# Using Diigo to Engage Learners in Course Readings: Activity Design and Formative Evaluation

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**Abstract:** This paper discusses the design and initial formative evaluation findings of a learning activity focused on social bookmarking using Diigo. The activity purpose was twofold, to teach a new tool and to use the tool to facilitate interactions surrounding some of the required cognitive course content. During this activity, students shared and tagged relevant resources with their classmates and, engaged in collaborative article annotation. Findings show that in general most students were active participants and had a favorable reaction to the learning activity. Several students indicated that they already had or planned in the future to use Diigo either individually or collaboratively for both personal and professional purposes. Students who did not have a favorable reaction to the activity tended to have problems in the technology or focused solely on the technology component of the activity. For future semesters, greater emphasis will be placed on the content that students share and annotate, with the tool de-emphasized as a means to an end.

## Introduction

Social bookmarking tools provide students with opportunities to share web-based resources and to collaboratively analyze those resources using annotations. Annotations include descriptions, highlights and comments. In a learning environment, these bookmarks and annotations align with the curriculum, allowing students to apply course concepts to real-world resources. Higher education students have found social bookmarking tools useful and easy to use (Chen, Hwang, & Wang, 2012; Gao, 2012; Razon, Turner, Johnson, Arsal, & Tenenbaum, 2012; Nokelainen, Miettinen, Kurhila, Floréen, & Tirri, 2005), in one case specifically mentioning the benefit of exposure to various viewpoints within a social bookmarking environment (Gao, 2012).

When social learning methods are used, students are "presumed to build more knowledge through the process of sharing and discussing knowledge and experiences" (Razon, Turner, Johnson, Arsal, & Tenebaum, 2011, p. 350). Studies have found that social computer-based annotation supported learning better than individual paper-based annotation (Chen, Hwang, & Wang, 2011) and level of social activity when using annotation features was positively related to final grades (Nokelainen, et al., 2005). These prior studies suggest that social annotation activities may be an effective way of promoting learning. The purpose of this paper is to describe a social bookmarking

activity using Diigo, a social bookmarking tool, and to share the formative evaluation results from the first semester of the activity's implementation.

**Course Context**

The Diigo activity was developed for students in a required technology course for pre-service teachers at a large public university. During this course, students learn to use a variety of software programs to perform teacher-oriented tasks (e.g., create a newsletter in a word processor and manipulate data in a spreadsheet). However, not all course objectives are focused on learning software. Additional course objectives address cognitive aspects of technology integration, including intellectual property guidelines and assistive technologies.

Students enrolled in the course are typically freshmen and sophomores who intend to be education majors, although 20-30% of the enrolled students take the course to fulfill a general computing requirement and are not education majors. Each semester there are six sections of the course, taught by graduate student instructors using a common syllabus and assignments. Courses meet once a week for three hours in a computer lab.

**Diigo Activity**

The Diigo activity was designed to serve two objectives. First, it provided students with the opportunity to learn an additional instructional technology. Second, Diigo offered a technology-based platform through which students might engage in substantive interaction with both course content (shared web artifacts) and peers (shared annotations). Essentially, the activity supported student engagement with scholarship about technology integration while simultaneously requiring students to learn a new tool with previously unfamiliar features such as tagging and annotating. Students were taught how to use Diigo across multiple lessons and were graded based on their participation. Table 1 provides information about the Diigo features used and topics addressed each week of the activity.

**Table 1.** Features and topics by week

| Week | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Course Concept | Academic Software | Web 2.0 | Productivity Tools | Assistive Technology | Professional Development |
| Bookmark | x | x | x | x | x |
| Tag | x | x | x | x | x |
| Describe | x | x | x | x | x |
| Highlight | | x | x | x | x |
| Page Comment | | x | x | x | x |
| Peer Comment | | x | x | x | x |
| Topics | | | x | x | x |

During the first lesson, students set up accounts and were introduced to basic Diigo skills.  They searched for websites related to the week's course topic, bookmarked high quality sites, and tagged the sites for easy searching.  In addition, students added a description of the site; this description is the first annotation feature. As Diigo is social, students see peer bookmarks next to their own, creating a bank of resources.  Instructors allocated time for students to view the resource bank, emphasizing the tool's social nature.

