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# **Anchored Asynchronous Online Discussions: Supporting Learning Conceptions**

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## **ABSTRACT**

Online discussions show promise for improving students' learning. We conducted two case studies to explore the potential benefits of using anchoring in asynchronous online discussions. We compared anchored asynchronous online discussions (AAODs) with standard asynchronous online discussions (AODs) on students' experience and learning in a blended environment. Qualitative data were obtained from students based on a "take-home" essay. The students' answers were coded and analyzed for differences using open, axial, and selective methods. We found that AAODs were more likely to be perceived as helping improve understanding, problem solving, comprehension, and social learning. AAOD students reported more enjoyable and positive experiences with AAODs. Overall, a significantly higher number of AAOD undergraduate students stated that they would like to use online discussions in future courses. The implications for this study are notable for theory and practice. AAODs can increase sharing of ideas, perspectives, and support learning conceptions.

## **Keywords**

Anchored asynchronous online discussions, learning conceptions, blended learning, peer learning, social learning.

## **INTRODUCTION**

Educators and researchers have increasingly recognized the value of students' social interaction and its impact on learning in online environments. Using Web 2.0 tools, educators have accelerated the development of new teaching approaches including online discussions and other types of online collaboration. Thus, some of today's students are "prosumers": producers and consumers of information, which is different than in traditional teaching practice.

One of the most difficult courses for business students to complete is business statistics, which is typically taught "traditionally". Business statistics students often exhibit lack of interest, effort, enthusiasm, engagement, learning and performance. It is not uncommon to find students retaking business statistics courses for the third or fourth time. Furthermore, students who are apprehensive about learning statistics and those who have trouble doing computations tend to have a higher level of anxiety (Pace and Barchard, 2006). While not just limited to learning statistics, Vandergrift (2003) noted, "Anxiety is a common reaction to a listening task, which springs from student fears that they will not gain control. This fear often springs from a tacit assumption that they must understand every word, as well as unsatisfactory experiences with a listen and answer the following questions' approach to listening activities" (p. 426) that are often initiated by the instructor in class.

Research has shown that asynchronous online discussions (AODs) facilitate positive outcomes for learning related behaviors. For example, Du et al. (2007) used online discussion in the context of distance education and found that "students associated the quality of online discussions with successful project completion and knowledge construction...students also indicated their critical thinking skills were enhanced when working collaboratively and found the achievement of course goals easier and more efficient" (p. 8). A recent innovation in the design of AODs is an anchored asynchronous online discussion (AAOD) that enables students to link discussion threads to a document and produce additional benefits to learning. By using asynchronous online discussion forums as a supplement to face-to-face meetings (a blended learning environment (Rovai and Jordan, 2004)) a business statistics instructor can provide students with a strategic resource to help them avoid some of their in-class frustrations and help them prepare when they are outside of the classroom.

To this end, we conducted two case studies to explore the potential benefits for students of using asynchronous online discussions for business statistics classes, and to identify would-be effects and strategic value of anchoring for online discussions. We examined and compared anchored asynchronous online discussions (AAODs) with standard asynchronous online discussions (AODs) on students' interaction, experience, and learning.

Qualitative data were obtained from students based on a “take-home” essay that examined the effects of online discussions on learning, reasons for contributing, whether students would like to use online discussions in other courses, and suggestions for change. The students’ answers were coded and analyzed for differences using open, axial, and selective methods. Quantitative data in terms of student’s experience with the online discussions were also acquired from their responses and discussion logs, which helped provide insights into the quality of their interactions.

