of texts and the influence they believed web annotation had on F2F discussions to that point; additionally, the teachers described how they had used annotations to that point in their planning and assessments. Each of these midpoint interviews lasted 15-20 minutes.

A third and final teacher interview (see Appendix D) took place in mid-December, in the final week of the study, and explored their thoughts about how they implemented web annotation, the quality of student dialogue using Hypothesis, and perceptions of the usefulness of web annotation in supporting student comprehension of texts. Each of these interviews lasted about 20 minutes. All teacher interviews were transcribed in their entirety for further analysis, coded, and analyzed using open and axial coding (Strauss & Corbin, 1990).

**Hypothesis annotations.** One goal of this study was to examine whether web annotation supports student comprehension of texts through fostering dialogic discussion. In this case, the web annotation tool used was Hypothesis, a web browser extension that allows readers to highlight and annotate digital texts while viewing and responding to others' annotations. Students in each of the teachers' classes annotated eight texts, resulting in a total of 16 annotated discussions, all of which were available to me through the Hypothesis platform. Founded upon the research-based link between student comprehension and dialogue (Bakhtin, 1981; De Lisi & Golbeck, 1999; Murphy et al., 2009; Nystrand, 2006; Piaget, 1985; Soter et al., 2008; Wertsch, 1991), I gathered all participants' annotations within Hypothesis to analyze the prevalence of characteristics associated with high-level thinking and textual understanding, as measured by Soter et al.'s (2008) indices.

The manner in which teachers structured web annotation activities differed between the two cases. For example, Mrs. Jorgensen was teaching a unit about heroism, so all eight texts were related to that overarching topic. Typically, she would lead her students in a F2F discussion to start the class period, after which she would introduce the text to be annotated. Students in her class annotated during class time on school-issued computers, typically for 20-25 minutes, as a private whole-class group on Hypothesis. This meant that only people in the class could see their

annotations on the text, and every student could see what all the other students were annotating. Each web annotation activity was followed by a F2F discussion led by Mrs. Jorgensen and designed to draw upon the ideas students annotated to more fully understand the text. Because texts were introduced, web annotation activities were completed, and F2F discussions occurred typically on the same day, I chose to observe on those days, comprising eight of my 14 total visits.

In the other class case, Mrs. Reynolds' goals for student learning were focused on literary analysis, so F2F discussions in her class centered on students getting experience finding and talking about literary devices used in texts. These F2F discussions would then lead to Mrs. Reynolds assigning web annotation activities as homework. Students in this class were organized by Mrs. Reynolds into groups of three or four, meaning that web annotation discussions were visible only to the students in that small group. Mrs. Reynolds would typically review all groups' annotations and use them as starting points for whole-group F2F discussions during the next class period. Due to this setup, it was not feasible for me to observe every class session in which Mrs. Reynolds introduced the text and discussed the learning goals and assignment expectations; in times where I was not present for such, Mrs. Reynolds relayed those details to me through email. I was, however, present to observe all F2F discussions that followed up on and extended web annotation discussions of the eight texts.

**Field notes.** Field notes were written during each classroom observation and helped to explain how teachers prepared students to participate in the web annotation process, the role that annotations played in the teachers' instructional practices and discussions with students, and general perceptions of how web annotation appeared to support text comprehension. Observations also focused on the typical role of F2F discussion in each classroom, providing

valuable context for the nature of discussions that occurred via web annotation, and on whole class discussions about texts that students had finished annotating. Additionally, field notes included descriptions of the teachers modeling Hypothesis, elements of web annotation that confused students or caused interruptions in learning activities, patterns in how the teachers utilized previous annotations to guide future instruction, and observations of mood or other noticeable indicators of how receptive and engaged students were as they practiced or talked about web annotation while in class. These observations occurred a total of 14 times in each classroom over the course of the study.

**Survey of student perceptions.** As explained, this study followed a sequential research design (Collins, 2010; Leech & Onwuegbuzie, 2009). In my case, this meant that Likert-scale survey data informed my selection of students to interview and both data sets were analyzed within their respective phase and then interpreted overall at the end. In the second month, near the end of October, I administered a Likert-scale survey that asked students for feedback about the perceived impact of web annotation on their comprehension of texts (see Appendix A). This measure provided snapshot data of overall impressions from the whole sample of students. Moreover, survey data identified students who felt like they strongly benefited from the annotation process, students who felt like they did not benefit much or at all, and students somewhere in between. Based on those criteria, I next used purposive sampling (Collins, 2010) to select a sample of three students from each class to interview that represented a broad range of such perspectives: one student who reported overall positive perceptions of web annotation as a tool for textual understanding, one who reported overall negative perceptions, and one student somewhere in between. Survey items were also analyzed for centrality and for descriptive purposes, providing greater breadth of understanding for resultant discussions and implications.

**Student interviews.** As previously mentioned, I also conducted interviews with a subset of students to investigate their perceptions of the usefulness of web annotation in supporting comprehension of texts (see Appendix E). Specifically, these student interviews measured their overall thoughts about the role of web annotation in textual understanding, their perception of what dialogue looked like using the platform, and the relationship between online and F2F discussions. Student interviews took place in mid-December, during the final week of observations and on the same day as the final teacher interviews. Each student interview lasted about 10 minutes.

All student interviews, like the teacher interviews, were transcribed in their entirety for further analysis, coded, and analyzed using open and axial coding (Strauss & Corbin, 1990). These interview data were then synthesized with Hypothesis annotations coded using the aforementioned indices of student talk, field notes, student surveys, and descriptive analytic data. The following section details how these data were integrated to investigate and report on ELA teachers' and students' use of web annotation to support text comprehension.

### **Overview of Procedures**

In the weeks leading up to the start of the school year, I visited the two secondary classrooms to help teachers set up Hypothesis on their computers and work through any initial challenges with learning to use the tool. During the first two weeks of the study, I visited each classroom twice to help train students in the process and features of web annotation via Hypothesis, to set up private Hypothesis groups for each class, to support the students' conducting trial annotations on sample texts, and to resolve any technology issues.

I also coordinated with the two teachers to plan when they intended to discuss texts that had been annotated so that I could observe classroom discussions and related activities. These



observations occurred in each classroom at least twice per month throughout the study—including eight visits for the eight texts that were annotated—and helped me to understand how the teachers and students utilized web annotations in class to shape their discussions and thinking about the ideas presented in the texts.

At the end of the second month, using a Google Form, I administered the Likert-scale student survey (see Appendix A) to capture their perceptions of the usefulness of web annotation in supporting textual understanding. I calculated descriptive statistics to determine centrality of students' perceptions regarding the role that web annotation played in helping them to understand texts, whether their annotations built upon their peers' annotations and vice versa, and their overall attitudes about web annotation. From these data, and using the purposive sampling criteria described above, I selected a subsample of students to interview in the final month of the study.

Interviews with teachers took place at three strategic points in the study. The first teacher interview occurred at the beginning of the semester to describe these teachers' motivations and goals related to web annotation. The next teacher interview, towards the end of the second month of the study, explored the teachers' choices for implementing web annotation and their observations to that point. The final teacher interview occurred at the end of the study to reflect upon the overall usefulness of web annotation to support students' comprehension of texts. Interview questions were based on the protocols in Appendices B, C, and D but were also informed by patterns in what had been observed from analysis of annotations to that point. As I transcribed and reflected upon these interviews, I developed additional questions to explore with the teachers during subsequent site visits. In this way, my approach to data generation through interviews was recursive in nature. Additionally, as semi-structured interviews, follow-up

questions were formed in the process of the interview in order to clarify or extend teacher responses. Student interviews exhibited the same semi-structured characteristics and were additionally informed by the interviewees' individual survey responses, but they only occurred once—in mid-December during the final week of the study. After interviews were conducted and transcribed, they were imported into ATLAS.ti (a digital platform for coding qualitative data). That process, as well as the processes I employed to analyze all other data in this study, are described in detail in the following section.

### **Data Analysis**

Because I gathered data using various instruments to address my research questions and increase the richness and trustworthiness of my findings, I also utilized a variety of methods for data analysis. In this section, therefore, I articulate the processes I employed to analyze data gathered from (a) interviews and field notes, (b) web annotations, and (c) student survey responses.

#### **Interviews and Field Notes**

As a reminder, data from this study included three interviews with each teacher (conducted at the beginning, midpoint, and end); interviews with three students from each class (conducted in the final week); and consistent field notes throughout the study from my 14 observations at each research site. Because I used the same methods to analyze data from all of these sources, I include them all together in this section.

All teacher and student interviews occurred at the school site and were recorded using the audio recording feature from my smartphone. After interviews were conducted, they were transcribed using Rev (an online transcription service). Transcribed interviews were then imported into ATLAS.ti (a digital platform for coding qualitative data). Field notes were

recorded on my laptop using a Google spreadsheet that included columns for the date and time of the note, the activity students were engaged in, and specific details I observed during each activity. Additionally, I included a column titled “Patterns, Insights, or Breakthroughs” that gave me a space to reflect after observations and distill my thoughts into larger trends over time or major turning points in what I was observing; those ideas then informed some of the follow-up questions I asked teachers during interviews, an example of the recursive, interrelated nature of these two data sources. After classroom observations were complete, I imported all field notes into ATLAS.ti for coding.

All interviews and field notes were coded using constant comparison (Strauss & Corbin, 1990), which included gathering and analyzing survey and field note data, creating categories, and returning to previous data in a recursive process until reaching a point of saturation. Using this method, I first engaged in open coding, which involved a search, line by line across data, looking for any patterns in words or phrases that seemed relevant to my research or particularly insightful, creating categories to organize data. This initial process of open coding helped to “probe beyond the behavioral descriptions, considering the social meaning or importance of what [was] happening” (Dyson & Genishi, 2005, p. 85). After coding in this manner, I revisited the interview and field note data to look for relationships among categories, thereby engaging in a process called axial coding, which is described by Strauss and Corbin (1990) as putting “data back together in new ways by making connections between categories” (p. 97). These open and axial coding processes enabled me to convert raw interview and field notes data into recurring themes and overarching ideas that were included in my eventual findings and implications for this study.

## Web Annotations

As explained earlier, each class annotated eight texts in total, and the texts and students' annotations were available to me through the Hypothesis platform, allowing me to gather and code annotation data throughout the study. I read through annotations as students viewed them—embedded within the text—and analyzed the extent to which web annotation activities appeared to support comprehension of texts. To do this, I used a series of indices that research associates with improved comprehension (Soter et al., 2008) as an evaluation of the quality of their online interactions. Having conducted an exhaustive review of research on classroom discourse, Soter et al. identified the following indices for evaluation of quality talk: Authentic Questions, Uptake, High-Level Thinking, Affective Response, Intertextual Response, Shared Knowledge Response, Elaborated Explanation, and Exploratory Talk (see Table 2 below for a description of each of these categories). A second coder trained in these indices was recruited to increase reliability.

**Table 2**  
*Indices of High-Level Thinking and Comprehension of Texts*

<b>Annotation Type</b>	<b>Definition</b>	<b>Example</b>
Authentic Question	Open-ended question in which the author genuinely seeks an answer.	“Why is she so fixated on the shoes? What’s so special about them?”
Uptake	Any contribution that responds to something another participant has said.	“I agree. Her mom is trying to make her daughter someone she is not to make a good impression.”
High-Level Thinking	Thinking that goes beyond summarizing/reporting and into analysis, generalization, or speculation.	“I think this makes the essay unique. It compares what she does and how she fixes things to how people changed/built the world.”
Affective Response	Connection made between a text and feelings or personal life events.	“I don’t realize how good I have it. When I stay up late to work on an essay it is because I procrastinated, not because I had work until 12 AM.”
Intertextual Response	Connection made between a text and other texts (including art, media, TV shows, news, etc.).	“I feel like this is going to be like <i>Hunger Games</i> and they are getting their names pulled to fight against the other villages.”

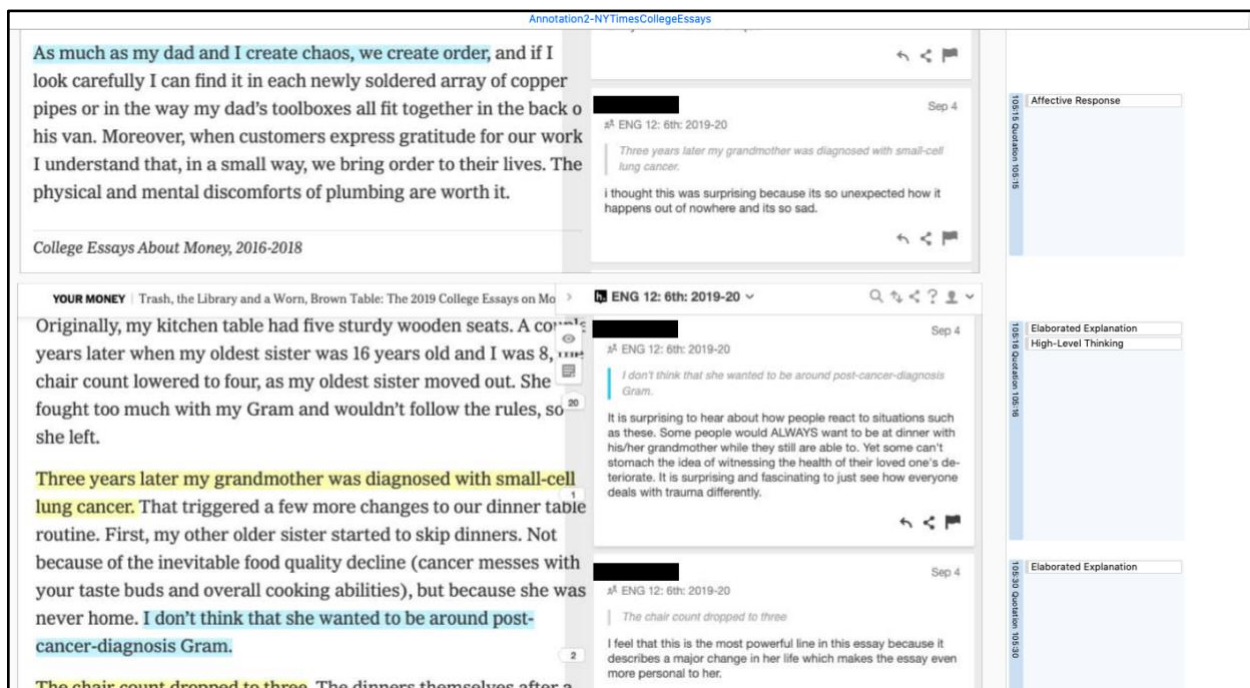
**Table 2 (Cont.)***Indices of High-Level Thinking and Comprehension of Texts*

<b>Annotation Type</b>	<b>Definition</b>	<b>Example</b>
Shared Knowledge Response	Connection made between current and previous class discussions or genres of interaction.	“Zach mentioned last time in class, it doesn’t have to be a superhero...”
Elaborated Explanation	Thinking that is explained in detail through an assertion and specific reasons in support of that assertion.	“There are many reasons a person could be considered ‘evil’...there are psychological reasons...there are childhood experiences and trauma...or even the fact that...”
Exploratory Talk	Co-reasoning where students build knowledge over turns, considering others’ thoughts and thinking collectively.	S1: “Why did the dad leave? Was it the mother’s fault?” S2: “It said, ‘Disappeared into memory.’ Maybe the dad died?” S3: “That’s what I thought happened.” S4: “Maybe he left before the girl could ever meet him or when she was a little baby.”

*Note.* These indices and definitions are derived from Soter et al. (2008), and the examples shown come from student annotations in this study.

Using the aforementioned indices, I coded all of the student- and teacher-generated annotations and counted the frequencies of each of these indices to infer the extent to which the online discussions appeared to support high-level thinking and comprehension. Figure 3 (below) is a screenshot depicting how these codes appeared in connection with the text students read and annotated. I coded the first example annotation as Affective Response because it includes an emotional response from the student (“...and its [sic] so sad”). I coded the second example as Elaborated Explanation because it shows the student’s assertion (people deal with trauma differently) and multiple examples to support that assertion (“Some people would ALWAYS want to be at dinner with his/her grandma while they are still able to,” and “Yet some can’t stomach the idea of witnessing the health of their loved one’s [sic] deteriorate”). I also coded that same annotation as High-Level Thinking because it exhibits a student going beyond the text to make generalizations about human nature and to present some analysis of how the person in this

excerpt chose to respond to trauma. The final example in Figure 3 is an example of an annotation where I deliberated over what to code it, eventually deciding on Elaborated Explanation because there was an assertion (“This is the most powerful line in this essay”) and two reasons (“It describes a major change in her life,” which in turn “makes the essay even more personal to her”). Although it did not have the depth of thinking or analysis to qualify as High-Level Thinking, it still was an Elaborated Explanation.



**Figure 3.** Screenshot of Annotations as Coded in ATLAS.ti.

After coding all annotations from the eight texts in both class cases, I employed Hatch’s (2002) process for typological analysis, whereby I looked for patterns within each index and then used the patterns as a lens to look back across all indices. For example, I examined annotations coded as High-Level Thinking from all 16 texts to look for patterns in the types of things students said, the types of texts that elicited high frequencies of the code, and the structure the teacher put in place for the annotation activity that resulted in high frequencies of the code. I engaged in this process for all eight of Soter et al.’s (2008) indices, and then examined patterns

across all indices. These data and analyses were crucial to investigating the online aspect of learning from texts and from engaging in dialogue with others, addressing my second research question regarding the extent to which web annotation appears to support students' understanding of the texts they read.

As a quantitative measure designed to provide snapshot data regarding trends in web annotation activities, I calculated the following descriptive statistics for each annotated text: number of annotations, number of initiating annotations (an initial annotation that could potentially start a discussion thread), number of replies, mean words per annotation, number of participants, number of conversation threads, and number of days the text was annotated. These data helped provide a frame of reference across the various texts because they highlighted over time the texts and pedagogical approaches that resulted in greater participation, a higher number of conversation threads, longer student responses, or more sustained discussion over time. Additionally, I compiled the following descriptive statistics for each student: total number of annotations, number of initiating annotations, and number of replies contributed, all of which were stored within Hypothesis' analytics database. These data helped provide a frame of reference across the various participants because they revealed students who were frequent contributors and the nature of their contributions.

### **Student Survey**

As mentioned earlier, the student survey was administered at the midpoint of the study, at the end of October, and it was comprised of nine Likert-scale questions and one open-ended response regarding overall student thoughts about web annotation in ELA. After administering the survey and gathering all responses via Google Forms, I computed the frequencies of student responses in each of the five Likert categories (Strongly Agree, Agree, Neither Agree nor

Disagree, Disagree, and Strongly Disagree). This allowed me to make judgments about the prevalence of agreement or disagreement with any given survey item and to compare trends between the two class cases.

Then, following Allen and Seaman's (2007) recommendation for analyzing Likert-scale survey data, I used the median score as representative of the average student response to each survey item. To do this, I input survey scores into SPSS (a statistical software package used for quantitative data analysis) and reported the median for each of the nine items in both classes. Although not an extensive report of centrality, these quantitative measures provided helpful snapshots of student perceptions that informed both my selection of a subset of students to interview in the final week of the study and the eventual findings regarding my third research question. Moreover, survey data proved valuable in an effort to enhance the trustworthiness of my research findings. The next section details, in addition to the triangulation provided by student survey data, the principles I followed to strengthen the trustworthiness of my qualitative data.

### **Methodological Trustworthiness**

This study's trustworthiness was ensured through various methods described by Creswell (2007). These included prolonged engagement and persistent observation, triangulation of data, peer debriefing, clarification of researcher bias, member checking, and rich description. This section provides a description of each of those methods and how they were applied to my study.

Prolonged engagement and persistent observation occurred as I visited each classroom four times each month over the course of the four-month study, collecting field notes and engaging in interviews with participants in multiple phases of the study. Triangulation occurred through the various sources of data, comparing analysis of annotations based on Soter et al.'s



(2008) indices with findings from interviews, field notes, and survey results. Using interrater reliability as an additional measure of trustworthiness, my dissertation chair and I co-coded four of the 16 total annotated texts, resulting in a 91.89% interrater reliability coefficient. I participated in peer debriefing with my dissertation chair throughout the process, allowing many opportunities to engage in dialogue and consider the *devil's advocate* perspective (Lincoln & Guba, 1985), thereby strengthening my eventual findings and discussion.

Considering Richardson's (1994) assertion that researchers should be transparent with their stance and potential biases, I clarified my existing research philosophies and biases within a *researcher reflexivity* statement. Additionally, I included member checking to align my findings and discussion sections with the teachers' views of what happened throughout the process. And through the writing of the final report, I used rich, thick description that provided enough detail for readers to come to their own conclusions about potentially shared characteristics with their settings or the usefulness of these research findings.

My data and discussion work together to provide *naturalistic generalization* (Stake, 1995), thus giving readers "a vicarious experience in the studied site," allowing them the ability to "generalize from that experience in private, personal ways, modifying, extending, or adding to their generalized understandings" of how web annotation may play a role in student comprehension of texts (Dyson & Genishi, p. 115).

This chapter has provided a detailed description of the research design and methods I employed to collect and analyze data for the study. I have specified each data collection instrument and how they work together to address all research questions. I have also described the safeguards I have put in place to protect the trustworthiness of my findings. In the next

chapter, I present my findings from analysis of the two cases under investigation in this research study.

## **CHAPTER IV: FINDINGS**

This chapter presents the findings from the two cases in this study: Mrs. Reynolds and her 9th grade class, and Mrs. Jorgensen and her 12th grade class. Beginning with Mrs. Reynolds and moving to Mrs. Jorgensen, I present a narrative of events as they occurred in this study, drawing on data I collected and incorporating the participants' voices whenever possible to support my analysis. As explained in Chapter 3, I drew on teacher interviews to address my first research question, "How do ELA teachers use web annotation to support student comprehension of texts?" Student annotations were evaluated in an effort to address my second research question, "To what extent, if any, does web annotation appear to support student comprehension of texts?" Student surveys, in connection with their survey responses, were analyzed alongside teacher interviews to address my final research question, "How do ELA teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?"

### **Mrs. Reynolds' 9th Grade Case**

Mrs. Reynolds was teaching 9th grade honors ELA at Fairview High School, a comprehensive public high school in a suburban community in the southern US. She was in her 6th year of teaching at the time, and she participated in this study because technology was a big part of what she did with students on a weekly basis; she felt that students needed to have experiences with digital tools for educational purposes so they would be prepared for an increasingly digital future. She enjoyed being around her students, and she was heavily involved in extracurricular activities at Fairview, serving as an assistant coach for both the golf and swim teams. Additionally, Mrs. Reynolds chose to implement web annotation with this specific class because all 9th grade honors ELA classes at the school were required to do annotation activities

to prepare for exams, and she felt the digital aspect would be valuable for them and helpful for her.

I met with Mrs. Reynolds the week before school began in August 2019 and interviewed her to identify her goals for student learning via web annotation and how she planned to implement the Hypothesis platform into her instruction. This was the first of three interviews with Mrs. Reynolds, all of which were designed to help answer my first research question: “How do ELA teachers use web annotation to support student comprehension of texts?” In addition to examining Mrs. Reynolds’ learning goals and vision for implementing web annotation, this initial interview shed light on the role discussion traditionally played in her instruction, providing valuable context for my classroom observations.

### **Mrs. Reynolds’ Motivations and Goals for Web Annotation**

When asked about her motivations for using web annotation with her 9th grade students, Mrs. Reynolds stressed her desire to get students to slow down when reading in order to spend more time thinking about what is happening in the text and why an author might use certain literary devices. She also saw potential benefits from having students read, respond to, and dialogue about digital texts for educational purposes. These motivations led her to consider how she might structure reading and annotation activities to support close reading, promote deeper thinking, and more effectively organize student learning.

