Students' Use of e-Text Annotations for Learning

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Abstract

Despite the prevalence of electronic textbooks in higher education, the extent to which these systems encourage learners to attune to mechanisms that afford transformative and deep learning processes remains largely unexplored. This study describes a preliminary analysis of students' use of interactive features of electronic textbooks and how their use aligned with supported learning frameworks. Content analysis was used to analyze the textual data generated by students' use of the question feature. Findings indicate students tended to use this feature as a simple information gathering tool and to other relevant contexts to the text. From these results, we discuss potential interventions that could promote more expansive teaching and learning mechanisms with the social annotation tools of electronic textbooks.

Electronic textbooks (e-Texts) have become an increasingly used and viable alternative to more traditional print options due to the reduced cost and availability of publisher agreements (Bureau of Labor Statistics, 2016). Studies of e-Texts have focused on various topics, including the influence of feature usage on student performance (Junco & Clem, 2015; van Horne, Russell, & Schuh, 2016), the comparison with printed textbooks (Daniel & Woody, 2013), how adoption of e-Texts corresponds with student or instructor preferences for educational technology in general and e-Texts specifically (Baglione & Sullivan, 2016; McGowan, Stephens, & West, 2009), and the degree to which students and instructors perceive how their use of e-Texts affects engagement and learning (Abaci, BrickaLorenz, & Quick, 2019). There have, however, been few investigations that seek to understand the ways in which e-Texts features are used in terms of how they influence learning processes.

Studies that have sought to understand how e-Texts were taken up and affected students' learning, recognized that these outcomes are greatly impacted by how instructors integrate the usage of the texts into students learning activities (Schuh, van Horne, & Russell, 2018). Other studies noted a lack of interaction with e-Text features (Cuillier & Dewland, 2014), or found students as generally unable to orient to the particular affordances of an e-Text (Berg, Hoffman, & Dawson, 2010). In order to understand how to design effective learning environments for content delivery via e-Texts, we need to identify whether and how students are utilizing the affordances of e-Texts. In particular, we need to understand the ways in which e-Texts afford social and communal orientations to content and discussions as part of learning and teaching designs (Schuh et al., 2018). Thus, this study seeks to present a preliminary analysis of students learning processes through their use of e-Text annotation and social annotation features.

Social annotation tools afford users the ability to highlight and comment on an electronic text and share those annotations with others in online settings (Novak, Razzouk, & Johnson, 2012). Social annotation in educational contexts have shown improved participation and engagement from students (Eryilmaz, van der Pol, Ryan, Clark, & Mary, 2013), improved text comprehension (Johnson, Archibald, & Tenenbaum, 2010), and improved instruction (Lebow & Lick, 2004). Students who participate in annotation activities have also shown improved reading practices and may lead students towards more complex engagement with the text they are annotating (Wolfe, 2008). Given the relevance of social annotations on students learning and their use of such tools in e-Texts, we sought to answer the following question:

> In what ways did users adopt and use social annotation features within e-Texts as part of their learning?

This question is the first step in developing more involved interventions with e-Texts by understanding how these tools may be better applied to delivering educational content.

Research context and participants

This study sought to understand the use of social annotation functions within an electronic textbook (e-Text) used by the third author, an instructor in a Communications Law course taught in Spring 2018. The e-Text was obtained through an inclusive, first-day access model adopted by a large Midwestern university. The e-Text included annotation features (e.g., highlights, notes, and questions) that students could make public to the course. Only the question feature was directly used to communicate with the instructor. The course was intended to facilitate students' understanding of journalism law and engage in practical requests for

information to state government agencies across the Midwest. The instructor required students to use the question feature regularly within the context of the course and asked the students to generate questions or comments that he could respond to.

Participants included 24 students within the third author's course. Demographic information was not collected for the students for two reasons. First, the IRB protocol of this study did not necessitate the inclusion of student demographics without their consent. Second, the preliminary nature of this study did not warrant the inclusion of any demographic information to understand the general patterns of social annotation use within the e-Texts.

Methods

The purpose of our analysis was to identify how students utilized the "Question" function within the e-text annotation tool. For this study we examined the 162 annotations that students created and tagged as "question." All annotations tagged as "question" were represented in the instructor's online dashboard and indicated to the instructor that the student requested a response. To code and analyze our data, we used content analysis (Schreier, 2012) and quantitative coding (Chi, 1997). First, the first and second author read through the annotations and generated preliminary codes. Next, areas of overlap and differences were discussed and the list of codes was revised. Using the revised list of codes, the annotations were coded again and three broader categories within the annotations were identified. These three categories reflected how the students used the "question" function of the annotation tool (see Table 1). Next, the annotations were coded according to the three categories. Our unit of analysis was the complete annotation, so some annotations were assigned multiple codes. Finally, we calculated intercoder agreement across all the annotations and found 84% agreement.

Table 1
Description of the themes identified in student annotations marked as "Question"

Theme	Description	Example
Request for Clarification	Questions which ask the instructor for a clarification of the text.	"What is an example of a vague law? I understand that it is a law that is hard for citizens and judges to know where the line is, but are there any cases that I could look at to better understand a vague law."
Application Questions	Questions which ask the instructor how the content or ideas of the text apply, usually to contexts beyond the description of the text.	"How would the constitution apply to things the founding fathers would have never guessed existed in this time time period, especially with the use of the internet?"
Statements	Annotations which comment on aspects of the text or their implications.	"It is remarkable how many different areas of the law the Freedom of speech covers."

