Linear vs. Spatial Discussion Formats for Online Courses

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Abstract

This study compared student perceptions of using a traditional linear discussion board to using a spatial discussion board for online course discussions. In a two factor within-subject experimental design, graduate students participated in a series of online discussion activities, alternating between posting in the linear discussion board and the spatial discussion board. They were surveyed about their attitudes regarding the formats. Generally, the familiar linear format was preferred, although attitudes about the spatial format increased over time.

Introduction

Linear text discussion boards are a common tool in online courses. They are often used with the goal of increasing student-student interaction (Carr-Chellman & Duchastel, 2000). The constructivist learning theory emphasizes knowledge construction of individuals and of social interactions (Driscoll, 1994). Vygotsky's social interaction theory similarly states that social interactions are important for learning (Vygotsky, 1978). Therefore, one could assume that student-student interactions on discussion boards can contribute to learning.

Unfortunately, linear text discussion boards have not been as effective as these theories would predict. Students often see posting to the discussion board as superfluous and inconvenient (Lapointe & Reisetter, 2008) or just as an assignment instead of an opportunity to engage in discussion with their classmates (Aleksic-Maslac, Magzan, & Juric, 2009). Several studies have looked at ways to improve the quality of online discussions, such as increasing internal motivation (Bennett & Monds, 2008) and encouraging debate (Kanuka, Rourke, & Laflamme, 2006). But instead of trying to make linear text discussions more effective, perhaps an alternative format would lead to better discussions.

Spatial representations of information can be beneficial to learning. For example, visual displays help students group information into schemas, free up working memory for other thought processes, and help students see visual patterns that would be hard to understand in a sequential language structure (Hegarty, 2011). A map can integrate information, presenting related concepts in the same visual space instead of the information being scattered throughout written text (Nesbit & Adesope, 2006). For example, several students may have similar comments or

opinions, but on a linear text discussion board, their posts are dispersed throughout the thread. With a spatial format, similar ideas are placed in the same visual location, which helps students see at a glance the distribution of opinions among the class.

This study explored the following research questions:

1. How do students' perceptions differ between linear and spatial discussion formats in regards to ease of use, perceived usefulness, social presence and attitude?
2. How do student's perceptions of each format change over the course of the semester?

Method

Participants

To address the above research questions, we collected data from graduate students in an introductory level instructional technology course at a large southwestern university. Twenty students completed at least some of the surveys, but only 11 students completed all surveys and were included in the analysis.

Discussion Boards

The course was held entirely online over the course of a fall semester. During the semester, students were asked to respond to eight discussion topics; students discussed each topic for one week. The instructor provided a topic or question and students responded using either a linear or spatial discussion board. Students were required to create an original post and respond to at least two peers. Using a within groups design with counterbalancing, students alternated which discussion board they used, so that by the end of the semester, they had participated in each format four times. Prior to participating in graded discussions, students posted introductions to both discussion formats in order to familiarize themselves with both systems.

This study used the Blackboard content management system for the linear discussion board as shown in Figure 1. Students' original posts are left aligned, with responses indented.