**Reading with a purpose.** In a description of her experience as an ELA teacher, and foregrounding her desire to help students understand and learn from literature, Mrs. Reynolds mentioned that they often read too quickly with the result that they only pull surface-level ideas from the text. In her quest to experiment with instructional activities that support students’ thinking more deeply about material they read, she understood web annotation and Hypothesis as

a potential tool she could use to support their close reading of short stories. Prior to asking students to annotate a text, she planned to provide them with specific instructions and prompts so they would be more intentional in looking for literary elements and analyzing compositional choices an author made in writing a short story. Web annotation, she hoped, would require students to slow down and read a text more carefully than they might otherwise. To utilize web annotation as a tool for learning from texts, she felt it important that students receive guidance in how to annotate and have opportunities to discover how annotation can help them dig more deeply into texts and learn more from them. Because 9th graders, from her perspective, often do not know what, why, or how to annotate, she planned to provide explicit instruction in those regards.

**Learning how to have productive dialogue.** It was clear from our interview that Mrs. Reynolds frequently used class discussion to support learning from texts. She valued having “academic conversations, being able to have a discussion with someone, disagreeing with them or even building on their ideas—it is very important...English lends itself to discussion and it’s the whole point. We’re discussing these texts and you’re in conversation with the author and other people” (Initial Interview, 8/28/19).

As Mrs. Reynolds envisioned a web annotation platform that would allow students to read digital texts, annotate their thoughts, and engage in discussion with each other, she reported some trepidation and concern. In a F2F class discussion, she would customarily lay ground rules for discussion etiquette, such as not talking over someone else, respecting others’ views, and focusing comments on academic ideas; in that setting, she would always be present to monitor the discussion and ensure things were headed in a positive direction. In online settings and without clear guidance or constant monitoring, she worried that annotations would become

haphazard, students wouldn't know how to engage in dialogue, and discussions might get messy because "you never know what they're going to post. It's hard to police that the entire time" (Initial Interview, 8/28/19).

**Using digital texts in the ELA classroom.** Related to reading with a purpose, Mrs. Reynolds also valued the digital nature of web annotation because she assumed that it provided structure and formality to the process of reading digital texts. In our initial interview she shared her belief that students read and interact with text on their digital devices every day with the result that they assume that digital reading is meant for outside of class and regard it as different from the types of learning activities they do in ELA classrooms. As Mrs. Reynolds explained, "Too many times they are reading a blog or an article and they are just reading it, whereas if I give them a piece of paper, they're like, 'Oh, this is an assignment'...[both digital and print texts] can be an assignment" (Initial Interview, 8/28/19). She wanted to change that perception and show students that they should be reading digital texts for educational reasons. In more academic terms, she hoped to help them understand that their in-school literacy practices should blend with their out-of-school literacy practices.

In addition, Mrs. Reynolds valued the practical convenience that web annotation might afford her and her students. From a teacher's perspective, she stated that "digital information is so much easier to send and assign to students, and even the ease of me taking it home to grade it, I can pull up and open my computer—which is one item—compared to taking home 150 pieces of paper, or more" (Initial Interview, 8/28/19). From a student's perspective, she thought it would be helpful for students to document their learning in a sort of digital portfolio. It could also help them keep track of their reading homework because they would always have their

Chromebook in class, so they would always have a record of their reading and their thinking and could thus access it for class activities.

### **Expectations for Student Participation**

When asked about how she planned to consider and assess levels of student participation in web annotation, Mrs. Reynolds emphasized quality over quantity. She suggested that she would rather see a student provide “a few really deep things” than a bunch of “small, insignificant notes” (Initial Interview, 8/28/19). For example, she regarded annotations that might include recall, definitions, or basic rephrasing of the text as less significant contributions; instead, she hoped to see evidence of inference, analysis, and thought-provoking questions throughout students’ web annotation discussions. She went further to say that, although one in-depth annotation that shows elements of inference and analysis is a good thing, she hoped to see students more fully explain the steps and processes guiding their high-level thinking by providing several annotations throughout a text. In other words, quality annotations were the foremost goal for Mrs. Reynolds, but she also wanted students to become more adept at breaking down and showing evidence of their thinking through a certain quantity of annotations as well.

As mentioned earlier, Mrs. Reynolds planned to use web annotation via Hypothesis with short stories, but she also hoped to have students annotate poetry, articles, and excerpts from novels throughout the year as well. Her curriculum during the fall semester of 2019, in part organized by a team of ELA teachers at her school, focused largely on short stories but also included a unit on *Romeo and Juliet*, so those were the texts under examination for my study. She mentioned that she was not sure how she would grade student participation but would discuss with her ELA team to make sure her strategy was comparable to their plans with similar texts.

## **Expected Challenges with Web Annotation**

In our initial interview, Mrs. Reynolds described the challenges and obstacles she expected to confront as she implemented web annotation with her students. As explained, she had concerns about students being respectful and academic in their language use as they interacted with their peers' ideas, and she was not sure how to assess the quality of annotations in a systematic, fair, and feasible way. Beyond those concerns, of course, were concerns about the technology itself: how could she ensure the Hypothesis program would work on school laptops? What would the learning curve be for a platform that students have most likely never used before? What would she do if the wireless network was not functioning? Further, she stated that some of her students seem to actually prefer handwriting to typing, so she was deliberating whether to give students the choice to annotate manually or digitally but decided to require all students to participate in web annotation as part of her class for these four months. Considering these potential challenges, Mrs. Reynolds planned to introduce web annotation by teaching about what annotation can do for readers and then getting the class set up with Hypothesis.

## **Introducing the Practice of Annotation**

From the first classroom observation at Fairview High School with Mrs. Reynolds, it was clear that students were comfortable in her classroom and motivated to participate in class activities. Mrs. Reynolds would lead discussions by calling on a wide range of students to provide input or share their thoughts about her questions. During my first field observation, she sought to prepare students for web annotation activities by having them talk about what annotation should look like and what makes some annotations more effective than others.

These 9th grade students were just beginning their second week of classes for the school year, but they had been asked over the summer to read several texts and annotate them as



practice for the Pre-AP College Board exams they would take later in the year. Mrs. Reynolds, during my first visit, asked the students to discuss their preliminary experiences with annotation in pairs and to consider what they did as they read, what their annotations looked like, and how they went about the process of annotating texts they read. Students suggested that annotation helped them to break stories and big ideas down into smaller parts, to more fully understand what the author was saying, and to find and remember information that may be important later.

Mrs. Reynolds built upon their responses by stating that the next few months would include a lot of annotation, guided by purposes and prompts. She then provided several examples of annotated texts and asked students to examine what annotation *is* and what it appeared to *do* for the annotator in these specific contexts. Students noticed that annotations often focus on the most important details or central ideas of a text, but that they are also often used to highlight unfamiliar words or confusing parts of a text. Mrs. Reynolds suggested that, in her class, students should highlight a word they don't know, find the definition, and write it in the margins as a way to expand their vocabulary and help them more fully understand the text. One student shared that annotations can also help readers to ask questions about a text, and Mrs. Reynolds agreed, adding that annotations in her class would center on literary elements, helping students focus on choices an author made and how texts were organized to convey a story or achieve specific purposes. She concluded by saying that annotation activities would help students ask *why?* as they read, causing them to step further into a text and consider why authors used certain literary elements in short stories. This introductory discussion thus provided a way for Mrs. Reynolds to lay the ground rules of effective annotation in her class and with the texts they were going to analyze.

## **Mrs. Reynolds' Web Annotation Implementation**

Following that introductory discussion, Mrs. Reynolds introduced web annotation to her students. She discussed the benefits of having options in regard to how one read and annotated texts and the importance of gaining experience using digital tools for educational purposes. She spent a few minutes giving an overview of Hypothesis and showing how they would be reading, annotating, and digitally discussing texts over the next four months. Students then took out their school-issued Chromebooks and followed her instructions on how to set up and use the Hypothesis platform. They each created their own free account and joined the private class group. Because Hypothesis runs on Chrome as an “extension” (a program that is enabled or disabled simply by clicking an icon in the upper-right corner of the browser), students were directed to the Chrome Web Store and asked to add it to their browser. However, because the school district set permissions on school-issued laptops, students were blocked from installing the extension and were thus unable to use the web annotation tool. Mrs. Reynolds had anticipated this would happen and had submitted a ticket a week earlier to the district’s technology specialist to approve the Hypothesis extension, but the students were still prevented from installing and using the web tool. She had planned to introduce a digital short story and provide instructions for reading and annotating online as homework, but due to circumstances decided it would have to wait until the following week, after the district had ironed out installation permissions.

Adjusting her plans for the day, Mrs. Reynolds instead lead students through a traditional pencil-and-paper annotation activity that focused on a one-page short story. The class read the text three times, each time annotating for different purposes. The first time they looked for parts of the text that either surprised them or which they found themselves expecting; next, they read

the text a second time to highlight key ideas and supporting details; finally, they read it and commented in the margins on the style and structure of the text. This activity was led by Mrs. Reynolds as a think-aloud and offered students a model of things they could attend to, think about, and annotate as they read a text. Mrs. Reynolds again stressed that she expected students to use their annotations to analyze the author’s choices and to comment on the purposes they sensed a text was designed to serve.

With that initial activity serving as an example of the annotation process, and after the Hypothesis platform was approved by the district, the students began annotating digital texts. To help visualize patterns in the levels of participation and types of interactions that students contributed to these annotated texts, I compiled basic descriptive statistics for all eight texts (see Table 3). In the sections that follow, I provide context surrounding web annotation activities over the course of the four months I observed Mrs. Reynolds’ class and conducted analysis on their annotations. I also describe some of the F2F activities I observed during this time that either built upon their online discussions or contrasted with the types of online interactions I observed. These sections, organized by annotated text, address my findings from teacher interviews, student survey responses, and student interviews to present an integrated analysis of the interplay among my research questions, which examined Mrs. Reynolds’ implementation of web annotation, the extent to which student annotations were characterized by indices that research on classroom discourse associates with textual understanding (Soter et al., 2008), and student and teacher perceptions of the usefulness of web annotation in ELA.

**Table 3**  
*Descriptive Annotation Data for Discussions in Mrs. Reynolds’ Class*

Text	Annotations	Initiating Comments	Replies	Words Per Annotation	Participants	Threads	Days
1	140	80	60	9.57	29	26	1
2	304	181	123	12.02	27	94	6

**Table 3 (Cont.)***Descriptive Annotation Data for Discussions in Mrs. Reynolds' Class*

Text	Annotations	Initiating Comments	Replies	Words Per Annotation	Participants	Threads	Days
3	190	168	22	11.95	28	21	2
4	36	36	0	11.95	28	21	2
5	235	196	39	12.59	23	31	2
6	116	82	34	12.58	26	27	3
7	89	68	21	12.06	20	18	5
8	121	93	28	14.83	17	27	8

**Text #1: “The First Day”**

In the last week of August, during the second week of the study and after the district had approved the Chrome extension for use on student computers, Mrs. Reynolds asked me to lead the class in a practice with web annotation using Hypothesis. The students had already used paper and pencil to annotate “The First Day,” a short story by Edward Jones about a mother trying to transfer her daughter to a better school. Students pulled up a digital version of the text and I guided them through how to make the same highlights and annotations on the digital text as they had using pencil and paper. After getting comfortable with the tool, Mrs. Reynolds asked them to go through the text again, this time using Hypothesis to annotate specific instances in the text that revealed character traits of the mother (Field Notes, 8/30/19). The students contributed a substantial number of annotations and the web page was quickly inundated with highlights and text in the margins.

A total of 29 students participated in this first annotation activity, which resulted in a total of 80 initiating comments (defined as a site of potential interaction where a person annotating a text produces an original annotation that may or may not garner a response from another person). Analysis of those initiating comments revealed that students contributed 26 Authentic Questions, most of which—aligning with the prompt Mrs. Reynolds gave—either inquired about the mother’s intentions or explored her personality traits. For example, in “The First Day,” the

mother is told that she has brought her daughter to the wrong school, but she “shakes her head vigorously” and says, “I want her to go here”. A student highlighted that text and asked, “Why is she so insistent on her going to this school?” In line with Soter et al.’s (2008) coding procedure (and informed by Nystrand et al., 1997), anytime a student seemed to genuinely seek an answer to something they didn’t know, I coded it as an Authentic Question. There were 22 instances of Uptake, 16 of High-Level Thinking, 4 of Exploratory Talk, 2 Elaborated Explanations, and no Affective, Intertextual, or Shared Knowledge Responses (See Table 6 for a display of the frequencies of all eight indices found in this and the seven other annotated texts).

Viewing this text in light of the seven others this class annotated, these data reveal that students were contributing a pretty typical number of Authentic Questions and instances of Uptake, but they were not making the types of assertions supported by substantial evidence that are categorized as Elaborated Explanations. As an in-class, initial practice with web annotation, students were not spending substantial time crafting detailed responses but were mainly trying to get a feel for what web annotation would look like for them during this semester.

After seeing how this first annotation led to a large number of annotations that quickly filled up the digital page with the students’ thoughts, Mrs. Reynolds moved forward with her plan to divide the class into smaller, three-person private groups for annotation. She mentioned that this would make the process cleaner, with each person only seeing their small-group partners’ thoughts, while also allowing for more in-depth discussions online that could be built upon when the class returned to talk about the story as a whole group.

### **Text #2: “The Lottery”**

Following this first annotation, Mrs. Reynolds next assigned the class to read the short story, “The Lottery,” by Shirley Jackson. This was done as homework, and students were to

respond to the prompt, “How do the characters in this story relate to the duality of human nature—the idea that every single human being has good and evil within them?” Mrs. Reynolds provided this prompt because she wanted students to pay attention to specific characters and how they reflected the theme of the story. She instructed the students that they were to post their own ideas first and then, because she wanted to facilitate dialogue, they were to respond to others’ ideas in their small group at least six times (Field Notes, 8/30/19).

In annotating “The Lottery,” a total of 27 students contributed 181 Initiating Comments (more than double the number of the first annotated text). In doing so, they posed 94 Authentic Questions. My analysis of the data also identified 121 instances of Uptake, 32 instances of High-Level Thinking, 5 instances of Exploratory Talk, 6 instances of Elaborated Explanations, three instances of Shared Knowledge Responses, three Intertextual Responses, and two Affective Responses (see Table 6). The Uptake total was much higher than the first text because students were required to reply to their classmates six times, but this activity also showed many more instances of the other indicators, signifying that students were engaging in more dialogue and high-level thinking than in the first reading.

Expanding the comparison, these totals were substantially higher than those from all other annotated texts in my data set for Mrs. Reynold’s class; in fact, “The Lottery” produced the highest number of annotations coded in five of the eight indices associated with comprehension and high-level thinking (Soter et al., 2008). Asked how she accounted for the dramatic increase in student annotations, Mrs. Reynolds speculated that it was due to a number of reasons: students were required to post their thoughts and then reply at least six times; they were more interested in the topic of this short story than “The First Day;” and it was their first experience with web annotation on their own and at home. Additionally, she posited that “it could just be the nature of

the text: it leaves just enough to the reader that it creates questions and doesn't explicitly provide all the answers" (Email Correspondence, 2/5/20).

### **Text #3: "The Red Fox Fur Coat"**

The third text Mrs. Reynolds assigned her 9th graders was Teolinda Gersão's "The Red Fox Fur Coat," and this time, she did not require students to contribute a specific number of responses; instead, she had them focus on identifying instances of foreshadowing and on asking questions of the text. She shifted the requirements so students would be more focused on specific literary elements and less on a certain number of annotations. Those expectations are reflected somewhat in my analysis of the annotations, which resulted in a total of 28 students producing 168 Initiating Comments, 36 Authentic Questions, 18 instances of Uptake, 33 instances of High-Level Thinking, 9 Elaborated Explanations, 2 Intertextual Responses, 1 Affective Response, and no Shared Knowledge Responses or Exploratory Talk (See Table 6). Many of the annotations coded as High-Level Thinking included students analyzing excerpts that showed foreshadowing and other literary devices, approaching Mrs. Reynolds' goal for students to explore what writers do as they craft a short story. It was also clear that the frequencies of Authentic Questions and Uptake were substantially lower than in "The Lottery," a drop most likely explained by the shift in Mrs. Reynolds' requirements for responding to others.

It was at this point that Mrs. Reynolds reported being quite excited about Hypothesis because it encouraged students to take notes and made their thinking very accessible for her as the teacher, whether she was in her classroom or at home on a personal computer. She liked how students were working and thinking outside of the classroom, and how Hypothesis enabled absent students to stay on track with readings and discussion topics. She mentioned that students' digital annotations did not exhibit a widespread increase in depth of thought when compared

with traditional activities surrounding class texts, but indicated that she saw from a handful of students' annotations that there was potential for that to be the case.

#### **Text #4: “An Occurrence at Owl Creek Bridge”**

With the next reading, Mrs. Reynolds felt the need to slow down and read deeply with her students, offer more guidance in what effective annotation looks like, and explore their thinking in a F2F setting before having them annotate the text. As a result, the whole class read together the first two parts of “An Occurrence at Owl Creek Bridge,” taking time to talk about what was happening and ensuring that students were following the narrative (Field Notes, 9/18/19). Then, as homework, students were asked to finish reading the short story on their own and make an annotation towards the end in which they shared, in their own words, what they believed had actually occurred—because the ending includes a surprising twist. Having done so, students were to return to the beginning of the story and annotate for clues that might have tipped them off to what was actually transpiring in the narrative.

Reflecting a change in the approach and goals set forth by the teacher, in annotating “An Occurrence at Owl Creek Bridge,” a total of 28 students contributed only 36 Initiating Comments, 10 instances of High-Level Thinking, 4 Elaborated Explanations, and one Authentic Question. There were no instances of Uptake, Exploratory Talk, Affective Responses, Intertextual Responses, or Shared Knowledge Responses. All of these totals were substantially below the average for the different coding categories across the eight annotated texts.

However, this experience was noteworthy in that it sparked a change in how Mrs. Reynolds bridged students' online annotations and F2F class discussions. Because she was feeling like annotation activities were not resulting in a widespread increase in textual understanding, she thought it would be helpful to use specific student annotations to improve



F2F discussions. Therefore, she started reading through the student-produced annotations looking for valuable insights and recurring themes evident in student comments, which she would write down on an index card. She then was able to draw from these ideas during the following class session when she invited the students to build upon their own and others' annotations to explore more deeply the ideas they brought forth.

For example, regarding the ambiguous actions and thoughts of the main character in "An Occurrence at Owl Creek Bridge," Mrs. Reynolds instigated conversation by explaining, "Some of you said in your annotations that this is his imagination, some of you said it was a hallucination, or a calming mechanism..." and then asking students to elaborate on those speculations. This resulted in a discussion that veered away from what was typically seen in F2F discussions in the class—the typical IRE model—and into a dialogic discussion where students were actively driving the thinking, responding to the teacher and each other in a free, open conversation (Field Notes, 9/24/19). They mentioned several instances in the text that made them question what was happening, and they speculated about various alternative perspectives that were not initially apparent in their mind. When I asked her about the decision to start distilling student ideas on the index card and using those in F2F discussions, Mrs. Reynolds stated, "I do like the idea of bringing [small group annotations] to the whole class. Let's take the best pieces of your discussion and talk about them whole-group...because that's something maybe not everyone considered." She and I both saw this as a breakthrough, where student annotations not only informed her planning for the discussion but also served as catalysts for deeper thinking and dialogue about the text.

At this stage of the study, after the class had annotated four of the eight total texts, I administered the student survey to capture student perceptions about web annotation and to

provide data that would inform my selection of students to interview at the end of the study. I also conducted the midpoint interview with Mrs. Reynolds to check on her perceptions of web annotation to that point. Therefore, the following sections move to those findings before returning to the second half of annotation activities.

### **Student Survey**

Administered at the midpoint of the study after students in Mrs. Reynolds' class had used Hypothesis in conjunction with their readings for approximately two months, I administered a student survey designed to illuminate students' perceptions of web annotation and inform my selection of students to interview later in time. Specifically, survey items asked students for feedback about the perceived impact of web annotation on their comprehension of texts (see Appendix A). This measure provided snapshot data of overall impressions from the whole sample of students, but it also helped me identify a student who reported strong comprehension benefits from web annotation, a student who strongly believed web annotation did not positively impact comprehension, and a student somewhere in the middle. These were the three students from this case that I, in turn, interviewed at the conclusion of the study.

In addition to providing a purposive sampling strategy for student perceptions (Collins, 2010), these survey data were analyzed for centrality and descriptive purposes. Per recommendations for analyzing Likert response data (Boone & Boone, 2012), I calculated the median score for each item and frequencies of each response (Strongly Agree, Agree, Neither Agree nor Disagree, Disagree, Strongly Disagree). These data help to illuminate trends in student perceptions within participants in this case and, ultimately, across cases.

Items 1-3 on the Likert Survey (see Table 4, below) captured how students felt web annotation impacted text understanding; Items 4-6 dealt with their perceptions of dialogue using

web annotation and the relation those discussions had with F2F discussions; Items 7 and 8 measured their comfort level using the tool in this context, and Item 9 captured whether they would like to use web annotation in the future. In the sections that follow, I share and examine student responses to the survey, organized by the aforementioned topics.

**Impact on textual understanding.** Responses to the first survey item, “Web annotation helps me better understand the texts we read in this class,” were mixed, with the median response neither agreeing nor disagreeing, while nine students disagreed and seven students agreed. Responses to Item 2, “Sharing my thoughts within Hypothesis enhances my understanding of texts we read,” were also mixed, with nine students agreeing, nine disagreeing, and the rest in the middle. However, when thinking of the impact on text comprehension of seeing other students’ thoughts (Item 3, “Viewing others’ posted comments within Hypothesis enhances my understanding of the texts we read”), 14 students agreed, seven disagreed, and seven were in the middle.

**Table 4**  
*9th Grade Student Survey Results*

Likert Survey Item	Median	SA	A	A/D	D	SD
1. Web annotation helps me better understand the texts we read in this class.	3.00	2	5	12	2	7
2. Sharing my thoughts within Hypothesis enhances my understanding of texts we read.	3.00	2	7	10	5	4
3. Viewing others’ posted comments within Hypothesis enhances my understanding of the texts we read.	3.50	3	11	7	3	4
4. My classmates usually reply to my ideas with comments that build upon my annotations in some way.	3.00	2	9	10	2	5
5. I regularly reply to my classmates’ ideas with comments that build upon their annotations in some way.	3.00	3	8	13	1	3

**Table 4 (Cont.)***9th Grade Student Survey Results*

Likert Survey Item	Median	SA	A	A/D	D	SD
6. Web annotation discussions enhance the face-to-face class discussions we have about the text.	3.00	2	7	13	3	3
7. I am comfortable sharing my ideas with my classmates and teacher via web annotation.	4.00	8	9	8	1	2
8. Hypothesis is user-friendly (i.e., I am comfortable with the technology).	4.00	9	12	3	0	4
9. I would like to use web annotation in other classes.	2.00	4	4	3	7	10

*Note.* SA=Strongly Agree, A=Agree, A/D=Neither Agree nor Disagree, D=Disagree, SD=Strongly Disagree; median scores are based on a 1-5 scale (SD=1, SA=5).

**Productive and useful dialogue.** Items 4-6 measured perceptions of student dialogue using Hypothesis and the relationship between online and F2F discussions. In respect to each of these three items, more students were in the middle (Neither Agree nor Disagree) than any other category. When asked whether their classmates frequently built upon their ideas using Hypothesis (Item 4), 11 students agreed and seven disagreed. Results showed a little less disagreement when asked the inverse—whether they, the survey respondent, frequently built upon their classmates’ ideas using Hypothesis (Item 5). When asked whether web annotation discussions enhanced their F2F discussions of the text, results were mixed, with nine students agreeing and six disagreeing.

**Comfort with Hypothesis.** Item 7 asked about students’ level of comfort using Hypothesis to share their ideas with peers and the teacher. The median response was 4, indicating a general perception that students felt safe and comfortable making their thoughts visible to others. Seventeen students agreed and only three disagreed, with eight students in the middle. Item 8 measured how comfortable they were figuring out the technology and features within Hypothesis, and responses were even stronger in the affirmative than the previous item:

21 students agreed, four disagreed, and three were in the middle—resulting in a median response of 4.