Results

Students most often used their "question" annotations to ask about how the text applied to some situation (57% of all annotations, see Table 2), followed by clarification of the text (35%). In both the Application Questions and Request for Clarification categories, students often brought

in examples as part of their question. Although students tagged their annotation as a "question," sometimes students did not ask a question at all; rather, students provided a statement of opinion or interest relating to the text (25%). Below, we discuss each of these categories in more detail.

Table 2
Themes prevalent in the annotations marked as "Question"

Theme	#	%
Application Question	93	57%
Request for Clarification	57	35%
Statements	41	25%

Application Questions

This category occurred most often in the annotations, with more than 50% of all annotations asking questions about how the content of the text might apply, usually to another context not described in the text. For example, one student annotating text about libel asked, "It is interesting/ would be interesting to see how libel plays out with social media and internet. How does libel work in gossip columns or tabloids?" A different student annotated a section on phone book copyrights and asked, "Is this why people can sell your address and number and it is not considered copyrighted?" In this example, the student asks if phone book copyrights affect what can happen to the information inside phone books.

When asking application questions, students often provided examples of situations, either from current events or hypothetical examples to clarify what they were asking. A student annotated a section about First Amendment protections and asked:

> Would it be unlawful for a [sic] organization such as Google to fire an employee for their own political memos? An example of this would be James Damore and his manifestos about women and political bias in the workplace.

Many students used similar phrasing ("An example...would be...") following an application question. This phrase functioned as a way to narrow their question and often referred to relevant current events.

Request for Clarification

Students sometimes expressed difficulty understanding ideas from the text and requested clarification from the instructor. Often, these annotations were stated simply, such as, "What is the difference between ideas and intelectual [sic] properties?" Sometimes students attempted to synthesize the text to ask whether they were correct, "Does this mean that even if it is not published online but seen on tv through broadcast media it could be within a courts [sic] jurisdiction?" Another way that students requested clarification of the text was by requesting examples from the instructor. For instance, one student requested an example to help them understand a term described in the textbook, "What do they mean by a redress of grievances? Or an example of what this could mean?" These examples show how the students used the annotations to ask the instructor to provide more details or clarify concepts in the text that they found confusing.

Statements

While all of the annotations we analyzed were tagged by students as a "question," some students' annotations contained no question at all. Often, these annotations simply provided the students a space to express an opinion. One student annotated a section about how some justices view the Constitution of the United States as a living document and added their own thoughts, "This is how I have viewed it. I think it is very vague, and as society changes I think it does respond to those changes as well." Other students expressed surprise or interest in what they read, "It is remarkable how many different areas of the law the Freedom of speech covers."

A few students used the annotations as an opportunity to express their own political opinions in relation to concepts from the text:

> I often wondered why Hillary Clinton didn't sue Trump for libel and or slander because of all the viscous attacks against her during the debates and over the elections. He dragged her through the mud and ruined her reputation. I know you probably don't agree, but that's cool!

In this annotation, the student even addresses the instructor directly by referencing "you" and, perhaps, expecting a response from the instructor that contradicted this student's opinion. Other students referenced "liberal voices" on the Supreme Court, "irrational executive orders" from the President of the United States, and the 2016 United States presidential election in general.

Discussion

This analysis revealed relatively standard functions and applications of questions as strategies for engaging with the disciplinary content of the course. However, students' request for additional examples to understand the course content may suggest that the instructor can provide more relevant examples than what may be contained in the text. Alternatively, the strong presence of application questions may suggest that students are particularly interested in connecting course content to contexts they find more relevant or interesting. Even within the statements, students often brought in their own relevant contexts that related to the text. Students are more likely to retain course content when they make connections to their own relevant contexts (Engle, Lam, Meyer, & Nix, 2012) or when they problematize the course content by asking application questions (Engle & Conant, 2002). Drawing on these frameworks by allowing and encouraging these types of questions also prioritizes students' identities and agency as a resource for learning. This finding may extend the utility of these annotations for promoting desired outcomes such as deeper transfer of the disciplinary content and practices.

It is important to note how crucial the structure of the annotation activity is for how students participate. It is also important to note the students were required to make annotations as part of their course grade, which influences our interpretation. Our findings seem to support Schuh et al. (2018) in recognizing the role of the instructor and the activity prompt for shaping students' annotation activities. Specifically, the instructor's use of social annotations as a formative assessment helped the students engage in some common information management strategies when encountering new material; but the lack of specificity in how students should engage in the annotations may explain the common categories of interactions observed within the data. The limitations of the e-Texts platform may have inhibited collaboration among

students, as the annotations were typically only shared with and could only be responded to by the instructor. Additionally, small changes to the activity prompt may result in engagement that connects students' personally meaningful experiences and contexts to the course content in ways that improve learning (Andrews, Chartrand, & Hickey, 2019). Future analysis of the instructor's responses could provide additional understanding about how the annotations were used for learning. Applying different methods, such as discourse analysis, may also provide insight into how students' identities and learning are co-constructed within the annotation activity (e.g., Lester & Paulus, 2011).

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