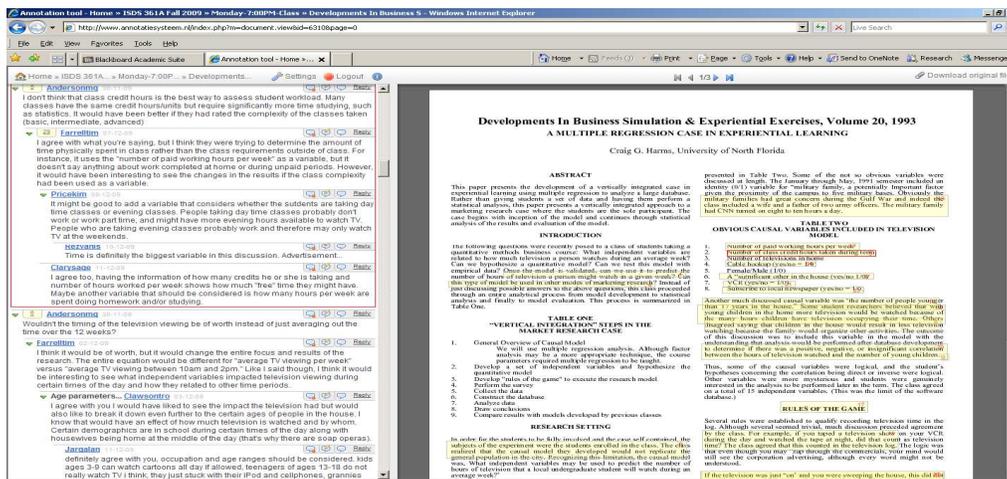
**ASYNCHRONOUS ONLINE DISCUSSIONS**

Dennen (2008) suggested that “the discussion is an artifact of learning” (p. 209), and that online discussions require students to read (articles, others posts), write (own thoughts and ideas), and engage (by asking questions and posting replies). Asynchronous online discussions are both highly interactive and social (Gunwardena et al., 1997; Gunwardena and Zittle, 1997). Richardson and Swan (2003) found that the students’ overall perception of social presence served as a predictor of their perceived learning in the course. Guzdial and Turns (2000) suggested that adding a discussion forum is one of “the simplest ways to start integrating information technology into the class” (p. 438), since it does not require a change in the curriculum. Disantes et al. (2003) added that asynchronous online discussions are “pre-established,” “private” (access is not public), and can be “used to supplement other learning venues...such as face-to-face (F2F) meetings” (p. 567). Wu and Hiltz (2004) found that AODs produced meaningful effects in terms of students’ perceived learning for distance education.

**Anchored Asynchronous Online Discussions**

Anchoring is a process of creating reference points between parts of a document and comments in the discussion space to help prevent drifting within the context. Anchoring in online discussions allows for the selection of any piece of a document (word, sentence, paragraph, or page) to be the focus of the discussion thread. The potential advantage of anchoring is that it provides a visual marking of selected text, which makes the referenced (represented) text more explicit, which tends to direct attention towards it. Anchored (annotated text-based) forms of online discussions are notable from other forms of discussions because annotations are situated within or alongside the text by forming a tight link that is seen in the same field (Kaplan and Chisk 2005). The annotated (anchored) interface clearly helps users establish a context as a basis of the discussion (see Figure 1). The interface shows the discussion article on the right side of the screen and the discussion on the left side of the screen. Each discussion thread has a number that links it to a highlighted piece of text in the right screen. When a thread is selected (by clicking on its number) a red frame appears on both sides of the screen to indicate the correspondence between the text from the article and thread from the discussion space.

When a piece of text is selected (highlighted or marked) for discussion, the anchor is formed, which directs the focus of the discussion thread in the discussion space to that marked piece of text, which in turn forms the basis of the discussion thread. This linkage between the discussion thread and the article makes it harder for students to drift away from the idea being discussed. The marked text and the discussion of this text make the ideas generated more explicit (external) and focused around the text. The discussion can become clearer and more defined when an idea is made explicit and external to others (Siemens, 2006). This action may invite others to add their own perspectives, elaborate further, or attempt to clarify their own understandings of the idea. Tversky and Kahneman (1974) explain this type of linkage (anchoring) as a bias towards an anchor.



**Figure 1. Anchored asynchronous online discussion (AAOD) interface**

Abowd et al. (1999) suggested that anchoring discussions in lectures makes a good approach to extending the classroom digital media. Brush et al. (2002) added that anchored discussions could be a viable tool to complement classroom face-to-face education. Brush et al. (2002) concluded that “anchored online discussions allowed the less vocal students to contribute equally and made in-class discussions more interesting” (p. 9). Guzdial and Turns (2000) used anchoring in the discussion and found it “to motivate a discussion and to provide a focus for the discussion” (p. 443). Anchoring technology was also found to be useful for collaborative discussions (Van der Pol, 2007; Van der Pol et al., 2006). Moreover, Eryilmaz, Alrushiedat, Kasemvillas, Mary, and van der Pol (2009) found that use of anchoring in the AODs has an effect on reducing the cognitive (mental) load of the students, which allow students additional spare capacity for processing of mental tasks.

Jonassen (1997) suggested using instructional design interventions to scaffold problem solving and support learners’ efforts. Anchoring in asynchronous online discussions holds the promise of scaffolding the students’ learning efforts. Hence, understanding the dynamics and effects of using AAODs in a blended course can serve to improve course design and pedagogy.

## RESEARCH METHODOLOGY

Case study design was chosen, because of the lack of the tight control available, and the need to examine differences between the two types of online discussion (OD) in a natural educational setting. In the actual setting, students are not bound by time and place in order to participate. Students had 24/7 access to the ODs. The students’ participation in the ODs was natural and normal. However, in case study research, it is desired to apply some controls to increase the validity of the study; there are challenges, some of which are (Robson, 2002):

- 1) Random assignment that is generally hard to do outside of the lab in the real world. But, in the context of education, randomly assigning students is feasible. We told the students that the class would have two groups of students participating in online discussions, and that we assigned the groups randomly. An email was sent to each student to let him/her know about his/her group assignment.
- 2) When applying some controls to compare two groups, the possibility of the no-treatment group being influenced by the researcher may result in questionable validity. In this regard, both treatment and control groups were given the same attention and instruction. Both groups were also encouraged to participate in the online discussions.
- 3) We maintained objectivity and awareness of all communications to ensure no favoritism to avoid getting the “Hawthorne effect.”
- 4) Ethical issues due to deviation from guidelines.

We also obtained approval from the institutional review board (IRB) and adhered to the protocol of the research.