**Overall student perceptions of web annotation.** The final Likert item asked students whether they would like to use web annotation in other future classes. This was designed as a final, overall measure of student perceptions of web annotation, and the results were quite revealing: 17 students said they would not want to use it in the future, eight said they would, and three were in the middle—resulting in a median of 2, the lowest median for any item in the survey.

Finally, the survey included an option for an open-ended response that invited students to share any other thoughts they had about web annotation that might shed light on its usefulness for ELA students. Participants offered a range of responses that shed further light on their perceptions to that point (Table 5, below).

**Table 5**  
*9th Grade Students' Open-Ended Perceptions of Web Annotation*

<b>Positive Response</b>	<b>Negative Response</b>	<b>Nuanced Response</b>
“It makes it easier for us to annotate because we can see what other people have annotated and we can reply to them.”	“I would rather use paper to annotate because I remember the content better.”	“Although it is a brilliant idea and a nice tool, I feel that web annotation servers are better utilized in scenarios where contributors cannot be near each other and therefore cannot converse.”
“It takes less time to annotate things, which leaves more time to do more annotations or read the text more in depth.”	“It’s pretty awful and annotation in general should never be used.”	“I feel like it depends on the group of kids using it. If people in your class are not willing to interact with Hypothesis, the experiences is [sic] worse. When used correctly it is useful.”
“Web annotation helps us students keep up with our work and makes us able to work together outside of school.”	“I do not like web annotation.”	“I like it a lot more than annotating on paper, but still if given the choice I [sic] rather not do it.”

**Table 5 (Cont.)**

*9th Grade Students' Open-Ended Perceptions of Web Annotation*

<b>Positive Response</b>	<b>Negative Response</b>	<b>Nuanced Response</b>
“It is very easy to use and it saves a lot of time.”	“I really don’t get anything out of it.”	
“It helped me understand the text by breaking it down.”	“I just prefer annotating normally.”	
“It helps me see what other students think about a certain part of the text.”		
“I like how I can do it at home.”		

**Mrs. Reynolds’ Midpoint Reflections**

During the same week I administered the student survey (in the final week of October), I interviewed Mrs. Reynolds for the second time, following up on her expectations and goals for student learning and identifying her perceptions of the role web annotation had played in supporting students’ comprehension of texts to that point. Like the first interview, this conversation was semi-structured, which permitted my exploring observations Mrs. Reynolds’ shared in greater depth. During the interview she reiterated the emphasis she placed on students’ needing to read and annotate with a purpose, benefits she felt she had seen from Hypothesis discussions, and strategies she had adopted for using student annotations in F2F settings.

**Reading and annotating with a purpose.** In this second interview, Mrs. Reynolds reported on her initial goal of giving students structure and purpose for their reading and annotating activities. She wanted to provide specific lenses to guide their thinking, such as literary devices students should look for and comment on as they read. When asked to describe how she believed this was impacting students, she explained,

When I have them annotate for a purpose, they know I’m looking for *this thing*. Otherwise, kids will read through a text and annotate, ‘That seems interesting,’ or, ‘Yeah, I agree.’ They’ll go with something really basic, put too much, or put much of nothing at all. A purpose kind of teaches them to view things with a specific lens. (Second Interview, 10/30/19)

She went on to say that because the students were in 9th grade, they needed explicit structure, but she also shared her hope that they would eventually learn how to do the things she asked of them on their own and know that they should be attending to certain features of texts as they read.

When describing how she perceived students' web annotations as reflecting their level of text comprehension or high-level thinking to that point, Mrs. Reynolds expressed moderate satisfaction about the quality of what students were writing. Sharing her belief that these were young high school students who needed teacher support to reach the level she wanted them to, she explained, "With a specific purpose, they know exactly what they are looking for most of the time, so that improves the quality [of their annotations]" (Second Interview, 10/30/19). She noticed that students were typically annotating the minimum number she required for each text, but said she was okay with the quantity of annotations because they were addressing the prompts she provided and were having valuable discussions via Hypothesis. The following sections describe the benefits she perceived from web annotation and her thoughts about the manner in which she had implemented it to that point.

**Perceived benefits from web annotation.** Throughout this interview, Mrs. Reynolds highlighted several aspects of web annotation with Hypothesis that she viewed as benefits. First, she described how it effectively broadened the range of students participating in discussion:

We've got a lot of strong characters and a lot of boys who like to hear themselves talk, so [web annotation] gives a chance for some of those people who don't always want to speak over someone or fight for the floor, it gives them a chance to voice their own thoughts. (Second Interview, 10/30/19)

Essentially, she thought one strength of affordance of Hypothesis was that it leveled the discussion in ways that F2F discussions did not. Because web annotation discussions typically

occurred in her class over a stretch of a couple days, students did not have to worry about being interrupted or rushing to contribute their thoughts.

She also found value in the online setting because it provided some level of permanence to students' ideas and it broke down geographic barriers for learning (students could engage in discussions from home or at school). Citing potential dialogic benefits from web annotation, she remarked, "I like how it can span distance, so when we do have assignments at home, it makes me feel better about sending it home with them because it does give them a chance to bounce their ideas off a classmate" (Second Interview, 10/30/19). Additionally, because she could access their annotations any time after they posted them, she was able to review their notes on the readings in the evenings or during planning sessions at school, finding themes and intriguing ideas that emerged from student annotations. She mentioned wanting to spend even more time doing this because she valued those online annotations and big ideas as starting points for the class's F2F discussions.

Additionally, Mrs. Reynolds appreciated the convenience of digital student writing as opposed to traditional paper and ink. She was more confident that students would do the reading homework because it was automatically saved on the web, preventing them from losing their physical texts or notes. Moreover, these students did not have lockers at Fairview High School, so she felt like they appreciated not having to carry things around with them beyond a single laptop. Finally, she also saw web annotation as a way to prepare students for online learning:

We offer virtual classes at the high school, so there are some kids who strictly take a class online. So we're not just getting them ready for online or hybrid college classes; some of their high school classes are actually online. The ability to access and annotate like this is extremely useful and valuable. (Second Interview, 10/30/19)



This benefit resonated throughout the semester for Mrs. Reynolds as one important reason why she chose to experiment with web annotation and why she continued to find value in its role for student learning.

Finally, when I asked Mrs. Reynolds about the impact web annotation had to that point on students' understanding of text, she brought up the idea of confidence:

I think it's very beneficial for them to be able to make an annotation and then have two or three other people be able to say, 'Hey, that's a really good point.' It just boosts confidence and confirms that they're on the right track. So many times they're questioning if they're doing it right or if they found enough, and it gives them a chance within a small group—a comfortable, safe group—to see others' take on things. (Second Interview, 10/30/19)

Although not a direct measure of textual understanding, this idea of improved confidence is significant because Mrs. Reynolds felt like that boost in confidence helped students become more comfortable in talking about texts, which she hoped would result in greater textual understanding.

**Reflection on implementation of web annotation activities.** As it was the midpoint of the study, this interview provided a valuable opportunity for Mrs. Reynolds to share with me her thoughts about her experiences incorporating web annotation to this point in the study and to reflect upon certain things she had done to implement and scaffold web annotation use with her students. The foremost pedagogical decision that she felt impacted student learning was, as mentioned above, how she gave students a specific lens through which to read each text. She felt that was necessary, especially for young high school students, and she got the sense that they were able to form richer ideas and experience higher-level thinking as a result of that scaffolding.

Having had two months of experience with Hypothesis, she was glad she organized students into small (3-4 person) groups for more intimate annotation discussions:

If I had one large group looking at a smaller text, like maybe an excerpt or even a short story, there wouldn't be enough for everybody to talk about it. And they're not at that level to where they can have a deep discussion with that many people without getting sidetracked or distracted or wanting to be funny. (Second Interview, 10/30/19)

These small groups, she believed, also provided a higher level of comfort because groups stayed the same throughout the semester and students seemed to develop a level of familiarity with their partners.

As mentioned earlier, Mrs. Reynolds decided to start distilling recurring or intriguing ideas students shared in their web annotations. For example, the F2F discussion of "An Occurrence at Owl Creek Bridge," presented above, began with Mrs. Reynolds explaining that she noticed several annotations speculating about what was going on inside the main character's mind and wondering whether the plot details were happening in reality or whether they were in fact products of his imagination; Mrs. Reynolds perceived this as helpful scaffolding for students to extend their thinking about texts, and at this point she felt she needed to do more of that work to ensure that F2F discussions would lead to deeper comprehension and high-level thinking.

Speaking further about the relationship between students' online discussions and their whole-class F2F discussions, Mrs. Reynolds described her intentions to use Hypothesis in an upcoming reading unit: "When we read *To Kill a Mockingbird*, I'd love to have them annotate texts from that and then come in and discuss it, maybe either as a class or in a Socratic [Circle] and see if they pull from their own annotations" (Second Interview, 10/30/19). Her desire to implement online discussions as a precursor to in-class discussions was fueled by her perception that web annotation activities supported students' thinking about texts they read in new ways by bringing their thoughts in conversation with their peers'; additionally, reviewing student annotations helped to direct her focus on parts of the text where students had valuable insights to

share or exhibited what she termed “misreadings” of the text, suggesting that perhaps comprehension was lacking.

Overall, Mrs. Reynolds was optimistic that web annotation discussions would become increasingly meaningful and dialogic as students continued to use it in the second half of the semester, but this interview was highlighted by the feeling that students were not using Hypothesis to engage in dialogic conversations and expand their thinking in meaningful ways. Her prevailing idea was to focus more time and attention on examining students’ annotations and using the most salient ones as discussion points in F2F discussions to facilitate increased textual understanding. The week following this interview, I returned to the classroom to continue observations and analysis of the remaining texts to be annotated.

#### **Text #5: “Lamb to the Slaughter”**

In the class session leading up to the next online reading and annotation activity, Mrs. Reynolds organized a Socratic Circle. In doing so, she asked a small group of students who had read a common novel to form a circle at the center of the room, and the rest of the class formed a large circle on the perimeter. Time was then devoted to student-led dialogue about the book they read, with Mrs. Reynolds adopting the role of passive observer. As I watched students engage in conversation about the text they read, I noticed several examples of Affective and Intertextual Responses. For example, students repeatedly asked and responded to questions about each other’s emotional reactions to the book, trying to put themselves in the main character’s shoes or connecting their lived experiences to those of characters in the book. Multiple students brought up connections to other books they had read or movies they had seen (10/7/19). By comparison, these two categories—Affective and Intertextual Responses—were sparse in my analysis of the

web annotation activities throughout this study, so it was notable that they were so readily apparent in this F2F Socratic setting.

The students' next task was to read and annotate "Lamb to the Slaughter," a short story by Roald Dahl about a pregnant woman who murders her husband with a leg of lamb. Mrs. Reynolds asked the students to comment on the author's choices for literary devices (e.g., dramatic irony, foreshadowing, symbolism, point of view) but did not set a specific requirement for replies. Perhaps due to the dramatic content of this short story, a total of 23 students contributed a substantial number of annotations to this text: 196 Initiating Comments, 48 Authentic Questions, 33 instances of Uptake, 18 instances of High-Level Thinking, seven Elaborated Explanations, two instances of Exploratory Talk, two of Affective Responses, and two of Intertextual Responses. There were no Shared Knowledge Responses (See Table 6).

In each instance these frequencies were higher than average, with the exception of Exploratory Talk and Shared Knowledge, rivaling "The Lottery" as the text with the highest frequencies of these indices. In this instance, it is likely that the substantial increase was due to student interest in the plot twist and murder, because the majority of their annotations were commenting on the surprising actions of the protagonist (e.g., the wife "went crazy for a minute" or "is absolutely bonkers"). These types of comments were not readily apparent in many of the other texts and, while most were not categorized as Affective Responses, showed some level of natural interest in the text and motivation to read and annotate.

### **Texts #6-8: *Romeo and Juliet***

In the final two weeks of the study, and before the fall semester final exams, students read *Romeo and Juliet* and annotated a scene from each of the final three acts. Because the goals and annotation prompts for each of the three scenes were similar, I have grouped them together

in one section. In Act 3, Scene 3, Mrs. Reynolds asked students to annotate their analysis of Romeo’s character and how he responded to being banished from Verona. In Act 4, Scene 1, students were to analyze Juliet’s character and interpret how she responded to her father’s edict that she marry Paris. In Act 5, Scene 3, they annotated and discussed occasions in the story where alternate actions could have prevented the four deaths in this concluding scene. For the first two of these readings, Mrs. Reynolds required students to contribute 3-5 original comments and reply three times to their classmates; for the final scene, they were to contribute 5-10 original comments and three replies.

A total of 26 students annotating Act 3, Scene 3 resulted in 82 Initiating Comments, 32 instances of Uptake, seven Elaborated Explanations, 12 instances of High-Level Thinking, three Authentic Questions, two instances of Exploratory Talk, and no Affective, Intertextual, or Shared Knowledge Responses. A total of 20 students annotating Act 4, Scene 1 resulted in 68 Initiating Comments, 21 instances of Uptake, seven instances of High-Level Thinking, one Authentic Question, one Intertextual Response, and no Exploratory Talk, Elaborated Explanations, Affective Responses or Shared Knowledge Responses. Finally, a total of 17 students annotating Act 5, Scene 3 resulted in 93 Initiating Comments, 17 instances of High-Level Thinking, 22 instances of Uptake, nine Elaborated Explanations, four Authentic Questions, one Affective Response, and no instances of Exploratory Talk, Intertextual Responses, or Shared Knowledge Responses (see Table 6 for side-by-side display of the frequencies of all eight indices across all eight annotated texts).

**Table 6**  
*Frequencies of Indices Associated with Textual Understanding from Mrs. Reynolds’ Class*

Text	IC*	AQ	U	HLT	AR	IR	SK	EE	ET	Total
1	80	26	22	16	0	0	0	2	4	70
2	181	94	121	32	2	3	3	6	5	263
3	168	36	18	33	1	2	0	9	0	99

**Table 6 (Cont.)***Frequencies of Indices Associated with Textual Understanding from Mrs. Reynolds' Class*

Text	IC*	AQ	U	HLT	AR	IR	SK	EE	ET	Total
4	36	1	0	10	0	0	0	4	0	15
5	196	48	33	18	2	2	0	7	2	112
6	82	3	32	12	0	0	0	7	2	56
7	68	1	21	7	0	1	0	0	0	30
8	93	4	22	17	1	0	0	9	0	53
Total	904	213	267	154	6	8	3	60	13	698

*Note.* IC=Initiating Comment, AQ=Authentic Question, U=Uptake, HLT=High-Level Thinking, AR=Affective Response, IR=Intertextual Response, SK=Shared Knowledge, EE=Elaborated Explanation, ET=Exploratory Talk. Indices based upon Soter et al. (2008). \*Not included in total.

It is helpful, also, to look at the prevalence of these indices as percentages of the total number of annotations students contributed on any given text and throughout the study overall. Therefore, Table 7 (below) converts frequencies to percentages to give a sense of how often a given index was observed relative to the total number of annotations made. For example, over a third (39.80%) of the annotations made in “The Lottery” (Text #2) were coded as Uptake, signifying a strong amount of dialogue, of students taking up others’ ideas in some manner. And in “Lamb to the Slaughter” (Text #5), although there were an abundance of annotations throughout the text, only 14.04% were Uptake, denoting much less dialogue when compared with other texts that did not have as many overall annotations. Viewing all annotations made across texts in this case, 17.30% of annotations were Authentic Questions, 21.69% were Uptake, 12.51% were High-Level Thinking, 0.49% were Affective Responses, 0.65% were Intertextual Responses, 0.24% were Shared Knowledge Responses, 4.87% were Elaborated Explanations, and 1.06% were Exploratory Talk. Viewing web annotations in this light underscores the widespread lack of connections with the texts (Affective, Intertextual, and Shared Knowledge Responses) but also the overall lack of all indices, considering the most prevalent index, Uptake, occurred roughly once in every five annotations.

**Table 7***Percentages of Indices Associated with Textual Understanding from Mrs. Reynolds' Class*

Text	AQ	U	HLT	AR	IR	SK	EE	ET
1	18.57	15.71	11.43	0.00	0.00	0.00	1.43	2.86
2	30.92	39.80	10.53	0.66	0.99	0.99	1.97	1.64
3	18.95	9.47	17.37	0.53	1.05	0.00	4.74	0.00
4	2.78	0.00	27.78	0.00	0.00	0.00	11.11	0.00
5	20.43	14.04	7.66	0.85	0.85	0.00	2.98	0.85
6	2.59	27.59	10.34	0.00	0.00	0.00	6.03	1.72
7	1.12	23.60	7.87	0.00	1.12	0.00	0.00	0.00
8	3.31	18.18	14.05	0.83	0.00	0.00	7.44	0.00
Total	17.30	21.69	12.51	0.49	0.65	0.24	4.87	1.06

*Note.* AQ=Authentic Question, U=Uptake, HLT=High-Level Thinking, AR=Affective Response, IR=Intertextual Response, SK=Shared Knowledge, EE=Elaborated Explanation, ET=Exploratory Talk. Indices based upon Soter et al. (2008).

These data mirrored what Mrs. Reynolds (and the students themselves) reported: students typically completed the required number of annotations and replies and did not go much beyond that; evidence of that is seen as Uptake increased in the texts where the teacher explicitly required a certain number of responses and it decreased when the teacher did not set a requirement for such. Considering that trend, I argue that these web annotation discussions generally were not very dialogic in nature. Moreover, considering the low percentages of Soter et al.'s (2008) indices, there is not ample evidence to suggest that web annotation led to a marked increase in high-level thinking or textual understanding. However, the following section parses out several student perceptions about web annotation that complicate these findings, revealing benefits and affordances that were not captured by the evaluation of annotation quality.

### **Student Perceptions of Web Annotation**

In mid-December, during the final week of observations, I interviewed three students from Mrs. Reynolds' class: Hannah, who felt strongly that web annotation had a positive impact on her understanding of texts she read; Eleanor, who felt strongly that web annotation did not have a positive impact on her textual understandings; and Blake, who reported a more nuanced,

balanced perception of the effects of web annotation on his textual understanding. As described in the previous chapter, these students were chosen in light of their responses to the mid-point survey, administered in the final week of October. My decision to interview these three specific students hinged on two factors: based on the numeric Likert-scale data, they represented a broad range of perspectives regarding the impact of web annotation on textual understanding; and, within the open-ended response portion of the survey, they each provided compelling thoughts about their experiences with web annotation, leading me to believe they would be rich informants for this data set. The following sections detail each student's perspectives and then transition into the final interview with Mrs. Reynolds.

**“New ideas will pop up because of my classmates.”** Hannah identified as a person who had already developed the habit of annotating texts, even without a teacher requiring it, stating that annotating helped her “break the text down” into parts she could in turn analyze (Student Interview, 12/16/19). Reflecting upon Hypothesis and her use of web annotation in this study, Hannah suggested that more classrooms should implement the activity because she felt it helped students get a better understanding of the text and—because it's permanent and visible—it “helps the teacher know that [the students] understand the text...She can see our thoughts on it and make sure we understand it, that we're not just reading it.” She enjoyed transferring her private, pen-and-paper practices to the online realm.

Hannah appreciated being able to see traces of her own thinking because she would often go back to what she had annotated for recall purposes to remind her of what she wanted to share in a F2F discussion with the whole class; in this way, she saw web annotation as a preparatory activity for in-class work, such as essays or tests. From her perspective, online and F2F discussions meshed well with each other because Mrs. Reynolds gave specific prompts that



intentionally led into class discussions, and she felt more confident sharing her thoughts about the text in a F2F setting when she drew upon what she had already written as web annotations.

Hannah said she would usually annotate various character traits or “turning points” she observed in the short stories they read (Student Interview, 12/16/19). She saw value in reading others’ annotations and suggested that this extended and expanded her own thoughts on the topic at hand: “The technology was way more helpful than just highlighting it on my own because when I have the digital one, new ideas will pop up because of my classmates. But when I’m just on paper, it’s just my thoughts—I can’t see what anybody else thinks.” As students would reply to each other, Hannah saw it as an opportunity for elaboration, and she felt that her classmates would usually agree with the original annotation and then add to it in some way.

**“Oh yeah—that’s, like, really important.”** Eleanor, based on her survey responses, felt strongly that web annotation did not have a positive impact on her textual understanding. However, upon interviewing her, it became evident to me that her opinions about web annotation in December, when the interview took place, had changed considerably since she had completed the survey (in late October). She started the interview by saying that she did not feel comfortable with Hypothesis toward the beginning of the school year because she was so used to traditional highlighting and making comments with a pen or pencil; she felt like the pencil-and-paper method helped her understand what she was reading better than typing her thoughts into a computer. As the semester progressed, though, Eleanor recognized several benefits from web annotation that she hadn’t anticipated. As she explained, “At first I didn’t like it, but then I kind of came to realize that it was really helpful and let me have group discussions with my table” (Student Interview, 12/16/19).

She, like Hannah, appreciated the permanence of her thoughts on the Hypothesis platform and felt those annotations served as a springboard for additional learning: “It helped me understand the text better, so when we would write an essay over it or have further assignments then I would know what I was doing more with the text” (Student Interview, 12/16/19). She recognized that Mrs. Reynolds gave them specific tasks for each annotation activity, and she credited those prompts with framing her thinking. For example, when asked to analyze the main characters in *Romeo and Juliet*, Eleanor recalled how she annotated various differences between Romeo and Juliet; she highlighted Romeo’s speech and several of his quotes and then wrote annotations that described how he was different from Juliet.

When asked to characterize the types of replies students gave using Hypothesis, Eleanor shared that she did not ever see any real disagreements, but she attributed that to the fact that they worked in small annotation groups instead of as a whole class. Most replies, in her view, were basic statements of agreement (e.g., “I agree with this,” or “That was a good point”). However, when thinking generally about seeing others’ thoughts via web annotation, Eleanor stated, “They would give me a different perspective because...other people would see completely different things [than I did]. It really opened my eyes to be like, ‘Oh yeah, that’s like, really important’” (Student Interview, 12/16/19).

**“Two brains are better than one.”** In my third and final interview with a student from Mrs. Reynolds’ class, Blake offered several insights about his experience with web annotation that help to illuminate its role in students’ understanding of text. His comments centered on how web annotation helped him talk about what the author was doing in a text and how the use of certain literary devices impacted a story. He also emphasized the convenience of the tool, stating

that he liked using Hypothesis because it allowed students to communicate outside of the classroom and it was an easy tool to learn how to use.

Blake started our interview by describing his motivations for annotating, noting that he and his classmates had been told “since seventh grade” that annotating is a helpful practice during reading (Student Interview, 12/16/19). He stated, “There have been many times where I’ve thought I understood [a text] completely and I just really didn’t. Annotating and really thinking about figurative language, especially with a guy like Shakespeare and the language he uses and why he uses that, really helps my understanding.” That description provided a backdrop for his experiences with and perceptions of web annotation.

As he read and considered what to annotate in each text, Blake suggested that he intentionally sought to avoid basic statements and instead offer more substantial insights into the text. Often, he viewed annotating as a way he and his classmates could help each other understand what was happening in the story or better understand the purposes behind narrative decisions an author made. Although he felt that many interactions on Hypothesis were superficial, and suggested that students could use more examples of what makes a good annotation and a not-so-good one, he mentioned that there were times when he felt like his annotations helped his classmates comprehend a text and other times where his classmates’ annotations helped him better comprehend a text.

Blake described a progression or a procedure to his annotations. As he was reading a text for the first time, he would annotate “the more obvious things first, like figurative language, and what those things meant—just to get a better understanding to start off” (Student Interview, 12/16/19). Then, after finishing the reading, he would go back and annotate “why [he] thought the author wrote in a certain way or what the text meant, or deeper descriptions about the text.”

He felt he learned a good deal more from this process than typical reading experiences without annotating because he seemed to put more effort and energy into thinking about the texts.