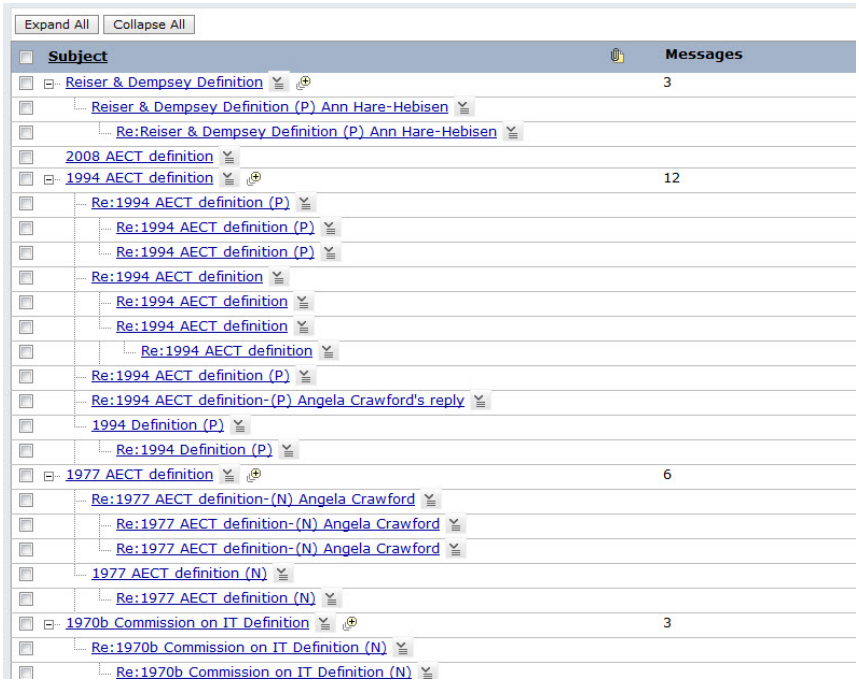

Figure 1. *Linear Discussion Board (Blackboard)*

MindMeister (http://www.mindmeister.com/) was used for the spatial discussion board (See Figure 2). MindMeister is an online mind mapping tool. Students placed their responses visually along a continuum to indicate their agreement or disagreement with the topic. Responses branch out to the sides.

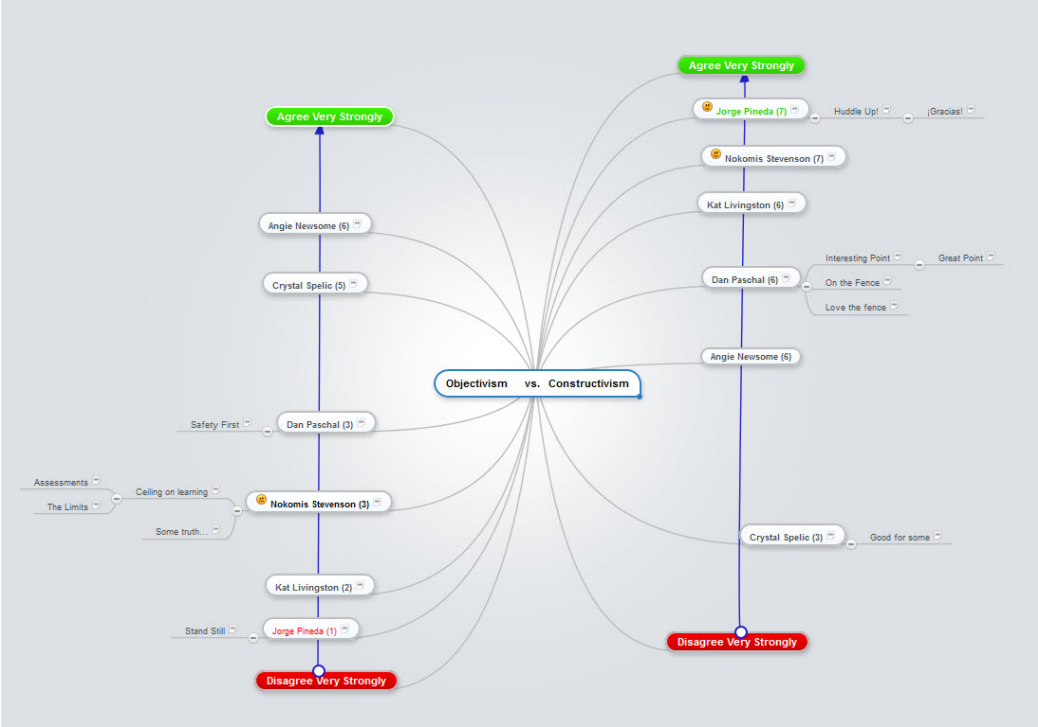

Figure 2. *Spatial Discussion Board (MindMeister)*

Data Collection and Analysis

After each discussion, students completed a survey by indicating their level of agreement with fifteen Likert-type statements (5-point scale). The survey items were designed to measure four constructs 1) ease of use, 2) perceived usefulness, 3) social presence and 4) attitude. After discussions 1, 2, 5, and 6, students were also asked three open-ended questions: 1) What did you like about the discussion tool (i.e., Blackboard or Mindmeister)? 2) What challenges did you experience when using the discussion tool? and 3) What instructional advantages do you see in using the discussion tool?