During the second lesson, students learned the other annotation features: highlighting and adding comments to the webpage.  These highlights and comments are extracted into the Diigo software and are listed below the bookmark (Figure 1).  Peers may view and comment on the extracted annotations or may follow the bookmark and view them on the webpage. Instructors allocated time for students to comment on their peers' annotations, encouraging social interaction.
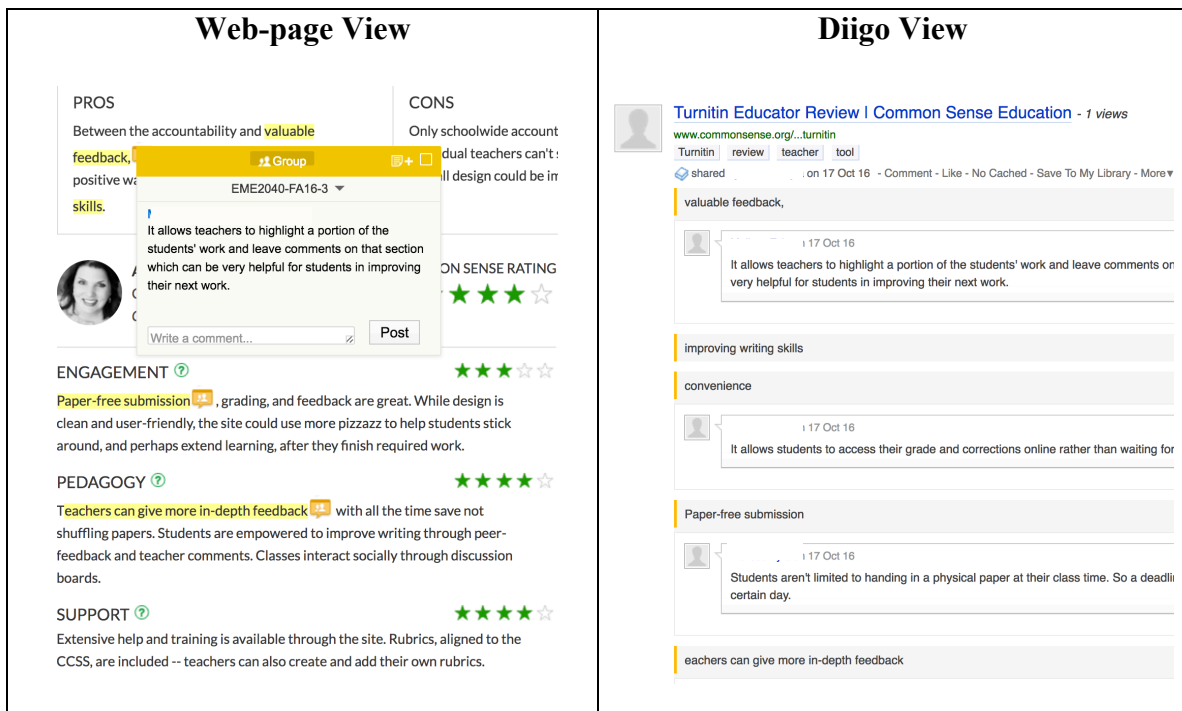


**Figure 1.** A bookmark with highlights and comments as they appear on the webpage (left) and in Diigo (right).

During the third lesson, the final Diigo feature was introduced:  topics.  Topics is a discussion forum through which students comment on a prompt posted by the instructor. These prompts elicit prior knowledge so web searching targets the weekly concepts. The topic threads appear in the resource bank like a bookmark, but no websites are involved.

During the fourth and fifth lessons, students applied the previously learned Diigo skills to new weekly concepts.  The lessons followed the same sequence as week three: 1) discuss the week's concept via topics, 2) bookmark, tag, and describe a high-quality site related

to the concept, 3) highlight and comment on the webpage, 4) view peer bookmarks and comment on their annotations.

## Evaluation Method

Formative evaluation was embedded into the activity, with approval granted from the university's Institutional Review Board to collect data from consenting students. Data collection consisted of collecting archives of student work on Diigo and a brief survey asking about student experiences using Diigo conducted at the end of the term. Ninety-nine students were enrolled across the six sections of the course, and a total of 78 students completed the survey.

## Evaluation Findings

Prior to this course, none of the students had used or were familiar with Diigo. In one course section, two of the students had prior experience with other social bookmarking tools. For the remaining 76 students, social bookmarking was an entirely new concept.

When asked about initial impressions of Diigo at the beginning of the activity, student responses varied. Some were neutral, waiting to see what would happen in their class. Others were a bit apprehensive or uncertain, such as the student who wrote, "I did not understand Diigo at first because I had never heard of it before. I thought it was a little confusing and I didn't know why we would use it." Still others explained that they were curious, in addition to being a bit skeptical of something new. In that vein, one student stated, "I had not ever used such sources, so I was interested to find out about them. I did think it was a little pointless through the beginning of the semester."