When asked to comment on the nature of student dialogue in Hypothesis, Blake said, “Two brains are better than one” (Student Interview, 12/16/19). He valued the ability to see and respond to others’ ideas. Interestingly, like Eleanor, he expressed a desire for more healthy opposition of ideas: “The most helpful part [of dialogue] is disagreement, because that’s where you really learn things...that’s when progress is made.” He wished there was more collision of ideas to help shape and reshape student thinking about texts they read.

Blake also assumed that students were more confident using web annotation than in F2F conversations about texts. Notably, in the open-ended portion of his survey response from two months earlier, he had offered the following comment: “I feel like web annotation servers are better used in scenarios where contributors cannot be near each other and therefore cannot converse. In this situation, I feel like other methods like face-to-face conversations would be more effective” (Student Interview, 12/16/19). When asked about that response, he explained, “I’ve changed since then. At that point I hadn’t really realized how [student] confidence changed, how the people’s belief in themselves changed over web annotations.”

These three student interviews emphasized the value in seeing classmates’ ideas and how that can extend, deepen, or otherwise enrich their thinking or understanding of some aspect of a text; they also highlighted a general lack of tension among ideas, suggesting that students typically agreed with their peers’ ideas, and sometimes added to them. Even Eleanor, who initially reported negative perceptions of the role of Hypothesis in supporting textual understanding, concurred with Hannah and Blake that the process of reading, annotating, and engaging with others’ annotations helped her think more deeply about and more fully understand

texts she was assigned in class. With the students' responses in mind, I conducted the final interview with Mrs. Reynolds.

### **Mrs. Reynolds' Final Reflection on Web Annotation in ELA**

Upon beginning our final interview, I asked Mrs. Reynolds to restate her main goals for choosing to implement web annotation in her classroom and for student outcomes. She reiterated her desire to find ways for students to slow down as they read and really think about texts, stating that students will often claim to have read something but then have little to share about their readings. Essentially, she felt like student responses too often showed little evidence of textual understanding. Throughout this final interview, Mrs. Reynolds shared details, based on those goals, of how she taught students to annotate with a purpose, how she structured web annotation activities to foster such purposes, and how she attempted to bridge online and F2F discussions of texts.

The most important ingredient for successful annotation, in Mrs. Reynolds' mind, was for students to read with a purpose—that is, with things to look for and make notes on as they read. For example, she taught them to look for how an author develops an idea or a theme throughout the text, or how two characters compare and contrast with each other, or how they change over the course of a story. She also spent a large amount of time teaching about figurative language, asking students to attend to things such as personification, dramatic irony, or imagery as they read and to make annotations describing what they noticed. She suggested, “Sometimes [students] are like, ‘I don’t even know what I’m looking for! How do I know if I’ve done it?’ They can’t gauge their own understanding or success” (Final Interview, 12/16/19). When asked how successful she felt students were at this task throughout the study, she said, “Hit or miss. If

and when we do it more, it'll get better. They're still learning how to interact with each other in the classroom.”

That latter statement stemmed in part from her earlier comment that some of her students seemed to lack maturity in their web annotation discussions and needed to learn and apply principles of effective academic conversation. For example, one student copy-pasted into a Hypothesis annotation the complete transcript of a movie he had pulled from the web; another copy-pasted nonsensical language he pulled from the web and posted that annotation, resulting in a few other students replying with lighthearted banter. These interactions, while possibly providing entertainment for a few participants, were seen as a waste of time and energy from Mrs. Reynolds' perspective and did not relate at all to the text at hand. As these students were 9th-graders, Mrs. Reynolds emphasized the need to teach them what academic conversation looked like—and in light of web annotation specifically, how to participate within Hypothesis in a way that related to the texts and built upon others' ideas. Although the class began doing web annotations fairly early in the semester, Mrs. Reynolds expressed the need to begin even earlier to make sure students knew it was just a part of what they did in her class.

Moreover, Mrs. Reynolds shared her belief that it was necessary to keep the structure of a required number of annotations in each text. Although she mentioned in this interview that she wished she could just let them freely participate without setting a required number of annotations, she recognized that students usually only contributed what they were expected to, and not any more than that. She suggested that the final few readings from *Romeo and Juliet* were the exception, as students annotated many more times than required, but she felt that was due to the emotional responses they were having to the intense conclusion of the play, and noted that not every text will elicit such dramatic responses.

Upon reflecting, she was glad she placed students into small groups for web annotations. For example, she posited that if she had given the final scene of *Romeo and Juliet* to the whole class to annotate on Hypothesis together, “You might have two kids that did all the annotations and [other students] would get on there and say, ‘Oh well, they said everything that I wanted to say,’ so all they would be saying is, ‘I agree’” (Final Interview, 12/16/19). She felt the times when she really dug into students’ annotations, pulling out their best ideas or most intriguing thoughts and presenting those in a F2F discussion, were effective bridges between online and F2F learning experiences. Although she felt some regret that she did not do more of that, she saw the benefits for student understanding of text as she built upon their web annotations in a whole-class, F2F setting. Mrs. Reynolds also went further into a consideration of how she might facilitate web annotation discussions in the future, imagining them as a digital version of the “silent discussion” protocol, where she would annotate certain parts of a text with questions to prompt discussion, and then students would respond to those questions.

Finally, Mrs. Reynolds reflected on the overall convenience—and the problematic nature—of using this digital tool in an ELA class. She did enjoy the ability to “keep up” with student learning. She said, “I like how, even if [students] weren’t here one day during school, they’re not missing out on discussion... We can even say, ‘We don’t have time to discuss this in class, so I want you to discuss it on your own [via Hypothesis] and still allow me to be able to evaluate it’” (Student Interview, 12/16/19). Although in that sense the digital platform provided convenience, Mrs. Reynolds also highlighted the technological struggle the class experienced with Hypothesis. First, even though she tried to approve the Chrome extension a week or two before school began, it was not actually approved and as a consequence, students weren’t able to annotate the whole first week of the study. Second, setup was difficult for 9th-graders because

they had to create an account, go to their email to click the verification link, and go back to Hypothesis to make sure they had properly joined the private class group.

Having presented my findings from the case of Mrs. Reynolds and her 9th-grade students at Fairview High School, I next share my findings from the second case in my study, which involved Mrs. Jorgensen and her 12th-grade students at Highland High School. Following the same procedure as in the first case, I draw on teacher interviews, researcher field notes, student survey results, data from eight annotated texts, and final student interviews to present a detailed description of how Mrs. Jorgensen implemented and adapted the web annotation with her students, an analysis of the quality of annotations contributed, and perceptions of the role of web annotation in textual understanding from the second case in this study. Both research settings are then juxtaposed and synthesized to examine commonalities and differences across the two cases.

### **Mrs. Jorgensen's 12th Grade Class**

As a reminder of the description of Mrs. Jorgensen presented in the previous chapter, she was teaching 12th grade ELA at Highland High School, a comprehensive public high school situated in a rural community in the southern US with a racially diverse student body comprised of grades 10-12. Mrs. Jorgensen was in her 22nd year of teaching and stated in an introductory meeting with me that she was always searching for new ways to get students talking with each other, using new tools, and reading texts in meaningful ways. She had been at Highland for most of her 22-year career, and she focused much of her efforts as a teacher on the social and emotional well-being of her students. She always sought to find ways for student voices to be heard, especially the large population of English language learners in the school. Mrs. Jorgensen chose a specific section of English 12 students because it was her largest class and it had a wide range of student ability and linguistic backgrounds.



I met with Mrs. Jorgensen the week before school began in August 2019 and conducted the initial interview to identify her goals for student learning via web annotation and learn about how she planned to implement the Hypothesis platform into her instruction. This was the first of three interviews with Mrs. Jorgensen, all of which were designed to help answer my first research question: How do ELA teachers use web annotation to support student comprehension of texts? In addition to a discussion of learning goals and vision for implementation, this initial interview—detailed in the following sections—shed light on the role that discussion traditionally played in her instruction, providing valuable context for my classroom observations.

### **Motivations and Goals for Web Annotation**

Very early into my first interview with Mrs. Jorgensen it became clear that, although she had been teaching for more than two decades, she had never felt like she knew it all and was continually looking to experiment with new tools or ways to engage students in learning activities. She explained that she wanted to try web annotation with her students because she felt strongly that comprehension improves as students are provided opportunities to verbalize their thoughts from reading, and she viewed annotations as one way for them to do that; additionally, she saw power in the ability for students to see their peers' thoughts about a text and was intrigued by that feature inherent in the Hypothesis platform.

In regard to textual understanding, Mrs. Jorgensen wanted to see if web annotation would facilitate deeper learning. During our interview she explained, “I would like to just see if it encourages them to push themselves a little bit more, to not rely on the simplest answer...it’s going to push them to come up with something new to say or to expand upon what someone else has said. So my goal is increased depth of conversation and of text understanding” (Initial Interview, 8/20/19). It was clear that Mrs. Jorgensen valued discussion as an integral part of what

she did as a teacher; in fact, she at one point explained, “Discussion is probably *the* most important part of the classroom, period. Lecture is just not going to cut it anymore for the way that students’ brains work now. And I’m not sure that it was ever the best idea for us, even in the pre-tech society.”

Moving further into a discussion of digital technology in our modern world, Mrs. Jorgensen highlighted several potential benefits from web annotation of texts. First and foremost, she hoped that Hypothesis would get her students more interested in learning: “I was hoping this would be something that would excite them. You hand them a paper and say, ‘Annotate this,’ and there’s frequently moans and groans. And so I thought the novelty might be exciting for them” (Initial Interview, 8/20/19). Moreover, she emphasized the convenience of web annotation to allow learning to continue for her students, even in the face of a snow day, sicknesses, or other interruptions to regular classroom attendance. Mrs. Jorgensen stressed that she hoped students would see web annotation as one way to study texts that would help them in college and beyond. She also loved the ability for students to have access to texts and their thoughts about the texts “anytime, anywhere.” Those potential benefits intrigued her and motivated her to participate in this study and to put effort into implementing web annotation with her students.

However, in our initial interview, she also identified several potential challenges or problems she associated with web annotation. She started by saying that technology will always have issues here and there in a classroom setting, so she was prepared for that, but she also worried about how tricky it might be to set up the class group, make everything functional on school laptops. For example, at that point in time, she was still uncertain whether the Chrome extension would be approved by her district, and she assumed that students would sometimes forget to bring their laptop to class or not have it charged. She also knew that the wireless

network in her classroom sometimes experienced a weak connection, which could slow things down greatly. Moreover, as she tried to visualize what class annotations of texts would look like, with everybody annotating on the same digital document, she was concerned that things could get cluttered and overwhelming for her and her students.

### **Role of Dialogue in Mrs. Jorgensen's Classroom**

Mrs. Jorgensen was intrigued by the social nature of web annotation because she valued dialogue as a tool for supporting student learning in her classroom. In the past, she regularly used discussion as a formative assessment to probe student textual understandings and as a way for her to clarify misunderstandings that sometimes arose from students' (mis)readings. Reflecting her belief that discussion was "probably the most important part of the classroom" (Initial Interview, 8/20/19), she regularly encouraged students to participate in speaking, prodding those who were reticent or specifically calling on them in low-risk situations and asking something like, "Do you have something to add?" She hoped that students who were less inclined to share their ideas in F2F discussions would appreciate the ability to think through what they wanted to annotate. Despite her hopes in this regard, Mrs. Jorgensen explained,

There are still those kids that are just never going to say anything no matter what you do. And I don't know how to motivate them. I put all the scaffolding in place that I can, but I feel like the anxiety thing is more and more of an issue in the classroom on a daily basis now, so it's kind of interesting to see how that interferes with discussion. They've always been quiet kids, but these kids are literally terrified to talk in some cases. (Initial Interview, 8/20/19)

She shared one example of how she had tried to address that issue in the past: as part of a silent discussion, she had hung large sheets of butcher paper, each with a question related to the text, on the classroom walls. She then released students to circulate and, without talking, record their responses to the questions directly on the butcher paper. They were also expected to go back through and respond to a certain number of ideas other people contributed. After that activity

students had reported that they really liked it, with one student stating, “I felt like not having to say what I wanted to say out loud made it easier for me to say it” (Initial Interview, 8/20/19).

### **Mrs. Jorgensen’s Web Annotation Implementation**

As Mrs. Jorgensen shared with me how she hoped to implement web annotation, she explained that she intended to use the tool with several of her classes, including another English 12 class and a composition course. She also talked about how she planned to determine the quality of what students contributed via Hypothesis and wondered whether she would require a certain quantity of annotations per student. Mrs. Jorgensen acknowledged that assessing annotation quality was a subjective determination, but expressed her intention to attend to unique ideas that students brought forward in relation to a text. Figuring that the quality of student dialogue would improve over time as students practiced and utilized Hypothesis, she planned to expect more unique ideas as time wore on. She was concerned that requiring a certain length of comment would disadvantage her English language learners, as several of them were not yet proficient at writing complex sentences or elaborating on ideas.

However, she did have concrete expectations for the categories of annotations students would make and for the number of contributions they would provide to individual texts. She said, “I want to make sure that they have the opportunity to comment, that they’re having the opportunity to ask a question, and that they are being asked to respond to someone else’s comment or question. So, I think that the number depends on the length and complexity of the piece, but in general they need to do all three of those things in order for it to be a successful annotation, in my mind” (Initial Interview, 8/20/19).

This expectation was reflected throughout the study, as Mrs. Jorgensen set specific requirements for students in each of those categories and entered grades based on that quantity.

She, like Mrs. Reynolds, planned to have her students annotate eight texts, including a variety of fiction and nonfiction, with one poem as a possibility. As a matter of context, Mrs. Jones mentioned that she did not assign homework in her English 12 classes because she had seen for too many years how burdened Highland High students were with jobs, siblings they took care of after school, and the lack of a quiet place to study at home. Therefore, she planned to have students complete all of the web annotation activities in class during regularly-scheduled class time, and she only planned to use shorter pieces that could be read, annotated, and potentially discussed in one or two 50-minute class sessions.

### **Web Annotation Activities in Mrs. Reynolds' 12th Grade Class**

In the second week of the school year, I went to Highland High School to observe how Mrs. Jorgensen implemented the Hypothesis platform into students' reading activities. I could see quite readily how much effort she put into discussion, spending substantial amounts of time in front of the students, prompting them with questions, calling on people to respond, and moving the conversation forward by elaborating on what students shared. Although there was not much student-driven discussion, students were ready and willing to participate and the class seemed happy and positive. This F2F discussion centered on the question, "What does it mean to be a hero?" The expectation was that this question would lead into the first text the students would read and serve as the overarching question for other readings, discussions, and class activities over the next few months.

After leading the F2F discussion, Mrs. Jorgensen transitioned into web annotation, explaining that students would be using Hypothesis to read, annotate, and discuss various texts in her class. She stressed that annotation can help students understand texts better, and that web annotation also allows them to see others' thoughts and expand their thinking on some topic.

Having introduced web annotation in this manner, she then asked that students take out their school-issued Chromebooks and follow her instructions on how to set up and use the Hypothesis platform. They each created their own free account, joined a private class group, and were directed to the Chrome Web Store to add Hypothesis to their browser—however, as was the case in Mrs. Reynolds’ class, students were blocked from installing the extension and were thus unable to use the web annotation tool. Like Mrs. Reynolds, Mrs. Jorgensen had anticipated this would happen and had submitted a ticket a week earlier to the district’s technology specialist to approve the Hypothesis extension, but the students were still prevented from installing and using the web tool.

Fortunately, a student in her class found an alternate route for Hypothesis annotation that did not require the Chrome extension so they were still able to use the platform to annotate their first text. However, they were not able to keep their private class annotations separate from Mrs. Jorgensen’s other English 12 classes, with whom she was also using Hypothesis to annotate class readings, so that made data collection and analysis a bit more complicated than might otherwise have been the case. Regardless, this began the web annotation experience in Mrs. Jorgensen’s class.

Similar to my approach with Mrs. Reynolds above, to help visualize patterns in the levels of participation and types of interactions students contributed to the texts they annotated in Mrs. Jorgensen’s, I compiled basic descriptive statistics for all eight texts (see Table 8). In the sections that follow, I provide context surrounding web annotation activities over the course of the four months I observed Mrs. Jorgensen’s class and analyzed their annotations. I also detail some of the F2F activities I observed that built upon their online discussions or that contrasted with the types of online interactions I observed. These sections, organized by annotated text, address my

findings from teacher interviews, student survey responses, and student interviews to present an integrated analysis of the interplay among my research questions, which (again) examined Mrs. Jorgensen’s implementation of web annotation, the extent to which student annotations were characterized by indices that research on classroom discourse associates with textual understanding (Soter et al., 2008), and student and teacher perceptions of the usefulness of web annotation in ELA.

**Table 8**

*Descriptive Annotation Data for Discussions in Mrs. Jorgensen’s Case*

Text	Annotations	Initiating Comments	Replies	Words Per Annotation	Participants	Threads	Days
1	80	52	28	23.94	24	21	2
2	48	47	1	34.06	17	1	2
3	87	80	7	22.59	24	6	3
4	87	47	40	27.44	26	18	1
5	85	44	41	13.18	24	17	2
6	82	42	40	27.43	23	18	9
7	55	24	31	16.51	22	16	1
8	11	8	3	36.09	4	2	2

**Text #1: “What Makes a Hero?”**

The first text the class read and annotated, “What Makes a Hero?” by Philip Zimbardo, was an article from an online magazine, and Mrs. Jorgensen chose it because it explored various elements of heroism and she felt it would effectively start the conversation about heroic attributes. As mentioned above, because the Chrome extension was not approved prior to this reading, students were not able to annotate within their own private class group, so annotations were combined with Mrs. Jorgensen’s other English 12 classes. For this article, Mrs. Jorgensen required students to make one initial comment, ask two questions, and reply at least once to someone else’s annotation. Unlike Mrs. Reynolds, she did not choose to require students attend to any specific literary element, instead keeping things more open to observe the nature of web annotation discussions when students take up the practice on their own (Field Notes, 8/21/19).

Analysis of all annotations for this text resulted a total of 24 participants contributing 52 Initiating Comments (sites of potential interaction where a student writes an original annotation that may or may not garner a response from a classmate). Based on Soter et al.'s (2008) eight indices, annotations included 29 Authentic Questions, 19 instances of Uptake, 12 instances each of High-Level Thinking and Elaborated Explanation, three instances each of Exploratory Talk and Affective Response, and one instance of Shared Knowledge Response, with no Intertextual Responses. These totals, along with the totals for all other texts annotated in Mrs. Jorgensen's class, are displayed in Table 12. The number of Authentic Questions in these annotations was the highest of all eight texts this class annotated, assuredly due to the fact that she required students to ask two questions; and none of the indices, besides Intertextual Response, were substantially lower than the average across all texts. Notably, Mrs. Jorgensen also participated in this web annotation activity, as well as all proceeding ones, which is something Mrs. Reynolds chose not to do. In these teacher annotations, Mrs. Jorgensen typically contributed a few Authentic Questions to nudge students deeper into the text or their thinking. After completing this first annotation activity in class, Mrs. Jorgensen asked students to put their thumbs up if they liked this method of reading and annotating, thumbs sideways or down if they did not. Only two or three students had thumbs down, five or six were sideways, and the rest (roughly 20-22) were thumbs-up (Field Notes, 8/21/19).

### **Text #2: "Trash, the Library, and a Worn, Brown Table"**

As I returned for future observations in her classroom, I consistently observed Mrs. Jorgensen leading her students in F2F discussion of texts and related topics. She tried to get students to extend their thinking beyond surface-level ideas comments, and she attempted to spread the discussion around to students who were reticent to participate—but most of the time



this involved calling on specific students to contribute, because most would not volunteer to share their thoughts. In the week following their first experience with Hypothesis, the Chrome extension had been approved by the district, students were able to join a private class group for all future annotations, and they began reading and responding to their second assigned text.

Mrs. Jorgensen introduced this article, which was a compilation by the *New York Times* of five college application essays by various high school students from the previous year. Because Mrs. Jorgensen's students were seniors, she wanted them to read closely from these exemplar essays to gain a sense of what effective college application essays look like. She gave them specific prompts for their annotations: they were to identify one part of an essay that surprised them, one that made the essay unique or personal, a single sentence that struck them as more powerful than any others in the five essays (and explain why), and one question that another student's annotation raised for them. This shift in specific requirements from the first to the second annotated text were motivated by a desire for students to see specific elements of college application essays that could help them in coming months as they wrote their own.

Annotations for this second essay resulted in a total of 17 participants contributing 47 Initiating Comments, 18 Elaborated Explanations, 12 instances of High-Level Thinking, nine Affective Responses, six Authentic Questions, one instance of Uptake, and no instances of Exploratory Talk, Intertextual Response, or Shared Knowledge Response (see Table 12). This second text showed an increase in Elaborated Explanations and Affective Responses, most likely due to the specific prompts that asked students to make assertions and support them with reasons. Conversely, there was a sharp decrease in the prevalence of Authentic Questions and Uptake—despite Mrs. Jorgensen requiring students to ask one question each in response to another person's annotation. I attribute that to the fact that students were annotating five different essays

within the same *New York Times* article, causing their annotations to be more disparate and disconnected from each other.

### **Text #3: “Sir Gawain and the Green Knight”**

The whole class, by the following week (mid-September), was reading *Sir Gawain and the Green Knight*, and Mrs. Jorgensen decided that she wanted the students to use web annotation to read and discuss one chapter of the story. Because this was a physical, printed text the students had access to in the classroom (a result of Mrs. Jorgensen’s inability to find a digitized version of the same chapter on the web), she decided to type it all up in a Microsoft Word document and upload the document for student discussion via Hypothesis. Beyond this taking her time and effort, it also resulted in another problem: students reported that they struggled to highlight specific parts of the chapter because the digital text did not recognize separations in letter characters and words. This did not impact my ability to code and analyze the annotations on the text, but it was an obvious annoyance for the students and teacher. Mrs. Jorgensen instructed them to just highlight the best they could and still contribute thoughtful annotations in the margins. She guided their annotations by asking them to provide thoughts about why the author depicted and developed the two main characters the way they did and the effect those decisions had on the text as a whole.

Annotations of this chapter resulted in a total of 24 participants contributing 80 Initiating Comments, 16 instances of High-Level Thinking, 10 Authentic Questions, five instances of Uptake, three Affective Responses, two Elaborated Explanations, one Shared Knowledge Response, and no instances of Exploratory Talk or Intertextual Response (see Table 12). Although this text resulted in a higher number of Initiating Comments than the previous two, none of the eight indices showed above-average prevalence when compared with the other texts

the class annotated, and Uptake and Elaborated Explanations were substantially below the average. These data indicate that web annotation, in this instance, did little to increase high-level thinking or textual understanding.

When students finished annotating, they moved directly into a F2F discussion of the chapter. As had been the case in the past, students were reticent to participate, so Mrs. Jorgensen had to continue calling on specific students, urging them repeatedly to become more engaged in the discussion. She refused to give up on a discussion of the chapter, even though students were struggling or resistant to share their thoughts. But the discussion soon turned to a romantic encounter between two characters in the text, and Mrs. Jorgensen called into question the morality of one of these characters; in doing so, she ignited student participation, the mood in the room improved, and students made claims and connected ideas across the chapter. As I listened to their comments, I felt from the latter half of this F2F discussion that students' textual understanding generally improved and they showed evidence of high-level thinking. Building on this momentum, Mrs. Jorgensen asked them to make predictions for the next chapter in the text and speculate as to how these ideas might develop throughout the story.

#### **Text #4: “Volunteered or Voluntold”**

Mrs. Jorgensen assigned the next reading, “Volunteered or Voluntold,” by Benjamin Oosterhoff, to challenge students to consider how extrinsic versus intrinsic motivation might play into heroic acts. She requested they ask one question, make one initial comment, and reply to two other students. She also prompted them to ask, “What is the author’s claim?” as they read, finding places to annotate and consider the main points the author was trying to make. Before setting them loose to read and respond, she reminded the students that the purpose of web annotation was to help keep their minds engaged with the text throughout their reading. It was an

article openly available on the web, so most students easily pulled up the page, activated the Hypothesis extension, and began annotating. However, two or three students experienced trouble with Hypothesis and Mrs. Jorgensen had to spend a few minutes with them to figure out the problem.