Results

The first research question asked **"**How do students' perceptions differ between linear and spatial discussion formats in regards to ease of use, perceived usefulness, social presence and attitude?" See Table 1 for a summary of means and standard deviations on these measures.

Table 1. Means and Standard Deviations for all measures.

Discussion Format (n=11)	Linear Discussion Board		Spatial Discussion Board	
Perceptions	First Use	Last Use	First Use	Last Use
Ease of Use	4.79 (.22)	4.75 (.47)	4.00 (.74)	4.15 (.85)
Usefulness	4.33 (.71)	4.36 (.81)	3.63 (.86)	4.06 (.94)
Social Presence	4.27 (.99)	4.24 (.54)	3.79 (.81)	4.21 (.76)
Attitude	4.52 (.69)	4.42 (.50)	4.09 (.93)	4.39 (.81)

*Standard deviations are presented in parentheses

To further examine this question, a two-factor within subjects ANOVA was conducted, with discussion format (linear vs. spatial) and time of use (first use vs. last use) as the within-subjects factors. Significant difference of discussion format were found favoring the linear discussion format for ease of use, $F(1,10)=11.145$,$p=.008$, perceived usefulness, $F(1,10)=14.559$, $p=.003$, and social presence, $F(1,10)=5.92$, $p=.043$. No significant results were found for attitude,$F(1,10)=3.617$, $p=.086$. Regarding the effect of time of use, no significant differences were found for the time of questionnaire administration (first use vs. last use) nor was the interaction effect significant.

The second research question asked "How do student's perceptions of each format change over the course of the semester?" Dependent t-tests were conducted. For the linear discussion board, there was no significant change. For the spatial discussion format, there was a significant change on social presence, $t(10)=-2.971$, $p=.014$, although attitude approached significance, $t(10)=-2.193$, $p=.053$.

When comparing differences in perceptions between the two formats at the beginning of the semester using dependent t-tests, significant differences were found across the board, favoring the linear discussion board: ease of use, $t(10)=-3.480$, $p=.006$, perceived usefulness, $t(10)=-3.202$, $p=.009$, social presence, $t(10)=-2.951$, $p=.014$, and attitude, $t(10)=-2.971$, $p=.015$. However, comparisons at the end of the semester show significant differences only in ease of use,$t(10)=-2.319$, $p=.043$, still favoring the linear format.

Discussion

Overall, students preferred the linear format over the spatial format. A review of responses to the open-ended questions suggests that the familiarity of Blackboard is a contributing factor to this preference.

"I liked discussing on the Blackboard because I was already familiar with the system."
"I use it [Blackboard] in all of my course online."

Exploring preferences at the beginning and the end of the semester, students' opinions of the linear format did not change over time, but their opinion of the spatial format improved in feelings of social presence, and approached significance in attitude. Comparing the two formats at the beginning and end of the semester shows a stark preference for the linear format at the beginning of the semester, but only a significant preference in ease of use later on. Student comments indicate that as they became more familiar with the spatial format, they had more positive things to say.

"It [MindMeister] gives me a sense of community with my classmates."
"I really enjoy the physical layout of the map."
"I also enjoyed being able to see the big picture."

There were also comments that showed a preference for the spatial format, especially for specific types of learners or discussions.

"The discussion tool [MindMeister] created a visual flow of the discussion that a regular discussion board lacks."
"[MindMeister] helps to collaborate and link ideas well."

By the end of the semester, there was little preference for one format over the other, suggesting that the differences may have been due to familiarity with the format. Students had used Blackboard in previous classes and linear discussions are used in other online discussion formats, such as forums and blogs. MindMeister was new and visual spatial tools are less common in other online discussions. Comments from students indicate that there were features of the spatial format that they preferred over the linear format. Echoing Nesbit and Adesope (2006), one student commented that the "visual layout is useful to see how different discussion posts connect and relate to each other." Perhaps with more comfort and familiarity with the tool, students will take more advantage of the benefits visual discussion formats offer. Future research in this area should control for the familiarity of the tool in order to explore the potential benefits of spatial discussion boards.

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