One of the six instructors indicated that students developed Diigo skills readily but that they were less inclined to view their peer's bookmarks and annotations unless specifically directed. She reported she liked how students delved deeper into the course concepts through searching and annotating. Once the topics feature was added to the lesson, student bookmarks better aligned with the weekly concepts. Other instructors shared similar feedback, and suggested that minor adjustments to how the activity was presented to students would further strengthen it.

Student impressions of Diigo at the end of the term remained variable, although the majority ended the experience on a favorable note. Sample comments from students include:

> My first assumptions about the program were correct. It was easy to use, and I can see myself using the program in the rest of my college, as well as the start of my professional career.

> Diigo was a fun program to use in this class. My classmates and I shared information and articles very fast and easy. I also liked how you can even add comments or suggestions with a group.

> Now that I have used Diigo a good amount, I really like it. I think it is incredibly useful and helpful. I actually started using it for other classes this semester, not just (this course) and it has helped me a lot. I think Diigo is something more people should know about and use.

> I quite enjoy Diigo because it's easy to keep track of tags and the hashtags/tagging for Diigo is so helpful. It's also very useful that we can add a brief description of what we're saving so that it's not just dozens of randomly saved websites and URL's. We can actually look at and read what it is that we're saving and it just makes it so much easier to go back and read it or find the saved website or page.

One feature that several students noted was that Diigo could help them work toward a paperless classroom by allowing them to annotate on their articles. For example, one student wrote:

> I feel as if I appreciate Diigo more so for the annotating online articles and websites more than I appreciate the social bookmarking aspect. The annotating seems more relevant and could make a classroom significantly more paperless.

Of course, Diigo is not the only tool with a digital annotation feature, but this activity represented the first time that most of these students had been exposed to that concept.

Although there were many positive reactions, among them were a handful of students who nonetheless indicated no desire for further personal use of Diigo. These students typically said that Diigo had more features than they needed. For example, one student noted, "If I want to bookmark, then I will just do it normally."

Students who did not like using Diigo expressed one of two sentiments. First, there were students who were not opposed to the concept of social bookmarking, but who struggled to make Diigo work. These students indicated that Diigo had crashed on them, they did not feel confident navigating the interface, or that they tired of having to launch the toolbar each time they entered the computer lab. Second, there were students who seemed to not understand that purpose of the overall activity. One of these students stated, "I think that it was over taught. We really didn't need 5+ weeks of instruction on it." It seems likely that this student perceived the activity as being entirely about learning how to use the tool (the first learning objective), and overlooked the second learning objective that focused on discussion of technology integration scholarship.

Reactions varied across course sections, as well. In one section, almost every student expressed dislike for the tool and activity or indicated struggling with the technology. This section stood out in contrast to the others because it was the only one in which technological difficulties were mentioned and in which the majority of the comments about the Diigo activity were negative. It is possible that the experience of this section reflects an issue with instruction, unique technical challenges that arose in the computer lab during one of their class sessions, or instructor enthusiasm and preparation.

**Discussion and Conclusion**

The learning opportunities provided by social bookmarking are evident in this formative study, although it is clear that technological difficulties and lack of understanding about the activity's purpose impeded learning for some students and remain issues to address in figure iterations of the Diigo activity. Regarding technology, some of the awkward Diigo interface elements are beyond our control, but we can prepare instructors and students for them through training and performance support.

The larger challenge is helping students fully realize the learning objectives. To fully engage in the learning experience, student orientation toward the activity may need redirection in two areas: from learning a tool to engaging with scholarly artifacts and learning resources related to technology integration, and from individual resource interaction to social resource interactions. Three solutions are proposed. First, student awareness of the activity's purpose may be heightened by articulating objectives clearly, and reiterating them each week. Second, instructors could provide specific behavioral steps and models for how to view and respond to peer artifacts with the explicit goal of developing social knowledge. Third, students could be asked to write a short weekly reflection about what they learned *through* the tool and *with* their peers about the current topic. Instructors could provide brief feedback each week to affirm the appropriate perspective or scaffold development of this perspective. This weekly reflection deserves instructor feedback as a scaffold to guide student perspectives toward the conceptual target. Collectively, we believe these solutions will help strengthen the effectiveness of the social bookmarking activity.

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