This article resulted in the following codes: of the 26 total participants in this activity, there were 47 Initiating Comments, 35 instances of Uptake, 25 Authentic Questions, 19 Elaborated Explanations, 17 instances of High-Level Thinking, six of Exploratory Talk, five Affective Responses, two Shared Knowledge Responses, and no Intertextual Responses (see Table 12). Compared with the other seven texts the class annotated, no single index was substantially below average (besides Intertextual Response). Conversely, this annotation activity resulted in above-average instances of Uptake, Elaborated Explanations, and Exploratory Talk; moreover, this text produced 109 total instances of the indices that comprised my coding scheme, the highest total for any of these eight texts.

Analysis of these data suggest a possible relationship among a teacher's annotation prompt, a requirement for replying to classmates, and the frequencies of indices such as Elaborated Explanation or Exploratory Talk. As students sought to address Mrs. Jorgensen's prompt, they naturally shifted to their own claims supported by reasons (similar to Text #2). This annotation activity, I argue, is an instance where the students' interactions appear to have supported their textual understanding. At this point in Mrs. Jorgensen's case, my analysis turned from an evaluation of annotated texts to the student survey, presented in the following sections.

### **Student Survey Results**

By late October, we had reached the midpoint of the research study, so I administered my student survey to capture their perceptions of web annotation, specifically regarding its role in

supporting textual understanding and productive dialogue (see Appendix A). As described in the 9th grade case, this measure provided snapshot data of overall impressions from the whole sample of students, but it also helped me to identify a student who reported strong comprehension benefits from web annotation, a student who strongly believed web annotation did not positively impact comprehension, and a student somewhere in the middle. These were the three students from this second case that I, in turn, interviewed at the conclusion of the study.

I analyzed the survey data following the same procedure outlined in the first case under investigation. As a reminder, Items 1-3 on the Likert Survey (see Table 9, below) examined how students felt web annotation impacted text understanding; Items 4-6 dealt with their perceptions of dialogue using web annotation and the relation those discussions had with F2F discussions; Items 7 and 8 measured their comfort level using Hypothesis, and Item 9 investigated whether they would like to use web annotation in the future. In the following sections I examine my findings within each of the aforementioned categories.

**Impact on textual understanding.** Responses to the first survey item, “Web annotation helps me better understand the texts we read in this class,” resulted in a median score of three, with 13 students agreeing, seven disagreeing, and seven in the middle. Responses to Item 2, “Sharing my thoughts within Hypothesis enhances my understanding of texts we read,” resulted in a median score of four, with 14 students agreeing, seven disagreeing, and six in the middle. Responses to Item 3, “Viewing others’ posted comments within Hypothesis enhances my understanding of the texts we read” also resulted in a median of four, but there was less disagreement with the statement than any other survey item: 18 students agreed, while only one student disagreed and eight were in the middle.

**Table 9***12th Grade Student Survey Results*

Statement	Median	SA	A	A/D	D	SD
Web annotation helps me better understand the texts we read in this class.	3.00	3	10	7	6	1
Sharing my thoughts within Hypothesis enhances my understanding of texts we read.	4.00	3	11	6	5	2
Viewing others' posted comments within Hypothesis enhances my understanding of the texts we read.	4.00	5	13	8	0	1
My classmates usually reply to my ideas with comments that build upon my annotations in some way.	3.00	1	5	11	8	2
I regularly reply to my classmates' ideas with comments that build upon their annotations in some way.	3.00	1	10	10	4	2
Web annotation discussions enhance the face-to-face class discussions we have about the text.	4.00	2	12	9	3	1
I am comfortable sharing my ideas with my classmates and teacher via web annotation.	4.00	6	8	5	5	3
Hypothesis is user-friendly (i.e., I am comfortable with the technology).	4.00	11	7	7	2	0
I would like to use web annotation in other classes.	3.00	2	7	8	6	4

*Note.* SA=Strongly Agree, A=Agree, A/D=Neither Agree nor Disagree, D=Disagree, SD=Strongly Disagree; median scores are based on a 1-5 scale (SD=1, SA=5).

**Productive and useful dialogue.** Items 4-6 measured perceptions of the quality of student dialogue using Hypothesis and the relationship between online and F2F discussions. In each of these three survey items, students reported more uncertainty than in any of the other items. When asked whether their classmates frequently built upon their ideas using Hypothesis (Item 4), six agreed, 10 disagreed, and 11 were in the middle. When asked the inverse—whether they, the survey respondent, frequently built upon their classmates' ideas using Hypothesis (Item 5), students were spread fairly evenly: 11 agreed, six disagreed, and 10 were in the middle. And

when asked whether web annotation discussions enhanced their F2F discussions of the text, results skewed toward agreement: 14 students agreed, four disagreed, and nine were in the middle. The stronger level of agreement was also reflected in median scores, with Items 4 and 5 each resulting in a median score of three while Item 6 resulted in a median of four.

**Comfort with Hypothesis.** Item 7 asked about students' level of comfort using Hypothesis to share their ideas about texts they read with peers and the teacher. The median response was four (signifying that the average student reported feeling comfortable using technology), with 14 students agreeing, eight disagreeing, and five in the middle. Item 8 measured how comfortable the students were figuring out the technology and features within Hypothesis, and it also resulted in strong agreement: 18 students agreed and only two disagreed, with seven in the middle.

**Overall student perceptions of web annotation.** The last Likert item asked students whether they would like to use web annotation in other future classes. This was designed as a final, overall measure of student perceptions of web annotation, and the results were again mixed: nine students agreed, 10 disagreed, and eight were in the middle, with a median score of three.

Finally, the survey included an option for an open-ended response in the event that students had other thoughts about web annotation they wanted to share and that might shed light on its usefulness for ELA students. Participants offered a range of responses that offered insights into their perceptions to that point in the study (see Table 10, below).

**Table 10***12th Grade Students' Open-Ended Perceptions of Web Annotation*

<b>Positive Response</b>	<b>Negative Response</b>	<b>Nuanced Response</b>
“It is a good tool when trying to look at things from a different perspective through the thoughts of other people.”	“I just don't really like using web annotation stuff in general.”	“I think that web annotation is great and has been an interesting change to the way that we usually discuss things in the classroom. However, I dont [sic] think that the comments are responded to quick enough to be very meaningful. I also feel that requiring students to do a certain number of annotations and comments has pros and cons. This definitely makes sure that students are participating, but from what I've seen, after reaching a goal of say 2 annotations and 2 comments, people tend to stop paying any attention to responses and other annotations...Overall, I have very much enjoyed web annotation and think it would be a great tool in other classes, like science classes, too.”
“I strongly prefer web annotations over handwritten annotations.”	“I do not think web annotation is very useful for English students.”	
“It allows those who are shy to put in their opinion.”	“I don't really like using it.”	
“I actually feel comfortable putting my thoughts and comments on Hypothesis.”	“Students dont [sic] really put a lot of thought into the annotations.”	
“It allows students to see things they might have not caught in first glance. It could encourage students to think more in depth if they see a prime example of another student pointing out something obscure.”	“I think we should focus on the actual text more and analyze it.”	
“I like how that the annotations help you with what doesn't make sense and you can come back to it and discus [sic] what doesn't make sense to you and then get help to understand it.”		
“I feel the goals our teacher sets about doing commenting and replying to others actually makes me want to understand the reading to participate in replying to others. It is also good because you get to see what people point out if you are having trouble getting the ball rolling.”		“I feel like Hypothesis would be useful for a big discussion over a certain article or passage. I feel like the individual comments make things a bit too chaotic, and I think that the discussion format with one question would be a bit better.”



## **Mrs. Jorgensen's Midpoint Reflections**

During the same week the student survey was administered, I interviewed Mrs. Jorgensen for a second time, following up on her expectations and goals for student learning and identifying her perceptions of the role web annotation had played in supporting students' comprehension of texts to that point. She shared her feelings about student dialogue via Hypothesis, about the relationship between students' online and F2F interactions, and about effective reading practices. I examine each of these topics at length in the sections that follow.

**Characteristics of student dialogue using Hypothesis.** In our first interview, Mrs. Jorgensen stressed that she hoped web annotation would encourage students to push further with their thinking as they read, not relying on a simple surface-level understanding of the text. In our follow-up interview, two months into the study, she reflected on how students were doing in that regard by saying that she had seen isolated instances of deeper thinking but that students were not talking about texts in the way she had hoped; often they would ask surface-level questions, like the definition for an unknown word; even when they contributed what Mrs. Jorgensen regarded as decent ideas, she noted that the conversation would stop once a student hit the requirement for the minimum number of initiating comments or replies. She felt like the discussions could go further, could be fleshed out more, if the students just had natural conversations about the texts: "As far as increasing depth of thinking and discussion, I think we've kind of hit a roadblock because they just—it's sad to say, but they just don't go further than what they have to. There's not really a long thread of conversation going on" (Second Interview, 10/30/19).

When asked more specifically if she felt like web annotation supported textual understanding, Mrs. Jorgensen explained,

It works as well as any other annotation method that I've seen. If we could somehow inspire them [the students] to actually engage in more discussion, then perhaps it would increase their depth of understanding. But certainly, it's bringing them from letting their eyes glaze over the lines, with no interaction with the text, to that next level—but it's not taking them to where I thought it might. (Second Interview, 10/30/19)

She mused that perhaps she could frame things differently, wondering if by requiring a certain number of responses she was in fact hampering the discussion. She brainstormed possibly not putting parameters on their next reading, instead saying something the effect of, "I want you to just dialogue about this piece; I want you to really have a conversation about this piece." She also considered putting the students in smaller groups to annotate, wondering if that would encourage students to contribute more annotations and engage in more collaborative thinking. It was clear that she was not fully satisfied with the types of thinking and discussion students were engaged in, and she was motivated to make a change.

**Relationship between online and F2F interactions.** Mrs. Jorgensen spent some time in our interview talking about how what students were doing online compared with what they were doing (or tended to do) in F2F settings. Thinking about how Socratic Circles usually work in her classroom, she explained that she did require a certain number of comments per student and suggested that many volunteered the minimum; however, several students did go beyond the minimum requirement. She also said that the Socratic Circle discussions involved multiple texts, which gave students more material to discuss and more sources to pull from. She felt like some of the same students who were vocal in Socratic Circles were more participatory in Hypothesis than the average student but not to the extent that they were in F2F discussions.

When asked if students ever referenced in F2F discussions things they had annotated online, Mrs. Jorgensen could think of a couple isolated instances where that happened, where students remembered something they had annotated a week or two earlier and felt it was relevant

to the current classroom discussion. She noted that she would often try to start a F2F discussion by having students open up their laptops, pull up Hypothesis, and look through their annotations as starting points for the class discussion; however, she felt that it was too “clunky,” too difficult for them to “locate their own [annotations] among the sea of other [students’ annotations]” (Second Interview, 10/30/19). She said that students felt overwhelmed by everyone’s annotations on the page when they just wanted to find their own to spark discussion.

**Active reading.** At multiple points throughout our second interview, Mrs. Jorgensen highlighted her desire to teach students how to read more effectively and how to study with a purpose. She said, “My first goal is to make sure students are engaged with the text, that they’re active readers” (Second Interview, 10/30/19). When asked how effectively web annotation engaged students with the text, she said, “I think it is a great tool for active reading. But like any tool, anything that would be on paper, it’s forcing them to think about and comment on a text. And so it works as well as any other active reading method.”

Thinking of web annotation in this vein, she stated, “I think that this is yet another tool we can offer students. One of the things I want my kids to remember is that what works for you or me is not necessarily going to work for someone else...How do you best learn? How do you best take notes? How do you best digest text?” (Second Interview, 10/30/19). She also mentioned that she used students’ annotations as a formative assessment to see where they might be misunderstanding a text, stating that such observations helped her “tweak” the way she assigned readings or the types of texts she wanted students to talk about throughout the semester. Overall, she felt like some students in her class benefited from the web annotation process being visible to others and being digital, but she recognized that it was probably not the best way for everyone to go about reading and talking about texts.

Finally, toward the end of our interview, I inquired about Mrs. Jorgensen’s practice of usually adding, “...and tell me why,” to the end of her annotation prompts. She said, “I think that asking [students] why pushes them to evaluate their own thinking and can lead to a more considered response. I also want them comfortable looking at text as evidence to support their assertions” (Second Interview, 10/30/19). I also asked her to describe her rationale for her own contributions to web annotation discussions, because she typically would provide two or three annotations per text. She said she practiced this early on in the semester to model effective annotations and discussions, but felt like she should pull back a bit so as to not interfere with “the natural unfolding of their musings by pushing the conversation in a certain direction.” With these ideas in mind, Mrs. Jorgensen entered the second half of the study, still searching for changes she could make to more fully facilitate higher-level thinking and dialogic student interactions.

**Text #5: Chapter 2 of *Robin Hood***

Students had read the first chapter of *Robin Hood*, by Howard Pyle, the previous day in class, and they started this class period by writing about the how the protagonist was depicted in the first chapter. After briefly discussing that warmup writing, Mrs. Jorgensen asked the students to take out their laptops, read Chapter 2, and annotate it via Hypothesis. She required them to make one comment, ask one question, and reply to two other classmates. She also gave them the option to read silently in the room or to go out in the hall and read out loud with a partner. Eight or nine students chose to take their laptops and read and annotate in the hall, while the rest stayed in the classroom and read silently at their desks. Like all of the previous web annotation activities to this point, Mrs. Jorgensen had to spend a few minutes helping a couple students figure out how to log into Hypothesis and activate the Chrome extension. One student had pop-

up blockers enabled in her browser, so it was preventing the Hypothesis login screen from coming up; however, Mrs. Jorgensen resolved these issues fairly quickly and all students were able to annotate during class (Field Notes, 10/16/19).

Analysis of annotations from this text resulted in a total of 24 participants contributing 44 Initiating Comments, 43 instances of Uptake, 26 Authentic Questions, eight instances of High-Level Thinking, six Elaborated Explanations, three Intertextual Responses, three instances of Exploratory Talk, and no Affective or Shared Knowledge Responses (see Table 12). There were substantially more instances of Uptake in this annotation activity than in any others in this class, but it was also essentially the only text that produced no Affective Responses.

**Text #6: “Anti-Heroes: Is there a Goodness of Purpose?”**

The following week, Mrs. Jorgensen came up to me excitedly to share an idea she had come up with to scaffold students’ annotations (Field Notes, 11/13/19). She had created a handout called, “Annotation and Question Creation Using Hypothesis,” and it provided step-by-step guidance for reading and annotating texts. Step 1 was for students to read the entire piece through one time, making sure they understood the main points. Step 2 was to read through a second time, asking questions that had the potential to generate conversation among classmates. This step also required a minimum of two questions and suggested students should vary the types of questions that they ask. As examples, the handout provided “sentence frames” to help students craft their questions (see Table 11). Mrs. Jorgensen was confident these frames would help students contribute valuable questions and ideas to Hypothesis discussions, and she seemed excited to see how things turned out.

**Table 11***Mrs. Jorgensen's Sentence Frames to Guide Annotations in Hypothesis*

<b>Text-Based Questions</b>	<b>Big Picture Questions</b>	<b>Connection Questions</b>
What does the author mean when he/she says _____?	Why does the author refer to _____?	How would you feel it _____?
In light of _____, how should we interpret _____?	What comparison does the author imply by mentioning _____?	How is this similar to or different from (another text, movie, etc.)?
What effect does the author create by saying _____?	Why does the character do or say _____?	How is this relevant to (some current event)?
Why does the author describe _____ as _____?	How does this character's actions/words affect _____?	
	How does the (imagery, figurative language, diction, etc.) of _____ affect the tone of the piece?	
	How does the author achieve his or her purpose with the use of _____?	

Using this handout as a guide, students read and annotated, “Anti-Heroes: Is there a Goodness of Purpose?” a nonfiction article by Brian Kinnaird about heroism from the internet. This annotation activity resulted in a total of 23 participants contributing 42 Initiating Annotations, 29 Authentic Questions, 24 instances of Uptake, 17 instances each of High-Level Thinking and Elaborated Explanations, eight Affective Responses, seven instances of Exploratory Talk, six Intertextual Responses, and no Shared Knowledge Responses (see Table 12). Compared with the averages across all eight texts, this annotation activity exhibited substantially higher instances of Authentic Questions, Intertextual Responses, High-Level Thinking, Elaborated Explanations, and Exploratory Talk. Overall, I coded 108 examples of indices associated with comprehension (Soter, 2008), which was also substantially higher than the average of 71 per text.

### **Text #7: “To My Husband”**

Because students were assigned to write a poem about a hero of their choosing, Mrs. Jorgensen spent time in the first week of December writing one about her husband. Seeing the value in using it as a mentor text and in using Hypothesis to analyze it, she asked students to read the poem and annotate it. She felt it did not make as much sense to use sentence frames in this instance, so she allowed students to annotate more freely in terms of their sharing their thoughts and questions. Mrs. Jorgensen relayed to me that she was surprised with the quality of annotations and how students seemed to respond personally to this poem in a way she was not expecting.

Reflecting that sense, this text resulted in a total of 22 participants contributing 19 Affective Responses, by far the highest number contributed in that category for all eight annotated texts. Analysis also showed 32 instances of Uptake, 11 Authentic Questions, nine instances of High-Level Thinking, seven Elaborated Explanations, three instances of Exploratory Talk, two Shared Knowledge Responses, and no Intertextual Responses (see Table 12). Interestingly, the high frequency of Uptake is reflective of the fact that Mrs. Jorgensen was responding to students’ questions about her poem, making the complexion of this discussion quite different from all the others. The high frequency of Affective Responses was due to the personal nature of the poem and how it seemed to naturally encourage students to respond personally and emotionally. In total, there were only 24 Initiating Comments on this poem, substantially lower than all other texts except the final reading, described in the next section.

### **Text #8: “Convicted Murderer Helped Stop London Bridge Terror Attack”**

In preparation for an upcoming F2F Socratic Circle—where students would be synthesizing, sharing, and debating about the ideas related to heroism they had read about,

annotated, and discussed throughout the semester—Mrs. Jorgensen provided one final text for students to read and annotate for extra credit, if they desired. The article, “Convicted Murderer Helped Stop London Bridge Terror Attack,” by Amy Russo, presented a real-life example of a flawed hero, paralleling several of the characters the class had read about and discussed over the course of the past three months. Out of the 30 students in the class, only four chose to participate in this web annotation activity. Analysis showed eight Initiating Comments, five instances each of Elaborated Explanations and High-Level Thinking, three instances each of Uptake and Authentic Questions, and no Exploratory Talk, Shared Knowledge Responses, or Intertextual Responses. These totals, along with the totals for all other texts annotated in Mrs. Jorgensen’s class, are displayed in Table 12, below.

**Table 12**

*Frequencies of Indices Associated with Textual Understanding from Mrs. Jorgensen’s Class*

Text	IC	AQ	U	HLT	AR	IR	SK	EE	ET	Total
1	52	29	19	12	3	0	1	12	3	79
2	47	6	1	12	9	0	0	18	0	46
3	80	10	5	16	3	0	1	2	0	37
4	47	25	35	17	5	0	2	19	6	109
5	44	26	43	8	0	3	0	6	3	89
6	42	29	24	17	8	6	0	17	7	108
7	24	11	32	9	19	0	2	7	3	83
8	8	3	3	5	0	0	0	5	0	16
Total	344	140	159	104	48	9	8	90	24	582

*Note.* AQ=Authentic Question, U=Uptake, HLT=High-Level Thinking, AR=Affective Response, IR=Intertextual Response, SK=Shared Knowledge, EE=Elaborated Explanation, ET=Exploratory Talk. Indices based upon Soter et al. (2008).

As was presented in Mrs. Reynolds’ case, Table 13 (below) converts frequencies to percentages to give a sense of how often a given index was observed relative to the total number of annotations made in Mrs. Jorgensen’s case. For example, more than half of all annotations in Texts #5 and #7 were coded as Uptake, signifying a strong amount of dialogue, of students



taking up others' ideas in some manner. Conversely, Texts #2 and #3 showed almost no Uptake whatsoever (2.08% and 5.75% of all annotations, respectively).

**Table 13**

*Percentages of Indices Associated with Textual Understanding from Mrs. Jorgensen's Class*

Text	AQ	U	HLT	AR	IR	SK	EE	ET
1	36.25	23.75	15.00	3.75	0.00	1.25	15.00	3.75
2	12.50	2.08	25.00	18.75	0.00	0.00	37.50	0.00
3	11.49	5.75	18.39	3.45	0.00	1.15	2.30	0.00
4	28.74	40.23	19.54	5.75	0.00	2.30	21.84	6.90
5	30.59	50.59	9.41	0.00	3.53	0.00	7.06	3.53
6	35.37	29.27	20.73	9.76	7.32	0.00	20.73	8.54
7	20.00	58.18	16.36	34.55	0.00	3.64	12.73	5.45
8	27.27	27.27	45.45	0.00	0.00	0.00	45.45	0.00
Total	26.17	29.72	19.44	8.97	1.68	1.50	16.82	4.49

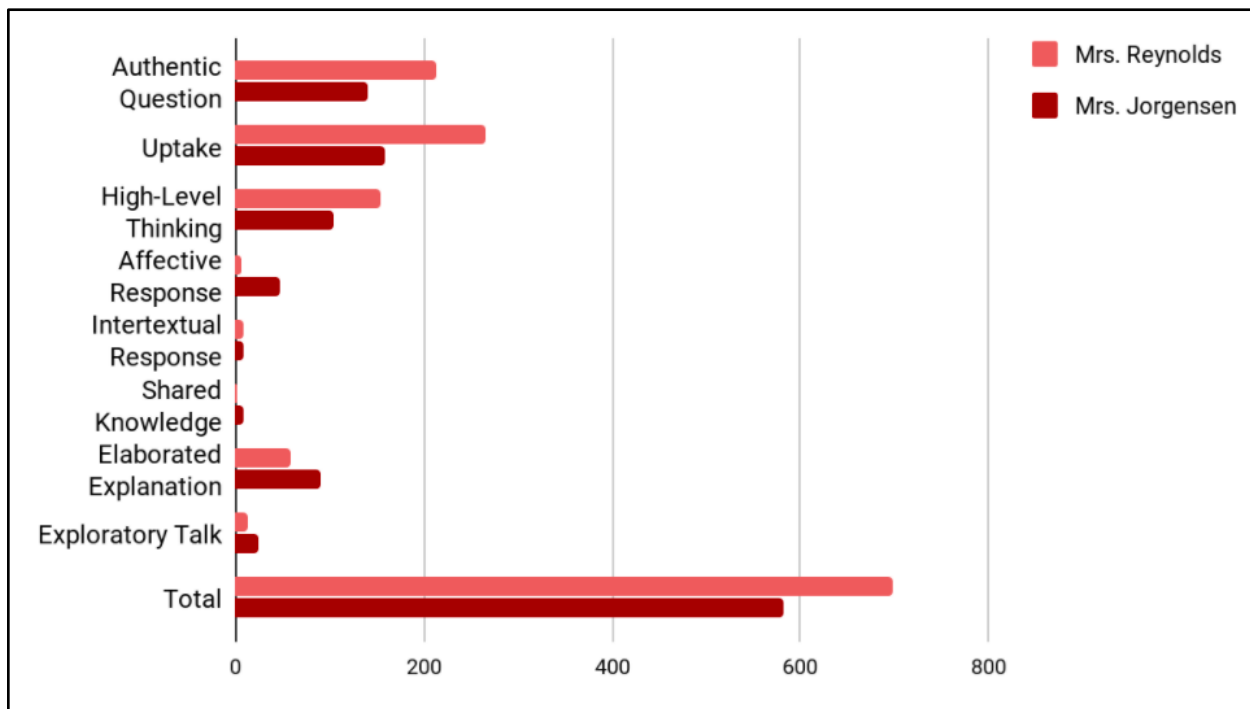
*Note.* AQ=Authentic Question, U=Uptake, HLT=High-Level Thinking, AR=Affective Response, IR=Intertextual Response, SK=Shared Knowledge, EE=Elaborated Explanation, ET=Exploratory Talk. Indices based upon Soter et al. (2008).

These percentages are reflective of the fact that Mrs. Jorgensen did not set requirements for replying to others in either text, whereas she did so in all of the others; similar findings emerge when looking at the prevalence of Authentic Questions. Viewing all annotations made across texts in this case, 26.17% of annotations were Authentic Questions, 29.72% were Uptake, 19.44% were High-Level Thinking, 8.97% were Affective Responses, 1.68% were Intertextual Responses, 1.50% were Shared Knowledge Responses, 16.82% were Elaborated Explanations, and 4.49% were Exploratory Talk.

### **Summary of Coded Annotations**

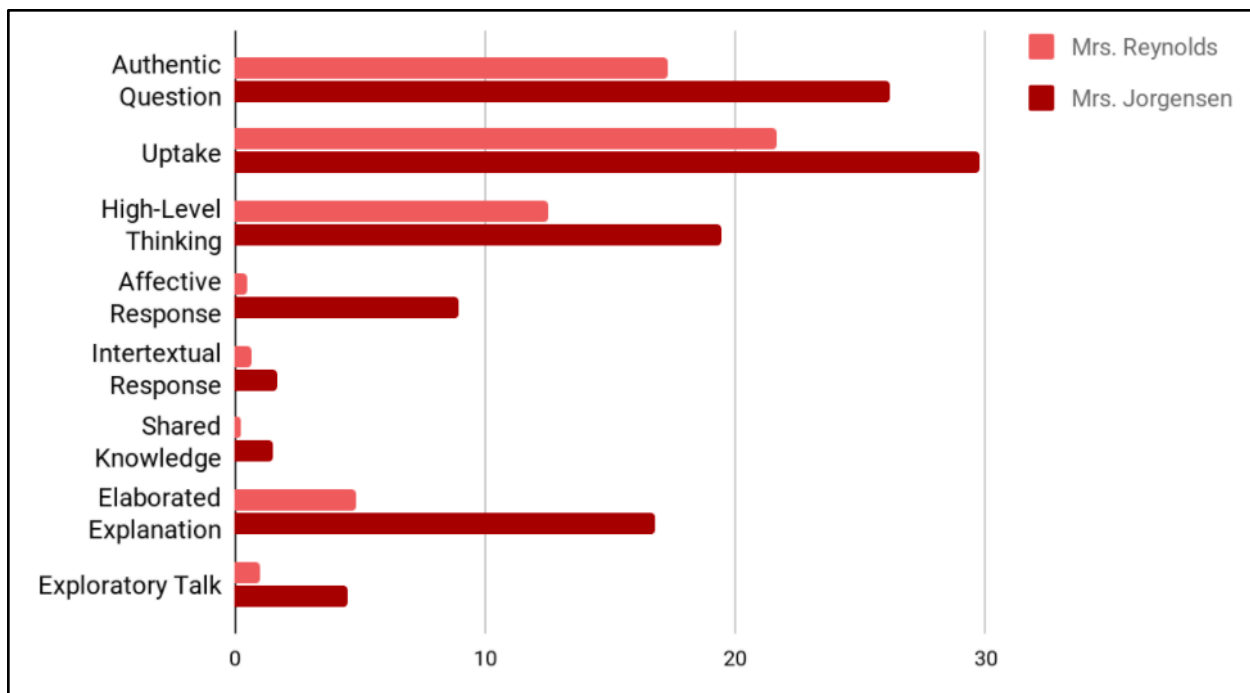
Combining annotation data from Mrs. Reynolds' and Mrs. Jorgensen's classes, and with regard to the eight indices that research associates with textual understanding, across both cases I coded 1,248 Initiating Comments (defined as a site of potential interaction where a student writes an original annotation that may or may not garner a response) and a total of 1,380 instances of the indices. In both classroom cases, annotations exhibited Uptake more than any other category

(excluding Initiating Comment), followed by Authentic Questions, High-Level Thinking, and Elaborated Explanations. Both cases also revealed a dearth of Shared Knowledge Responses, Intertextual Responses, and Affective Responses (aside from a poem the 12<sup>th</sup> grade students and connected to personally). The total frequencies of each index are presented below in Figure 4.



*Figure 4.* Frequencies of Indices in Each Class Case

Similar to Mrs. Reynolds’ class case, Mrs. Jorgensen’s case revealed widespread lack of connections with the texts (Affective, Intertextual, and Shared Knowledge Responses), but there was greater prevalence of annotations with all of these characteristics. In other words, the percentage of annotations that were Authentic Questions was higher in this second case than in the first; the percentage of annotations that were Uptake was higher in this case than in the first; likewise, the percentages of all the other categories were higher in the second case than the first (See Figure 5).



**Figure 5.** Percent of All Annotations Coded as Each Index.

This finding could be explained by the fact that these were high school seniors, as opposed to 9th graders; the difference in maturity with regards to academic conversation was apparent in my observations of F2F discussions as well as anecdotal observations of web annotations. Perhaps the seniors were just more accustomed to talking about texts in academic, analytical ways. Some of the difference could also be attributed to the fact that this group annotated, for the most part, while physically in the classroom setting, potentially keeping students in a frame of mind that focused their thinking and increased the quality of their annotations.

Moving from analysis of annotations to the final round of data collection within Mrs. Jorgensen’s case, I returned to Highland High to conduct student interviews and the final reflective teacher interview. The following sections detail findings from those conversations and lead into the final chapter of this dissertation, in which I discuss my findings and their implications for future research and ELA instruction.

## **Student Perceptions of Web Annotation**

In the final week of the study, in mid-December, I interviewed three students from Mrs. Jorgensen's class: Ryan, who felt strongly that web annotation had a positive impact on his textual understanding; Clara, who felt strongly that web annotation did not have a positive impact on her textual understanding; and Charles, who reported a more nuanced, balanced perception of the effects of web annotation on textual understanding. As described in the previous chapter, these students were selected based on their responses to the mid-point survey, which I had administered in the final week of October.

**“It made me think deeper about the text.”** Ryan started our interview by sharing that he was confused by Hypothesis in the beginning of the semester, mainly trying to learn the features and how to work the tool. But as he had more practice with it, he “found it really easy and also very beneficial to the class, to be able to look at other people's opinions and questions on a certain article” (Student Interview, 12/11/19). He provided insight into his motivations for participating in web annotation discussions, his thoughts about the structure of online versus F2F discussions, and the impact he perceived web annotation activities as having had on his understanding of texts he read for class.

Ryan showed a level of transparency when he admitted that his main motivation for annotating throughout the semester was his grade. He said there were a couple occasions when he truly enjoyed reading others' thoughts, and that spurred his own annotations and interactions, but overall he was motivated to participate in web annotations so his grade would not suffer. In fact, when I asked him what he wished Mrs. Jorgensen would change if she continued using web annotation in the future, he said he wished there was more grading so more people in the class would be motivated to participate. Although he completed all of the assignments, he felt there

were several students who did not put effort or thought into their annotations because they did not always see web annotation activities reflected in the gradebook.

When asked to describe the relationship between web annotations and F2F discussions of texts, Ryan felt like they were coherent, that the in-person discussion built upon what students had written on Hypothesis. He noted that the class would read and annotate an article and then build their whole-class discussion on the annotations, and he felt that was an effective way to better understand a text. Sometimes he felt like students struggled to understand a portion of a text, but when Mrs. Jorgensen would take up annotations that expressed their struggles and talk about them in class, Ryan felt those discussions resulted in new knowledge and greater understanding of the text. He said Mrs. Jorgensen would often answer in F2F settings questions that had been posed online, and he saw that as beneficial for student learning.

Thinking more about his own individual comprehension, Ryan suggested that web annotation helped him understand texts better and “dig deeper” into the things they were reading. He explained, “When I started asking questions about a certain part of the text, it made me think deeper about the text and I didn’t just read it—I read it and thought about it. So I feel like I had a better understanding of that section I annotated” (Student Interview, 12/11/19).

**“I just don’t like putting myself out there in front of the class.”** Clara offered a different perspective when she was asked to describe her general thoughts about web annotation. She didn’t like the platform precisely because her thoughts were visible to everyone else. She said, “I am very quiet, especially when it comes to opinion stuff because a lot of people don’t like my opinions and disagree with me. I just don’t like putting myself out there in front of the class” (Student Interview, 12/11/19). Clara’s responses were especially insightful regarding the intersection of student dialogue, engagement, and emotion.

Because she often felt like others understood the text better than she did, she would typically read the article and others' annotations but would not contribute any of her own thoughts. At times she felt like others' annotations were not very helpful because they were "common sense comments" (Student Interview, 12/11/19) or simple questions asking what a word meant; however, she noted that at other times she would look at her peers' annotations and would understand the article better because of their insights. It was clear from her responses that she considered how others would view her comments, and she held back from saying things if she thought it was not valuable or if she wondered how others would take it.

Clara described a lack of engagement for her with the annotation activities because several of the texts were not interesting topics or written in a way she enjoyed reading. Although she often completed annotation assignments "just because [she] didn't want to have to do something else," she often would not put much effort into it. She explained, "I had to be interested in what I was reading because then I'd actually read it, process what I was reading, and come up with real, genuine annotations or questions. Because if I'm not interested, I just scan through it and highlight and annotate" (Student Interview, 12/11/19). She did not feel invested in web annotation just for the sake of annotation; she felt a lack of connection to the texts and, therefore, a lack of motivation to participate.

The final topic that emerged from Clara's comments, evident in some respects in her previous idea about engagement, was that of emotion. When I asked her, at the end of our interview, to share any final thoughts about web annotation, she shared how the requirement to annotate and digitally discuss texts "stressed [her] out and made [her] annotations probably not make sense and seem really confusing" (Student Interview, 12/11/19). Analyzed in light of her comments about a lack of engagement and reticence to share her opinions because others might

disagree, it was clear that Clara did not feel comfortable using Hypothesis to share her thinking. Although our interview revealed some benefits from web annotation, her insights regarding the emotional aspect of web annotation were valuable because they were harder to capture through the other data sources in this study and they provided a personal, affective reaction to the web annotation process that teachers and educators should take into account.

**“We’re continuing conversations and we’re not just writing something down.”** As the third and final interviewee, Charles shared ideas that contrasted somewhat with Clara’s, especially regarding seeing others’ thinking and sharing one’s own ideas with the rest of the class through web annotation. His motivations for and overall perceptions of web annotation were similar to Ryan’s, but his responses also provided valuable insights into the role of web annotation in supporting reading comprehension and in facilitating dialogue.

As someone who was “not particularly fond of speaking in class,” Charles enjoyed being able to get his thoughts out in a space for others to see but without having to “say it in front of the class and having attention put on [him]” (Student Interview, 12/11/19). He noticed that other students would come up with ideas that he had not even considered, remarking that he was driven in part by an interest to see what others thought about the text. Charles also said, like Clara, that he thought about what others would think of his comment before he posted it—causing him to evaluate whether his comment “was meaningful and wasn’t just nonsense”—and that he appreciated how Hypothesis was one platform where he could spend the time to do that.

When asked explicitly about his motivation to participate in the class web annotation discussions, Charles said he did it because he was told to, but then he quickly followed that up with a comment about his having enjoyed engaging in dialogue with his peers in this space. He would look for questions his classmates asked and try to reply to those first, then look for others’

opinions he felt he could add to or extend on. He admitted, as Mrs. Jorgensen had observed across the class, that he would only go through this process until he had satisfied the assignment requirements. However, he was glad Mrs. Jorgensen gave specific requirements for replies: “By requiring that we annotate so many things and we reply to so many things, it guarantees that we're continuing conversations and we're not just writing something down and then leaving the document...we're actually continuing on the thoughts we have” (Student Interview, 12/11/19).

In speaking about the impact web annotation had on his comprehension of texts, Charles reported that he would always read all other annotations and felt that benefitted his understanding of the text. He suggested it helped him “dig deeper,” to “actually read instead of just going through it” (Student Interview, 12/11/19). Charles also felt like his peers’ annotations helped him to understand the text better before he was expected to talk about it in class, giving him more confidence that he knew the subject matter and had ideas to contribute.

In summary, the three student interviews highlighted the perception that students in Mrs. Jorgensen’s class benefited from seeing others’ thoughts and considering different perspectives from their own, but also that not all students were comfortable sharing their ideas with peers in an online setting. These interviews also shine positive light on the potential impact of web annotation activities on overall textual understanding, as the students understood it as providing a platform for them to slow down, read more closely, and attend to specific things in the text that they felt were meaningful or worth discussing. With these understandings in mind, I conducted the final interview with Mrs. Jorgensen.

### **Mrs. Jorgensen’s Final Reflections on Web Annotation in ELA**

Upon beginning our final interview, I asked Mrs. Jorgensen to restate her goals for student learning relative to the texts they annotated using Hypothesis that semester. She said the



goals varied depending on the text, but her overarching goal was to help students process and comprehend the texts they read so they could have productive discussions about them, both online and in class. She also wanted students to use the texts as models for their own writing, especially as it related to the unit on heroes in which they were immersed. She spent time in this interview sharing how she perceived the role of web annotation in working towards those goals, especially focusing her comments on the following themes: the impact of web annotation discussions on students' textual understanding, the need to provide explicit instruction and scaffolding for web annotation activities, and the convenience Hypothesis afforded her and her students.

Speaking about the impact of web annotation on student comprehension of texts they read, Mrs. Jorgensen remarked,

I definitely think that it helps them understand the text... There were some occasions where students corrected each other's misunderstandings, or one student would help another student who had a question about the surface-level meaning, which would keep them from getting a deeper understanding of the text if they didn't get that. (Final Interview, 12/13/19)

She also appreciated the ability, as the teacher, to look at students' annotations and "spot misconceptions about the texts" that she wanted to talk about in class. As Mrs. Jorgensen explained, "I think it affected me as a teacher, being able to see where their brains were going and see if there was a teachable moment I could take advantage of."

As she had during our midpoint interview, Mrs. Jorgensen again reiterated her belief that students generally engaged in the web annotation discussions until they had satisfied the numeric requirement she set for the assignment, with the result that the dialogue was not as free-flowing and natural as she had hoped. Thinking of how to get her students beyond that, she said that dialogic learning "would really have to just become so part of the culture of the classroom that it

would become ingrained” (Final Interview, 12/13/19), but even then certain students would probably still be resistant to engage in discussing texts.

She thought back specifically to the discussion that took place around the sixth text the students had read—where she provided sentence frames for students to craft their annotations—as one example of increased textual understanding through web annotation dialogue, suggesting that she felt like their comments and questions in Hypothesis had shown deeper comprehension of the article because they had spent time annotating and discussing it. In reflecting upon her instructional decisions and the impact they had on students, she said,

I made the changes because I was disappointed with the level of questions and comments posed by students, and I found their engagement with and understanding of the text to be more superficial than I wanted. I created the sentence frames, a more structured protocol to follow, and tried to spur them with my own questions and comments in an attempt to model how I interact with text. I think it's easy to take for granted what strong readers do as they read and process texts, so I needed the directions to be explicit if I wanted to raise the bar. (Final Interview, 12/13/19)

Those thoughts led her to comment about the need for the teacher to provide explicit instruction about web annotation and to scaffold student participation in such online discussions. Mrs. Jorgensen suggested that sentence frames were helpful for students but also believed that more support was needed even before that point. For example, students could read the text fully before starting to annotate to ensure they gained a basic understanding of it; they could break the text into parts and choose a specific aspect to focus on for their response; they could read the whole text and ask just one initial question of it for the class to discuss, and then go back to the text the next day and engage in web annotation activities to develop a more complete understanding of it. As students participated in web annotation discussions, she would provide examples of effective and less-effective annotations to avoid the irrelevant annotations she sometimes saw during this study. Moving forward, she said she would try to spend more time on

these types of explicit instruction and activities as preliminary supports for scaffolding students' textual understanding.

It is worth noting that Mrs. Jorgensen found Hypothesis to be convenient for herself and her students. She highlighted several affordances of the platform in this interview: web annotation was seen as an innovative practice for students, so they got excited about something tech-based and new; she liked that students' thoughts traveled with them in their laptops, making them easier to access, and ensuring that students could not lose their work; she enjoyed being able to view annotation analytics for quick snapshots of student participation. However, the digital nature of the annotation discussions also caused some setbacks in her class. She had to help a few students figure out Hypothesis almost every time the class started annotating, which took away time she could have spent conferencing individually with students on their reading or writing. Thinking of her experience assessing student annotations, Mrs. Jorgensen suggested that it was actually harder to grade web annotations than traditional paper-and-pen ones because everybody's annotations were scattered throughout the article, not organized by student. Also, her wireless network was having connection troubles for the final two weeks of this study, and that resulted in a decent amount of wasted time and of frustration. She remarked that there will always be pros and cons regarding the use of technology in the classroom, and her experience with using Hypothesis was no exception.

As a final reflection on the usefulness of web annotation in her ELA classroom, Mrs. Jorgensen said,

It's definitely something I would put in my toolbox of things I pull out and use, because I like to vary things. At the end of the day, what works to help me comprehend a text is not necessarily what works for you. So I feel that my job is, 'Okay, you could do this when you're approaching a text, you can do this, you can do this, and different texts may lend themselves better to one method versus another—but you need to know all these little options so that when you encounter texts that are confusing or unfamiliar you can go,

‘Okay, what are the things that I can use to approach this text?’ (Final Interview, 12/13/19)

Perhaps the most noticeable difference between the two cases that persisted throughout the study was teacher involvement in web annotations. Mrs. Jorgensen consistently contributed a few (two or three) annotations on most texts in an effort to spark discussion and provide additional prompts for students to consider. These annotations were usually Authentic Questions, with the lone exception being the personal poem she wrote as a mentor text, in which case most of her annotations were Uptake in the form of responses to students’ questions about her poem or about poetry writing in general. Mrs. Reynolds, on the other hand, intentionally did not annotate at all throughout the study because she wanted to promote authentic discussion in which her students were driving the thinking.

Another difference between the two cases was in how students responded to technological issues. While both classes experienced minor struggles throughout the study (e.g., trouble logging into Hypothesis, enabling the Chrome extension, annotating in the private group versus public setting), Mrs. Jorgensen’s students showed resourcefulness in how they responded to issues. For example, in the first week of annotating, when the technology was still blocked by district settings, a student discovered a way within Hypothesis to annotate without having to enable the Chrome extension. And then, in the final two weeks of the study when Mrs. Jorgensen’s wireless network was weak and inconsistent, a student turned on her cell phone’s wireless hotspot and wrote the password on the whiteboard for anybody to connect.

These were both compelling differences between the two cases in the study. They highlight the fact that these two teachers, although similar in their desire for student-driven dialogue as a vehicle for learning from texts, varied in how they approached and implemented web annotation with their respective classes. The next chapter, as part of a discussion of all

findings from this study, will explore the similarities and differences between the two cases in order to provide valuable implications for teachers and future research into web annotation and online student dialogue.

### **Conclusion**

The two cases that I have examined in this chapter depict how two secondary ELA teachers implemented Hypothesis, a web annotation tool, into their instruction in an effort to improve students' thinking about and discussion of literary and informational texts. This chapter provided a comprehensive presentation of the ways both teachers chose to implement web annotation in their instruction, the perceptions the two teachers and their students held of the role of web annotation in supporting textual understanding, and an evaluation of annotation quality as measured using indices of classroom discourse that previous research has associated with text comprehension and high-level thinking. Using the findings from this chapter, in the next chapter I provide a detailed discussion of what the findings mean in the context of the research questions that guided this study. Additionally, I identify and discuss implications of my study for future research, as well as for the use of web annotation in ELA classrooms. In doing so, I examine the central importance of pedagogy when considering implementing technology tools like Hypothesis into teaching and learning.

## CHAPTER V: DISCUSSION

The purpose of this multiple case study was to investigate how web annotation—through a process of online reading, writing in the margins, and replying to others’ comments— influences student dialogue in ways that research suggests are associated with improved comprehension. The following research questions guided my inquiry throughout the study:

1. How do ELA teachers use web annotation to support student comprehension of texts?
2. To what extent, if any, does web annotation appear to support student comprehension of texts?
3. How do ELA teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?

To address these respective questions, I (a) observed how teachers structured and implemented web annotation activities in their instruction, (b) assessed the quality of comments students contributed within the annotation platform using discourse features that research associates with improved comprehension and high-level thinking, and (c) examined student and teacher perceptions of the usefulness of web annotation.

Informed by the aforementioned purpose and research questions, in this chapter I discuss the significance of my findings as related to the literature in Chapter 2. Specifically, based on their relation with established principles of dialogism and effective online discussions, I interpret several (a) decisions both teachers made as they implemented and adapted the use of web annotation with their students, (b) patterns I observed from analyzing annotations using Soter et al.’s (2008) indices of classroom talk known to facilitate comprehension, and (c) key takeaways from student and teacher perceptions of the usefulness of web annotation in supporting student comprehension of texts. I then examine potential implications of this research study for ELA

teachers considering the use of web annotation to facilitate discussion of texts, and the chapter concludes with suggestions for future research into web annotation as a platform for supporting reading comprehension through dialogue.

### **Discussion of Findings**

**Research Question 1: How do ELA teachers use web annotation to support student comprehension of texts?** In considering how the teachers at the center of this study used web annotation with their students, it is valuable to revisit briefly their motivations for participating in my study. Both Mrs. Reynolds and Mrs. Jorgensen wanted their students to read more closely, more deeply, and to slow down and think carefully about what they were reading. One comment from Mrs. Reynolds was especially revealing with respect to the difference between traditional analog activities and a digital assignment like web annotation: “Too many times [students] are reading a blog or an article and they are just reading it, whereas if I give them a piece of paper, they’re like, ‘Oh, this is an assignment.’” She wanted her students to gain experience reading digital texts for educational purposes, getting used to employing digital technologies as a mediator for student learning. Both she and Mrs. Jorgensen assumed that students would need digital tools and strategies to draw upon as they moved forward into college or career settings, so they pursued web annotation as an avenue to support students’ developing literacy practices they regarded as relevant to those respective contexts.

*Dialogic principles.* A focused analysis of how these teachers designed and implemented web annotation activities reveals several aspects that relate with principles of dialogic pedagogy as discussed in Chapter 2. In Mrs. Jorgensen’s case, her choice to consistently provide annotation activities that invited students to contribute Authentic Questions so as to control and direct their online discussions is an example of the “suspension of hierarchical rank” evident in Bakhtin’s

description of Carnival (Morris, 1994, p. 199), in essence flattening the traditional hierarchy of expertise in a classroom setting and distributing authority more evenly in learning settings (Fecho & Botzakis, 2007; Lankshear & Knobel, 2007). In Mrs. Reynolds' case, aligned with the type of dialogic learning described by Mercer and Dawes (2014), students were provided ample opportunities to take on active speaking roles and were responsible for driving the thinking within web annotation discussions. Both teachers gave students the space that Alexander (2008) calls for: a discussion environment where students could explore their own thinking and suggest new ideas.

Examined through a dialogic lens, both Mrs. Reynolds and Mrs. Jorgensen provided freedom for centrifugal forces to work in web annotation discussions—meaning they did not constrain the conversation or push students towards specific answers—in hopes that students would widen and deepen their understanding of the text as they dialogued with each other. Based on the final round of interviews with both teachers, however, it appears that annotations often still worked centripetally, leading inward to definitions of unknown words or to surface-level comments that did not produce rich dialogue. To use language from Fecho and Botzakis (2007), student discussions in this study did not exhibit “learning [that was] under construction and evolving”; instead, the majority of online interactions appeared to be “reified and static” (p. 550) because many annotations were simply Initiating Comments with no Uptake or negotiating of ideas. In this regard, annotation discussions generally did not achieve the high-level thinking or comprehension that both teachers had hoped for.

The manner in which Mrs. Reynolds and Mrs. Jorgensen chose to navigate the connection between web annotation and F2F discussions also reflects elements of dialogism. For example, Mrs. Reynolds' use of a notecard to capture recurring themes in or intriguing ideas



from students' annotations, which she in turn used to revoice student utterances in F2F discussions the following day, constituted an example of ventriloquation. In light of Bakhtin's (1981) explanation that ventriloquation involves a speaker populating someone else's utterance with their own purposes and accents, adapting it to their own expressive intentions, Mrs. Reynolds was inserting herself into the discussion in a dialogic way; she was not sharing annotations in order to evaluate their accuracy or merit but instead as a spark for in-person dialogue with the hopes that students would delve deeper into the text and gain a greater understanding of the ideas presented therein.

*Annotating with freedom and purpose.* Throughout the study, I observed both teachers experience a tension between allowing students to freely annotate texts without parameters and requiring them to contribute a certain number of annotations or replies for each text. It was clear, from interviews and from my observations as teachers gave instructions to students regarding annotation activities, that both Mrs. Reynolds and Mrs. Jorgensen wanted students to discuss their ideas freely and without teacher intervention; however, both were also concerned that such freedom might not result in high-level thinking but in superficial or irrelevant annotations—or in little annotating altogether. This was evident in Mrs. Jorgensen's class as she began the fall semester with no number requirement for annotations in Text #1, gave a specific annotation prompt for Text #2, required a certain number of annotations and replies in Texts #3, 4, and 5, and then provided sentence frames and fairly explicit scaffolding for Text #6. She felt a need to provide specific requirements for student participation and even structured guidance in how they crafted their annotations in an effort to nudge them toward annotations that exhibited evidence of high-level thinking.

Mrs. Reynolds also set specific requirements for student participation throughout the study, but her approach in this regard was more focused on the types of things she wanted students to notice in the text—namely, literary devices authors used and explanations of the effect those devices had on the short stories or plays the class read. She also highlighted the tension between annotation freedom and structure when asked to comment on the quality of student annotations, remarking: “If students are giving me a few really deep things, that’s probably more valuable to me and more important than a lot of small, insignificant notes.” On the other hand, however, she wanted to see evidence of students’ thinking about the text through a certain number of annotations: “It would be hard...if they had this one really long, really good [annotation], I’d be like, ‘Well, where did you get that thought? Where did it come from? Show me some of the steps that you took to get there.’” That statement reflects Bakhtin’s (1981) idea of internally persuasive discourse: Mrs. Reynolds wanted to see evidence of her students reasoning with ideas the author (the authoritative voice) presented in the text through several web annotations that represented traces in their thinking.

As I talked with students about the structure their teachers provided for web annotation activities, their responses were reflective of a desire to accomplish the task with minimal effort or struggle, as is human nature. They described a tendency to contribute the minimum number of required annotations and then stop. Additionally, one survey respondent remarked that, once students had reached the assigned number of annotations, “People tend[ed] to stop paying attention to responses and other annotations.” This is significant, as it suggests that dialogue may cease prematurely if students are given a set requirement for annotations. Certainly students were allowed to continue to annotate texts and discuss them via Hypothesis as much as they wanted; however, it appears that the vast majority of students in these two cases rarely if ever took

advantage of that opportunity. With the students in this study, I did not get the sense that requiring a certain number of annotations or replies was constraining student thinking or that it was filtering out complex thoughts and understandings that might otherwise have been contributed had students not been given any parameters for their discussions, but it is one aspect of online discussion that teachers should be cognizant of as they consider implementing web annotation in their classrooms.

Reflecting on these strategies and their impact on student dialogue, I agree that setting parameters for a certain number of annotations seemed necessary with these student populations to spur high-level thinking and support their comprehending otherwise challenging texts. Students took up their teachers' prompts consistently over the semester, sometimes even copy-pasting the teacher's prompt into the Hypothesis platform and crafting their annotations as direct responses to something the teacher had asked. Students expected that type of guidance and they generally showed effort in pursuit of high-quality thoughts that addressed their teacher's prompts. Because findings were suggestive of a tug-of-war between annotation quantity and quality, between setting expectations and letting students freely and organically discuss a text, I am unable to put forth a definitive statement advocating an approach that most effectively leads students to dialogic interactions and high-level talking about texts. My findings instead echo concerns expressed by Hrastinski (2008), Romiszowski and Mason (2004), and Wise et al., (2013), who argue that online discussions are too complex to evaluate simply by attending to the number or length of posts students contribute, and who propose that students require scaffolding or structure to guide their thinking and their level of participation in digital dialogues.

**Research Question 2: To what extent, if any, does web annotation appear to support student comprehension of texts?** Viewing annotation data through a dialogic lens and

considering how they related to principles from Bakhtin's (1981) theory, I sought to understand how students responded to the authors' and their peers' utterances through web annotation. Analysis of annotations in each case, and a synthesis of findings across cases, viewed through the lens of Soter et al.'s (2008) indices, revealed several noteworthy patterns related to the extent to which web annotation appeared to support student comprehension and high-level thinking about texts: (a) generally speaking, web annotation discussions did not exhibit rich dialogue; (b) discussions where the teacher gave specific requirements for replies and provided specific writing prompts tended to result in higher frequencies of Soter et al.'s indices; and (c) there was a widespread lack of textual connections evident in students' annotations (i.e., responses that were Intertextual, Affective, or Shared Knowledge). I will discuss these patterns by highlighting insights about various indices from each classroom case and from a synthesis of both cases relative to the research into dialogism and online discussions presented in Chapter 2.

*Lack of rich online dialogue.* As stated in Chapter 4, Mrs. Reynolds' students were organized into small groups of three or four for all web annotation activities. Due to the smaller groups, it seemed like students felt more comfortable sharing their ideas with fewer people, as opposed to the whole class. It is also possible that they contributed a higher number of annotations so their discussion would feel more robust, which in turn led to a dramatically higher frequency of Initiating Comments than what was observed in Mrs. Jorgensen's class (904 compared with 344, respectively). This difference, I contend, was most directly due to the size of annotation groups. Although it does not necessarily mean student contributions will exhibit high-level thinking or lead to increased comprehension, placing students in smaller annotation groups seems to result in a higher number of utterances.

Interestingly, although Mrs. Reynolds' class contributed more annotations overall and showed higher frequencies of Initiating Comments, Authentic Questions, and Uptake in comparison with the other case, their annotations did not exhibit a substantially higher number of total indices overall (698 compared with 582, respectively). To present it another way: from a total of 904 Initiating Comments, Mrs. Reynolds' students produced 698 instances of the indices representative of high-level thinking; in other words, for every Initiating Comment in this case, there was less than one (0.77) instance of Soter et al.'s indices. On the other hand, Mrs. Jorgensen's class produced 582 total instances of the indices from only 344 Initiating Comments; in her case, for every Initiating Comment there were closer to two instances (1.69) of Soter et al.'s indices, occurring twice as frequently as in Mrs. Reynolds' class. Considering the vast difference between the two cases in the frequency of Initiating Comments (shared in the previous paragraph), there seems to be a striking difference in the quality of annotations contributed, as measured by Soter et al.'s (2008) indices.

I interpret these findings in two ways: first, the difference in annotation quality between the two cases may be explained in part by the fact that Mrs. Reynolds' students were in 9th grade and, although enrolled in a Pre-AP Honors course, seemed to lack an understanding of what constituted a good annotation. Extrapolating this idea, ELA students need to understand how to think about texts and then construct annotations that exhibit characteristics associated with high-level thinking and increased comprehension. Uzuner Smith and Mehta (2013) call this *educationally valuable talk*, which they define as explanatory, informative, implicative, exploratory, or argumentational contributions students make to an online discussion that tend to lead to increased learning outcomes.

Secondly, my findings in this regard speak to the general lack of rich, dialogic student interactions surrounding texts. Web annotation as a digital platform enables students to see each other's thoughts about a text and to respond directly to their peers, but interactions in this study generally did not result in much high-level thinking or evidence of increased textual understanding. Many Initiating Comments were just comprised of a single annotation without any responses; where there were responses, they were often reiterating the initial comment and not strong examples of the layering on or reshaping of ideas that result in rich heteroglossia. Web annotation, without intentional implementation to facilitate dialogue, does not seem to produce rich dialogic interactions among students.

Anecdotally, it is interesting to note that I did not notice a similar discrepancy between the two classes regarding the prevalence of high-level thinking in their F2F discussions; in fact, Mrs. Reynolds' ninth graders seemed to contribute as many, if not more, thoughts in a F2F setting that could qualify as high-level thinking or representative of textual understanding as the 12th grade case. Although this observation is purely anecdotal, it indicates a benefit from teachers explicitly teaching how to engage in dialogue in online settings.

***Elaborated Explanations, Exploratory Talk, and reading comprehension.*** Looking back at data from Mrs. Jorgensen's class, my coding of Text #4 ("Volunteered or Voluntold") resulted in several insights related to text comprehension. As a reminder, Mrs. Jorgensen introduced this web annotation activity by asking students to "have more conversation back and forth," requiring them to respond to two other students, instead of the typical requirement of one response. She also asked them to annotate in response to the question, "What is the author's claim?" as students worked through the article. This activity resulted in an average number of Initiating Comments (n=47, M=43.00) but in substantially higher frequencies of Uptake (n=35, M=19.88), High-

Level Thinking (n=17, M=13.00), Elaborated Explanations (n=19, M=11.25), and Exploratory Talk (n=6, M=3.00), when compared with the other texts in this case.

There were probably multiple reasons for this increase, but there appears to have been a relationship among the expectations Mrs. Jorgensen set for students' participation (a set number of replies to classmates), the prompt she gave (to annotate regarding the author's claim), and the higher frequencies of indices associated with increased comprehension and high-level thinking. This is especially intriguing considering the aforementioned notion that dialogue may cease prematurely if students are given a set number requirement for contributions. In light of this ambiguity, I suggest that the prompt guiding the annotation activity is crucial in getting students to contribute ideas that exhibit high-level thinking or that lead to increased textual understanding.

In this specific instance with Mrs. Jorgensen's class as they annotated Text #4, my analysis of student annotations indicated that they understood the prompt and presented reasonable explanations of the author's claim, but they also seemed more confident in presenting *their own* claims about ideas brought forward in the article. This notion is supported by the increase in Elaborated Explanations, suggesting students were more frequently contributing reasoned arguments in support of their ideas than was typical in the other texts. It is possible that this phenomenon would not have occurred had Mrs. Jorgensen not assigned the prompt to guide students' thinking, but it was significant that they seemed to go beyond simply reporting on the author's claim and into creating their own.

This increase, coupled with higher frequencies of Exploratory Talk as students replied to each other to satisfy the activity requirement and as they considered each other's ideas, provides sufficient reason to believe that web annotation supported increased comprehension and higher-level thinking about the article. In this particular instance, the increase in Exploratory Talk

indicates evidence of students reshaping or negotiating their understanding of the topic the article addressed, as previous research has described (Mercer & Howe, 2012; Wenger, 1998). The increase in Elaborated Explanations was an example of students contributing to an online discussion in a manner extolled by Mercer and Howe (2012), as they described why they believed what they believed and showed how and why they came to certain conclusions.

I highlight this text (Mrs. Jorgensen's Text #4) as one instance in which rich, nuanced student thinking was prevalent, while also recognizing that this was not the norm throughout most web annotation activities in this study. Moreover, the success students had while annotating this text—as measured by Soter et al.'s (2008) indices—hinged upon Mrs. Jorgensen scaffolding student participation and structuring ways to think about the text as she prompted them to report on and analyze the author's claim, supporting their writing with evidence from the text. Once again, sound pedagogy emerged as a central factor in facilitating effective online student dialogue.

***Making connections to the text.*** I was surprised to see a general lack of Affective Responses in both cases, based on anecdotal evidence that students seem more comfortable and confident sharing emotional reactions to texts or connecting ideas from texts to their own personal experiences. In total, Mrs. Reynolds' case resulted in six Affective Responses (out of 1,231 total annotations) and Mrs. Jorgensen's case resulted in 48 Affective Responses (out of 535 total annotations). Reflecting upon these data and the way these teachers chose to implement web annotation, I attribute the low frequency of Affective Responses to an emphasis on reading with a purpose that was more generally associated with literary or rhetorical analysis and focused less on connecting to students' personal experiences. There were two exceptions to this, and both came from Mrs. Jorgensen's class: Text #2 ("Trash, the Library, and a Worn, Brown Table") and



Text #7 (“To My Husband”). In the former, Mrs. Jorgensen specifically asked students to annotate a part of the text that surprised them, and many responses therefore included emotive or affective language. In regard to the latter, the poem that students read was written by Mrs. Jorgensen, literally about her husband, and the personal nature of the poem seemed to resonate with her students in a way that caused them to write about similar experiences or observations they had had in their family and personal lives (this text included 19 of the 48 total instances of Affective Response in the case).

Certainly, it is not expected that all ELA teachers go to the effort that Mrs. Jorgensen did to write their own poems to facilitate such affective responses, but this provides a valuable example of one way to get students to respond aesthetically and personally to a text. It is also plausible that poetry as a genre invites personal, affective responses in ways that informational texts do not. This suggestion is supported in Mrs. Jorgensen’s case, as the frequency of Affective Responses in the poem contrasted sharply with the frequencies in the informational texts and even the other works of fiction; however, this notion would need to be explored more intentionally, as Mrs. Reynolds did not include any poetry in her curriculum throughout the study.

In a similar vein, there was a widespread dearth of annotations that exhibited Intertextual Response and Shared Knowledge Response (combining both cases, I coded only 17 instances of Intertextual Response and 11 of Shared Knowledge out of a total of 1,766 annotations contributed across all 16 discussions). To be fair, considering the notion that students typically followed their teacher’s prompts and annotation requirements, students were never explicitly asked to connect their reading of a text with some other text or to connect the current discussion with previous class discussions on the topic. However, in looking at relationships among indices,

annotations coded as Intertextual Response were frequently also coded as High-Level Thinking, Uptake, and Elaborated Explanation. Considering this was not a quantitative study with a sufficient population to make statements about causation, it is at least noteworthy to mention that, because these indices are measures associated with increased reading comprehension, such findings support a rationale for teachers to structure web annotation discussions in a way that encourages students to connect their reading with other related texts, works of art, media, or TV shows—not only because it gives them opportunity to think outside of the text but also because it appears to nudge them into higher-level thinking and increased understanding of the text under study.

*Texts that generate interest.* One of the most notable observations from an analysis of Mrs. Reynolds' case was that Text #2 (“The Lottery”) resulted in substantially higher frequencies of Initiating Comments and of almost every one of Soter et al.’s (2008) indices associated with high-level thinking and text comprehension, when compared with the other seven texts they annotated that semester. Even though the requirement for number of annotations was similar across most texts, there were twice as many instances of Soter et al.’s indices in “The Lottery” than in the second place text (Text #5: “Lamb to the Slaughter”).

Mrs. Reynolds speculated that the text itself could have been part of the explanation for the uptick in student annotations. She explained, “[‘The Lottery’] leaves just enough to the reader that it creates questions and doesn’t explicitly provide all the answers.” The fictional short story, which tells of a community that conducts a lottery each year to decide which citizen will be killed by stoning, caused students to ask questions about the characters, the town, and the nature of the lottery, as well as to speculate about what was happening and how things would turn out; therefore, their annotations exhibited higher frequencies of Authentic Questions and

instances of High-Level Thinking. Their web annotation discussions also tended towards Exploratory Talk, as they considered together the unknowns and the exciting aspects of the story, not honing in on concrete facts but instead expanding ideas and speculating on possible explanations for what was happening in the text. This finding indicates that the text is a vital element of student engagement; if a text resonates with students, or if it excites or interests them, they would most likely be more willing to interact with it and with each other than would be the case with another less-interesting text. Although it is not realistic to think that every text an ELA teacher uses can be as compelling for teenage students as “The Lottery” was for Mrs. Reynolds’ 9th graders, it is one element that teachers should consider when selecting texts for web annotation or online discussions in general.

**Research Question 3: How do ELA teachers and students perceive the usefulness of web annotation in supporting student comprehension of texts?** In this section, I draw from both teachers’ voices to interpret their feelings about the impact web annotation had on reading comprehension and to situate their perceptions and experiences in the broader range of literature about effective online discussions. I do this by first discussing student perceptions of increased comprehension from seeing and interacting with others’ thoughts in the online setting, framing their comments in the Bakhtinian notion of heteroglossia. I then situate the teachers’ perceptions of the impact web annotation had on comprehension within existing research on learning outcomes from web annotation and general online discussions.

*Social aspect of web annotation.* It was clear, upon synthesizing all six student interviews, that they enjoyed the ability to see their peers’ thoughts and engage in discussion using Hypothesis. For a student like Charles (the 12th grader who reported moderate opinions about the usefulness of web annotation), who “was not particularly fond of speaking in class,”

web annotation provided an avenue for him to articulate his thoughts and evaluate the meaningfulness of his ideas before presenting them to others; this reinforces Wang and Woo's (2007) and Kingsley's (2011) conclusion that online discussions are beneficial for reticent or more passive students who for various reasons tend not to participate heavily in F2F discussions.

Charles also revealed that he would think about what others would think of his annotations, evaluating whether they were "meaningful" or "just nonsense," and Clara (the 12th grader who reported no positive impact of web annotation on comprehension) said something similar. Their comments exemplify the dialogic idea that utterances are always linked to previous and future utterances, highlighting the non-neutrality of language: our words are formed in "the atmosphere of the already spoken" and anticipate "that which has not yet been said" (Bakhtin, 1981, p. 280). Students are often cognizant of how their utterances will be received by their audience and attempt to craft their ideas accordingly, and that was apparent in their annotations as well as in my interviews with them about the process.

A recurring theme from student interviews, and from my analysis of survey responses from Item 3 (regarding the impact of seeing others' thoughts), was that many students felt they understood the texts better because they viewed others' posted annotations. Responses to that question showed stronger agreement than Items 1 and 2, regarding the impact of their own annotations and of web annotation generally on textual understanding. Something about the social aspect of web annotation, that is, of seeing and interacting with others' thoughts, seemed to cause students to feel like they understood the text more deeply. In Hannah's words (the 9th grader who reported a positive impact of web annotation on textual understanding), "New ideas will pop up because of my classmates" (Student Interview, 12/16/19). And as Blake (the 9th grader who reported a moderate impact of web annotation on textual understanding) succinctly

remarked, “Two brains are better than one” (Student Interview, 12/16/19). These statements, and the trends from survey responses, support Larson’s (2009) conclusion that students typically value their peers’ contributions in online discussions, whether such interactions result in increased learning outcomes or not. My study measured comprehension by evaluating students’ web annotations, showing relatively few instances of Soter et al.’s (2008) indices; however, it is possible that students in fact did increase in textual understanding by reading and considering their peers’ annotations without eventually contributing an annotation of their own that was evidence of such an increase.

This study was not designed to explicitly measure how seeing peers’ annotations affected one’s understanding of the text; to do so, more attention would need to have been paid the process students underwent as they read the text, as they read others’ annotations, and as they crafted their own thoughts (I address the need for such research at length in the implications section below). But in the realm of this current study, it was significant that students at least *perceived* themselves as having understood texts they read more deeply due to the social nature of web annotation. It is likely that students who see value in social annotation would be more motivated to participate, more willing to spend time reading others’ annotations and considering how they relate to the text, and potentially more engaged in contributing their own ideas. At the very least, taking learning outcomes out of the picture, it seems that the social aspect of web annotation can have a valuable psychological impact. As Blake put it, “people’s belief in themselves changed over web annotations” (Student Interview, 12/16/19). Especially for students who struggle to understand what they read in ELA classes, or for those who feel like they are not on the same reading level as their classmates, perhaps exposing a broader range of student

thinking on a platform like Hypothesis can serve to increase confidence and give students opportunities to engage in collaborative thinking in a low-stakes environment.

*A plurality of voices.* Related to the notion of increased textual understanding due to the social nature of web annotation is how these interactions bring students' thoughts together on one web page, placing student utterances literally alongside each other. If an annotation is an utterance, to use terminology from dialogism, then as they are placed beside each other and linked to each other through the reply feature, they create a form of heteroglossia—or plurality of voices, contexts, speech genres, or worldviews in which utterances are embedded—that could serve to increase the dialogicality of the online discussions and facilitate negotiated understanding of ideas (Bakhtin, 1981).

In these two cases, however, the data did not show much shaping or negotiating of student understanding. Hannah and Eleanor (both 9th graders in Mrs. Reynolds' class), felt like there was a lot of agreement and not much difference in student opinions in any given annotated text; Mercer (1995) calls this “cumulative talk,” in which “speakers build positively but uncritically on what the other has said,” and resulting in “repetition and confirmation” (p. 104). Blake, unwittingly speaking from a dialogic train of thought, remarked that “the most helpful part [of student discussion] is disagreement, because that's where you really learn things...that's when progress is made” (Student Interview, 12/16/19).

Reflecting upon student and teacher comments, and on my evaluation of annotation quality, I agree that there was not a wide variety of student perspectives coming in contact with each other over the course of a conversation. In other words, student utterances did not tend to create a rich heteroglossia, a polyphony of voices that richened and deepened the substance of the dialogue or that moved the conversation into new territories. This lack of disagreement

caused web annotation discussions in this study to generally miss out on opportunities for increased understanding and for the dialogicality inherent in “collaborative disagreements” (Sherry, 2014, p. 144). These findings indicate, as Larson (2009) suggested, that online discussions often miss the mark if participants are not carefully considering and responding to ideas which differ from their own, in an effort to work towards new ideas or shared understandings of texts.

***Two teachers’ final thoughts about web annotation and comprehension.*** As Mrs. Reynolds reflected on the experience of using web annotation with her 9th grade students, she recalled her initial goal of getting students to slow down and really think about the texts they were reading and how she sought to facilitate that process by guiding their reading and annotation purposes. Thinking of how web annotation discussions unfolded, Mrs. Reynolds felt that students struggled to achieve the type of high-level thinking and dialogue that she was aiming for. Mrs. Jorgensen felt similarly about the impact of web annotation on student learning: “[Web annotation] is bringing them from letting their eyes glaze over the lines, with no interaction with the text, to that next level—but it’s not taking them to where I thought it might” (Second Interview, 10/30/19). Reflections like these indicate that neither teacher was fully satisfied that web annotation clearly supported students’ textual understanding, but they both saw enough benefits from the process to state that they planned to continue using Hypothesis for online student discussions of texts.

**Situating these findings in existing literature.** Relating a synthesis of these reflective perceptions and overall findings to existing research on student dialogue, this study supports and extends findings from several studies regarding dialogue in the classroom. The tension between these teachers’ desire to facilitate dialogic student interactions and the lack of rich dialogue in

web annotations reflects Anagnostopoulos et al.'s (2008) description of the discrepancy between the value teachers place on student discussion of text and the actual amount of student dialogue that occurs in ELA classrooms. I argue that this study extends that finding, however, as it provides an example of the inherent challenges associated with teachers' facilitation of online dialogue—namely, that it seems to be more difficult in online settings for teachers to implement the “spontaneous scaffolding or support for developing ideas that are generated during open discussions” of the sort that Applebee et al. (2003) suggest have such a powerful impact on students' learning outcomes (p. 722).

Considering Mercer and Dawes' (2014) suggestion that dialogic pedagogy positively impacts learning outcomes as students are active participants in discussions that move thinking forward, this dissertation study again provides an example of the difficulty of cultivating a dialogic online environment for ELA students. Moreover, it underscores Mercer's (1995) assertion that teachers and students should work together to establish “ground rules” for discussions (p. 105)—in other words, they need to consider and then employ the patterns of interactions inherent in the types of talk that will help them achieve the goals they have for the discussion.

Relating a synthesis of these findings to existing research on web annotation, this study supports Kawase et al.'s (2009) assertion that web annotation provides perceived benefits for students as they view and interact with others' perspective on the texts they are studying. Because findings revealed a general lack of annotations rich in high-level thinking and dialogic interactions, my study challenges Lebow and Lick's (2004) conclusion that web annotation results in greater student participation and engagement, although there is evidence that students did show at least some increase in active reading, as reported in teacher and student interviews.



As an initial, exploratory look into how web annotation appears to support high-level thinking and reading comprehension, this study aligns with research that shows a lack of significant improvement on reading outcomes due to web annotation practices (Johnson et al., 2010; Razon et al., 2012). However, it does align with existing research of web annotation conducted in higher education settings that indicate an increase in perceived learning (Gao et al., 2013; Sun & Gao, 2016), and it does so in two high school classrooms, extending such findings into new settings.

In summary, my analysis echoes Nystrand et al.'s (1997) conclusion that dialogue can enhance and extend student learning only to “the extent to which instruction requires students to think, not just report someone else’s thinking” and that “meaning is realized only in the process of active, responsive understanding” (pp. 73-74). To place that idea more directly in context of this study: Hypothesis, web annotation, or any digital tool teachers use will not mean much for student learning unless the activity encourages active thinking about a text and open-ended, dialogic interactions. This idea is more thoroughly fleshed out in the “Implications for Practice” section below.

### **Limitations**

This research study was an exploratory investigation of how ELA teachers implement web annotation in an effort to support students’ comprehension of and dialogue about texts. A more expansive investigation of how students and teachers utilize web annotation to understand texts would require a much broader sample size and the use of a survey that has been thoroughly validated. Conversely, considering the nature of my research design, a much larger sample size would have essentially prevented the inclusion of interviews and extensive field observations; therefore, it would have changed the nature of the study. Moreover, because this study involved a

relatively small sample of students and teachers in particular contexts, generalization across all settings is not assumed. The data, through naturalistic generalization (Stake, 1995), can inform educators in other areas of the country or world, but they do not necessarily suggest replicability across all contexts and settings. My study examined two different teachers approaching activities in two different ways, enabling me to discuss similarities and differences and comment on potential implications for other teachers; however, additional single case studies that focus more deeply on one teacher's approach could provide additional insight to extend or enrich my findings regarding how teachers choose to structure and adjust the use of web annotation in discussions of texts. As an exploratory investigation of web annotation in secondary ELA classes, it is hoped that making the research methodology I employed transparent and offering readers thick descriptions (Geertz, 1973) of the contexts in which my study took place allows other researchers and educators to gauge the applicability of my findings to other settings.

Although investigating, in part, levels of students' textual understanding, in this study I did not administer comprehensive reading assessments. As mentioned earlier, perhaps students more fully understood the texts due to web annotation activities but did not annotate as evidence of that increase. Certainly, formal reading assessments could have provided concrete measures of comprehension that potentially revealed an increase in understanding that was not evident in web annotations via the indices employed in my study. However, because I was focused on viewing web annotations through a dialogic lens, I felt that Soter et al.'s (2008) indices were most effective at evaluating the prevalence of discourse features related to textual understanding; inclusion of comprehensive reading assessments would have caused my focus to veer away from dialogic student talk. Considering also that a substantial portion of my study was dealing with teacher implementation and perceptions of web annotation in ELA, I chose not to include formal

assessments. A follow-up study that more explicitly focuses on measures of reading comprehension would certainly provide value to the growing body of research on web annotation in educational settings.

It is also important to note that neither teacher was familiar with Soter et al.'s (2008) indices prior to the study. Both teachers valued the role of student dialogue in textual understanding, but they did not have familiarity with the specific indices I used to analyze web annotations. Therefore, they were not assessing annotations based on how frequently they saw High-Level Thinking, or Authentic Questions, or any of the other categories I used to code data. Had they been familiar with the study and the terminology Soter and colleagues used, they may have intentionally structured web annotation activities to promote student use of the various categories. A potential follow-up study that employs that type of intentional structure aligned with those indices would likely result in vastly different findings.

This study occurred over four months (from mid-August to mid-December of 2019), essentially comprising the first half of the school year. Had it stretched over the course of the whole school year, it is plausible that the teachers would have grown more adept at using web annotation to support the kinds of discussions they were aiming for, and that students would have become more familiar with Hypothesis, including how to interact with texts and each other using the platform. Another related limitation arises from the fact that these two teachers had no previous experience with web annotation. They both valued the practice of annotating texts and had included some aspect of that in their curriculum, but neither had used Hypothesis or any other web annotation tool with their students until this study. If they had been using web annotation with students, experiencing the difficulties associated with unfamiliar technology and tinkering with methods for implementation surrounding reading activities, my findings would

probably have been quite different. As suggested in the next section, technology implementation almost always comes with some level of technical frustration that teachers and students need time to work through; additionally, experience with web annotation would help teachers more clearly recognize implementation and scaffolding strategies that help facilitate the type of reading and dialogue that they want their students to engage in. The next section fleshes out those implications in light of my findings and the existing body of relevant research.

### **Implications for Practice**

Because this study provides an in-depth look into how two high school ELA teachers employed web annotation with their students and how the students themselves perceived the value of the platform and process, these findings are worthwhile for practicing teachers and educational researchers seeking to explore ways to help students comprehend texts they read. From a teacher's perspective, my findings point to the value of (a) focusing on pedagogy, not technology; (b) establishing a dialogic culture in the classroom; and (c) anticipating troubles when integrating technology and displaying patience while experimenting with digital platforms that may be new to teachers and students alike. In this section I examine the aforementioned implications in greater depth and provide relevant suggestions for teachers interested in implementing web annotation in the ELA classroom.

#### **Focus on Pedagogy, not Technology**

Both Mrs. Reynolds and Mrs. Jorgensen, in my interviews with them, identified a common motivation for their use of web annotation with students: specifically, they hoped that the digital technology, as something new and innovative, would more fully engage students in reading and discussing texts in meaningful ways. Mrs. Reynolds said she wanted students to use web annotation to “develop a deeper understanding of what they're reading...to slow down and

actually read it and read to understand (Third Interview, 12/16/19). Mrs. Jorgensen said, “since students are so tech-focused today, I was hoping that this would be something that would excite them” (Initial Interview, 8/20/19). Thinking reflectively upon those goals and on how web annotations played out, I am reminded of Philip and Garcia’s (2013) imperative to focus attention on pedagogy—that is, to center the teacher and her pedagogical choices—as opposed to the technology tool itself. It was not the goal of this study to extol web annotation generally or Hypothesis specifically as effective or ineffective with regards to student learning; instead, the goal was to identify and discuss how teachers used the platform, the processes they employed and the structures they provided for students, and how pedagogical moves they made impacted students’ talking about and understanding the texts they read. Therefore, a major implication for teachers is the need to make intentional decisions for inclusion of digital tools and processes like web annotation based on their broader learning goals and the practices they want their students to engage in.

An example of the type of intentional decisions teachers need to make regarding web annotation or other digital processes is highlighted by the distinct ways the two teachers in this study structured annotation activities. Mrs. Reynolds felt that small groups would promote more active dialogue with her students, so she placed them in private Hypothesis groups of three or four; Mrs. Jorgensen felt that her students would benefit from consistent exposure to a broad range of their peers’ ideas, so she had the whole class annotate as a group. Similarly, Mrs. Reynolds’ students annotated everything as homework, while Mrs. Jorgensen’s annotated everything in class. The characteristics and needs of one section of ELA students may be vastly different from that of another, so teachers should make decisions in this regard in careful consideration of their students and the learning goals associated with web annotation.

It is helpful here to revisit the “three Ts” that Philip and Garcia (2013) articulate as important factors for teachers to consider regarding digital technology. I present them here as questions teachers could ask themselves as they plan instruction with web annotation—or with any digital tool: (a) How might the technology allow me to expand the types of texts I can introduce to students and to transform the types of interactions students have with texts? (b) How does this specific tool (i.e., app, device, platform, etc.) offer new ways of gathering and organizing information that could help my students learn what I want them to learn? and (c) How might this digital tool support the types of classroom talk that research suggests is known to support student learning?

Reaffirming Philip and Garcia’s message, I contend that an approach like this places agency in the hands of the teacher: the power behind student learning comes from the teacher, not from digital technology. As a researcher and teacher who employs digital tools in much of my work, I recognize the powerful opportunities that web annotation and other digital platforms can provide for teaching and learning in our modern world. But simply embracing technology is not enough. I argue, paraphrasing Mrs. Jorgensen’s language mentioned earlier, that technology itself does not have the power to take students where teachers want them to go with their learning from texts. Mrs. Jorgensen recognized that and, consequently, started attending more closely to pedagogy, providing increased support so student discussions would become more meaningful. Philip and Garcia’s (2013) questions offer teachers guidance as they seek to build that type of structure into their curriculum so they can effectively leverage the affordances that digital technologies provide, especially when used intentionally and when aligned with a teacher’s goals for student learning.

## **Establish a Dialogic Culture**

The large body of research presented in Chapter 2 clearly supports student dialogue as a pedagogical approach that benefits student learning in a variety of ways. Although findings from this study cannot conclusively state that web annotation results in substantial increases in dialogic student interactions, the themes that emerged from a synthesis of interviews, survey responses, and classroom observations indicate several things teachers can do to establish a culture of dialogue in F2F and online settings that result in learning activities in which students explore new ideas, build upon each other's thoughts, provide support for their assertions, and negotiate shared understandings of texts.

Fecho and Botzakis (2007) provide teachers with several attributes of a dialogic classroom based on Bakhtinian principles. First, all students should have ample opportunities to raise questions and author responses to other's questions. The teachers in my study sought for this ideal by setting requirements for sharing initial thoughts and replies to others, and that strategy helped to ensure annotations were being contributed. It is a definite challenge to move beyond that type of structured discussion into a truly dialogic, student-driven one, but such a shift probably begins with establishing a dialogic culture in the classroom on a daily basis. Fecho and Botzakis' (2007) second attribute of a dialogic classroom is one that embraces context and "the nonneutrality of language" (p. 550), and they recommend that teachers try to nudge students into considering other students' life contexts, the contexts in which literary characters are depicted, or the historical contexts surrounding the texts they read. Third, a dialogic classroom encourages multiple perspectives, signifying that discussions are meant to expand our thinking and work outward to exploration of alternate thinking beyond one's own. Finally, they advocate a flattening of classroom hierarchies, requiring teachers to allow students to drive discussions

and to be flexible as dialogue potentially strays from where the direction the teacher was expecting. These attributes can help ensure ELA teachers promote a culture of dialogue that enriches student thinking, and it is my argument that such a culture could permeate interactions in both F2F and online settings.

In an effort to create this dialogic culture with their students, teachers will likely need to establish ground rules for effective discussions; in other words, students may need to see examples of what constitutes quality dialogue and how to interact appropriately in online settings. With regards to web annotation or other online discussion platforms, this may involve explicit teaching about the eight indices associated with high-level thinking and comprehension (Soter et al., 2008) and teacher modeling of effective participation in dialogue. For example, ELA teachers could show an annotated text where someone had posed an Authentic Question that sparked quality Uptake, Exploratory Talk, or High-Level Thinking. They could contrast surface-level annotations with ones that exhibit Elaborated Explanations, including an assertion that is supported by several reasons. Like Mrs. Jorgensen, teachers can insert themselves into the conversation to spark these types of contributions, and like Mrs. Reynolds, they can foreground the process of annotation by going through a specific text multiple times for different purposes to show students examples of meaningful annotations. Furthermore, aligning with Wang and Woo's (2007) suggestion, teachers can actively model how to write clearly and with enough detail so that students can understand their classmates' thinking and purposes for annotating. Moreover, students would benefit from having teacher-guided practice in how it looks to take up others' ideas, how to appropriately interact with peers on a digital text, and how to write clearly with enough detail that classmates can understand their thinking and purpose for annotating. As part of this dialogic culture, and aligning with suggestions from Hrastinski (2008), Juzwik et al.



(2012), and Smagorinsky (2013), teachers could relay to students that it is okay for their annotations to be imperfect works-in-progress, that they do not have to have fully-formed ideas to participate in web annotation discussions. In all the examples presented here, teachers can invite a dialogic culture into their instruction by modeling high-level thinking and making transparent the strategies that support increased text comprehension.

In thinking about opening up the classroom to these types of dialogic student conversations, Mrs. Reynolds' case highlighted something worth noting: she expressed frustration that some students did not even seem to have learned how to interact with each other appropriately and academically using Hypothesis. When talking about the lack of quality dialogue and high-level annotations, she said, "You never know what they're going to post. It's hard to police that the entire time." That statement was revealing of a tension Mrs. Reynolds felt, a need to regulate and monitor students' annotations because she was worried their contributions would not be relevant to the text or would potentially be trivial, lighthearted, or inappropriate for class discussion. This concern resonated with me as a reasonable issue as teachers attempt to provide freedom for students to discuss what they want to discuss, to engage in open conversation with peers and friends; however, strict monitoring and shaping of student language can result in inauthentic student talk and, in effect, limit the dialogicality of their web annotations. ELA teachers especially, as they present students with a wide range of texts, would benefit from using examples shared in this section that help to establish a dialogic culture and should focus on these principles early in the year to set expectations for student dialogue in their class, both F2F and online.

## **The Certainty of Technology Troubles**

One finding that presented itself multiple times and in both research sites throughout the study—and one that would certainly resonate with any teacher who has attempted to utilize technology consistently in their classroom—was the inevitability that technical troubles will arise, in one way or another. Despite the best efforts from both Mrs. Jorgensen and Mrs. Reynolds to ensure that the Hypothesis tool would work for their students using district computers—even to the extent of their contacting their respective district technology support teams to request access and troubleshooting—both of their classes were blocked upon their initial attempts to access the program. Mrs. Jorgensen, moreover, was frustrated throughout the last two weeks of the study due to the wireless network in her classroom being weak and inconsistent. Although our societies and schools are becoming increasingly connected to digital technologies and infrastructures, technical troubles like these will almost certainly persist for any and all teachers. It is helpful for ELA teachers, when planning to implement web annotation for student dialogue about texts, to anticipate troubles and to seek out help in their building or district from those whose job it is to help; however, even then it requires a certain level of patience and willingness to accept that there will be times when lessons, discussions, or activities will not go according to plan and teachers would do well to remember that the focus should be on sound pedagogy and to make adaptations based on those established practices.

Related to that idea, several researchers recommend that teachers consider how new technologies can take students time to learn and to become comfortable enough to effectively use as an educational tool (Archibald, 2010; Hammond, 2000; Juzwik et al., 2012; Kawase et al., 2009). It takes time and effort to learn the nuances of web annotation, or of any other digital platform or process for that matter, so teachers should consider that and exhibit patience with

students as they plan, implement, and adjust the use of web annotation or other digital tools in their instruction.

### **Recommendations for Future Research**

As an exploratory, multiple case study of how teachers take up web annotation in secondary ELA classes, and how the practice influences student dialogue in ways that research suggests are associated with improved comprehension, my findings support the notion that dialogic student interactions help students understand what they read; however, this study also underscores a need for further research into the role of web annotation in mediating textual understanding. As researchers attempt to more fully understand how web annotation can be used as a viable educational technology tool, instruments and procedures from this study could be employed in other educational settings to observe how teachers and students in elementary, higher education, or adult learning settings choose to use web annotation. Alternatively, studies in those settings could focus on an evaluation of the quality of students' discussions as measured by Soter et al.'s (2008) indices to discover whether certain categories are more or less frequent with learners of various ages or when teachers emphasize different goals for reading texts.

This study focused on teachers' implementation strategies, on the product of students' thinking about texts (i.e., an evaluation of the quality of annotations as measured by research-based indices), and on overall perceptions of the impact web annotation had on textual understanding. It did not investigate explicitly the process students undergo as they annotate, which would be a valuable follow-up research project. For example, future studies could capture eye movements across the screen while students read the text and others' annotations. Researchers could record students' screens as they are typing thoughts, erasing ideas, and revising writing. Interviews with students about the decisions they made on the individual

annotation level (e.g., encouraging participants to describe why they wrote a certain annotation the way they did or how they felt about their participation in a specific discussion threads) would provide valuable data regarding cognitive and dialogic considerations students make while participating in web annotation. Studies like these, which attend to the thinking and composing processes during web annotation, could shed more light on the internally persuasive discourse in which students engage as they participate in online discussions.

Echoing Uzuner Smith and Mehta (2013), more research is needed that specifically evaluates the quality of students' online contributions during web annotation and the impact those contributions have on specific learning outcomes. Research could employ validated instruments designed explicitly to measure reading comprehension as part of an experiment to determine the effect of web annotation as an educational intervention, controlling for previous reading comprehension scores. As an initial study, my study explores the impact of annotation activities on reading comprehension only as they exhibit evidence of research-based indices of high-level thinking, but an experimental design more tightly focused on comprehension scores from a section of secondary ELA students using web annotation versus a control group would shed more conclusive light upon the impact such activities have on students' textual understanding.

### **Conclusion**

While the findings from this study show how difficult it may be for ELA teachers to facilitate dialogic student interactions in online settings, they also detail two approaches toward dialogic pedagogy that help to identify effective strategies for web annotation in the classroom. Both teachers provided guidance and structure to discussions, but they also gave space for students to shape the dialogue and to explore new ideas through their annotations. Generally,

students annotated based on requirements the teachers set, and most of their annotated texts did not exhibit rich dialogue. Additionally, connections between the text and other texts or students' lived experiences were largely nonexistent in these cases, signifying an area of focus that may help increase student engagement in web annotation activities. However, both cases included instances where students engaged in high-level thinking and dialogue that appeared to increase comprehension for themselves and their peers. In those instances, students knew what was expected of them in the web annotation activity and formed their thoughts in relation to prompts the teacher gave.

This research study centralizes the teacher and sound pedagogy as crucial factors in effective use of web annotation—or of any digital platform—as a tool for learning, and it advocates for activities and processes that encourage students to share their thoughts, build upon others' ideas, ask questions that cause reflection and reimagining, and engage with perspectives that differ from their own. If web annotation is going to be an effective tool for cultivating discourse practices that support high-level thinking and increased comprehension, it must be used in ways that necessitate active thinking about a text and facilitate opportunities for original, open-ended responses to texts.

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## APPENDICES

### Appendix A

#### Survey: Student Perceptions of Web Annotation

*(The survey was administered online via Google Forms)*

1. Web annotation helps me better understand the texts we read in this class.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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2. Sharing my thoughts within Hypothesis enhances my understanding of texts we read.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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3. Viewing others' posted comments within Hypothesis enhances my understanding of the texts we read.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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4. My classmates usually reply to my ideas with comments that build upon my annotations in some way.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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5. I regularly reply to my classmates' ideas with comments that build upon their annotations in some way.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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6. Web annotation discussions enhance the face-to-face class discussions we have about the text.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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7. I am comfortable sharing my ideas with my classmates and teacher via web annotation.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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8. Hypothesis is user-friendly (i.e., I am comfortable with the technology).

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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9. I would like to use web annotation in other classes.

1. Strongly Disagree	2. Disagree	3. Neither Agree nor Disagree	4. Agree	5. Strongly Agree
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10. What other thoughts do you have about web annotation that might help me understand its usefulness for English students?

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## Appendix B

### Initial Teacher Interview Protocol

Interviewee: \_\_\_\_\_

1. What are your motivations for exploring the potential for web annotation in your instruction?
2. What are your goals for student learning this semester, relative to web annotation?
3. Imagining the ideal scenario, what would successful web annotation entail? What sorts of behaviors or outcomes would you hope to see from students?
4. What are your expectations for students' use of web annotation related to the following categories:
  - a. Quantity of annotations
  - b. Content or quality of annotations
  - c. Responding to others
5. What kinds of texts do you want students to annotate this semester? What criteria will you use in determining which texts to annotate?
6. How will you determine students' level of understanding of the texts you assign for annotation?
7. What challenges do you anticipate that might obstruct your goals and implementation plans for web annotation?
8. What is the role of discussion in your classroom? What expectations do you hold for students in a typical classroom discussion?

## Appendix C

### Second Teacher Interview Protocol

**Interviewee:** \_\_\_\_\_

1. What are your goals for student learning, relative to the texts they have annotated and discussed in class?
2. What role has web annotation served in working toward those goals?
3. What role have these annotations and online discussions served specifically regarding students' comprehension of texts?
4. How would you describe the nature of student contributions and interactions within Hypothesis?
  - a. Quantity of annotations
  - b. Quality of annotations
  - c. Dialogic interactions
5. Describe the extent to which ideas from web annotations have been taken up during class discussions.
6. How have you used students' web annotations in planning and/or assessment?
7. What other thoughts do you have so far about the usefulness of web annotation technology as an instructional tool?

## Appendix D

### Final Teacher Interview Protocol

Interviewee: \_\_\_\_\_

1. What were your goals for student learning, relative to the texts they annotated and discussed in class?
2. What role did web annotation serve in working toward those goals?
3. What role did these annotations and online discussions serve specifically regarding students' comprehension of texts?
4. How would you describe the nature of student contributions and interactions within Hypothesis?
  - a. Quantity of annotations
  - b. Quality of annotations
  - c. Dialogic interactions
5. Describe the extent to which ideas from web annotations were taken up during class discussions.
6. How did you use students' web annotations in planning and/or assessment?
7. If you were to use web annotation in the future:
  - a. What things would you do differently?
  - b. What things would you do the same?
8. What other thoughts do you have about the usefulness of web annotation technology as an instructional tool?

## **Appendix E**

### **Student Interview Protocol**

**Interviewee:** \_\_\_\_\_

1. What are your general thoughts about web annotation using Hypothesis?
2. When you chose to annotate something (i.e., write something in the text margins), what kinds of things would you typically write?
3. Thinking about the different texts you annotated, what were your motivations for annotating?
4. How did your own annotations impact your understanding of the texts?
5. How did your classmates' annotations impact your understanding of the texts?
6. When you would reply to others' annotations, what kinds of things would you typically say?
7. When others replied to your annotations, what kinds of things would they typically say?
8. How did web annotation discussions relate with face-to-face discussions about the texts? Did class discussions follow up with or build upon online discussions in some way?
9. What other experiences or thoughts about web annotation have you had that might help me understand its usefulness for English students?

## Appendix F

### University of Arkansas Institutional Review Board: Expedited Approval



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**To:** Johnny Allred  
BELL 4188

**From:** Douglas James Adams, Chair  
IRB Committee

**Date:** 07/19/2019

**Action:** Expedited Approval

**Action Date:** 07/19/2019

**Protocol #:** 1906202988

**Study Title:** Web Annotation in English Language Arts: Online Dialogue as a Platform to Support Student Comprehension of Texts

**Expiration Date:** 07/07/2020

**Last Approval Date:**

The above-referenced protocol has been approved following expedited review by the IRB Committee that oversees research with human subjects.

If the research involves collaboration with another institution then the research cannot commence until the Committee receives written notification of approval from the collaborating institution's IRB.

It is the Principal Investigator's responsibility to obtain review and continued approval before the expiration date.

Protocols are approved for a maximum period of one year. You may not continue any research activity beyond the expiration date without Committee approval. Please submit continuation requests early enough to allow sufficient time for review. Failure to receive approval for continuation before the expiration date will result in the automatic suspension of the approval of this protocol. Information collected following suspension is unapproved research and cannot be reported or published as research data. If you do not wish continued approval, please notify the Committee of the study closure.

**Adverse Events:** Any serious or unexpected adverse event must be reported to the IRB Committee within 48 hours. All other adverse events should be reported within 10 working days.

**Amendments:** If you wish to change any aspect of this study, such as the procedures, the consent forms, study personnel, or number of participants, please submit an amendment to the IRB. All changes must be approved by the IRB Committee before they can be initiated.

You must maintain a research file for at least 3 years after completion of the study. This file should include all correspondence with the IRB Committee, original signed consent forms, and study data.

cc: Sean P Connors, Key Personnel