## Subjects

The subjects for this study were students enrolled in the following two business classes (see Table 1):

- 1) Introduction to Business Statistics, Class A. Students in this course were 3<sup>rd</sup> year undergraduates.
- 2) Statistics and Management Science, Class B. Students in this course were 4<sup>th</sup> year undergraduates.

A total of 86 students participated in the online discussions, 42 used AAODs and 44 subjects used AODs. Each student was required to write an essay about online discussions. AAOD students turned in 40 essays with a 95% response rate. AOD students turned in 38 essays (86% response rate).

Class	AAODs			AODs		
	Participants (n1)	# of Essays	Response %	Participants (n2)	# of Essays	Response %
A	23	22	96%	23	19	83%
B	19	18	95%	21	19	90%
<b>Total</b>	<b>42</b>	<b>40</b>	<b>95%</b>	<b>44</b>	<b>38</b>	<b>86%</b>

Table 1. Subjects

## Procedure

The instructor (the first author) served the role of a facilitator and a “guide on the side” in the ODs. Equal time, guidance, and conditions were applied to each group (AAOD and AOD) within the same class so that no group was advantaged over the other. He was cognizant of the responsibility that he had to facilitate learning effectively as stressed by Garrison (2003). Nicole (2006) suggested that one of higher education’s objectives is to aid students in becoming more “self-regulated” (p. 9).

His role was limited to the setting up and implementing of the online discussions. It was included in the syllabus of each course that participation in ODs is mandated by the course. To ensure that the same conditions applied to both discussion groups in the same class, the same initial message was posted, which consisted of one sentence (e.g., “Discuss this article” or “How can this be possible?”) to both groups within the same class. The students participated actively in discussions of the relevant articles and collaborated to find solutions to given problems selected from the subject matter whereby they are expected to converge on finding the correct solution as a result of their participation. The AAOD system was Annotatiesysteem (link: <http://www.annotatiesysteem.nl>) and the AOD system was Blackboards’ discussion forum (link: <https://learn2.fullerton.edu>). For each group in a class, the content and discussion articles were exactly the same.

Data was collected on the last meeting day before the final exams week, the students were given a take-home essay that consisted of three open-ended questions (see Table 2). No personal data were obtained from the students, who were asked to email their answers on or before the last day of the semester, which allowed them approximately one week. The data were grouped and categorized into source files using Qualrus. Qualrus is a qualitative analysis software program.

Question #	Question	Purpose
1	Identify (by copying them) five discussion threads that were influential in your learning for this course. For each thread, explain in detail how the discussion affected your learning. If you contributed to the thread, explain why you did so and how that also impacted your learning. If you did not contribute to the thread, explain why.	Compare the effects of the two discussion tools in terms of thread structure, types of learning, and contribution at the thread level.
2	Identify at least three reasons, other than the ones that you might have specified in question 1, why you contributed to the online discussions? Give examples of your contributions (by copying them) and explain in detail how you think they affected your learning outcomes for the course.	Compare and contrast the two discussion tools at the online discussion (OD) level
3	Would you like to use online discussions in future courses? If yes, explain why and describe any changes that you would like to see in the online discussion system you used for this course. If no, explain why and describe any changes that you think would make the online discussion system useable for you.	Examine the experience, acceptance, and the intention to use online discussions again

**Table 2. Essay questions.**

## DATA ANALYSIS AND FINDINGS

In general, qualitative data analysis is composed of three simultaneous activities (Miles and Huberman, 1994): 1) data reduction (i.e., coding and writing memos), 2) data display (i.e., lists, links, or views), and 3) conclusion drawing/verification from beginning to end. We used descriptive coding in the analysis of students’ essays to identify potential patterns and themes. The open-ended nature of the questions allowed us to gain deep insights into the dynamics throughout the coding process. The first step was open coding, the process of recognizing and classifying categories in the qualitative data. This approach yielded a large number of codes (over 250) and eight categories: 1) perception of learning, 2) social learning, 3) other breeds of learning, 4) improved confidence (self efficacy), 5) collaboration, 6) contribution, 7) intention to use again, and 8) suggested changes. The second step was axial coding to connect the categories, which helped improve my understanding of the possible relationships (links) among the various codes. Third, selective coding focused on the core themes and the conceptualization of the story (Robson, 2002).

The students’ answers to the essay question as to whether they would like to use the online discussion in future courses were mainly positive. The reply to this question can be attributed to the students’ experience with using the online discussions. A “yes” reply would most likely indicate a positive experience, while a “no” reply would most likely indicate a negative experience. In their answers, most of the students said “yes” that they would like to use the online discussion again in future courses. Table 3 shows the number and percentage of students who answered “yes”. Overall, there is a statistically

significant difference ( $z= 2.28, p=.023$ ) for the students’ experience between the two online discussions (see Table 3).

Class	AAOD			AOD			z	p
	n1	# of Yes	% of Yes	n2	# of Yes	% of Yes		
A	23	20	87%	23	17	74%	1.11	0.271
B	18	17	94%	21	14	67%	2.08	<b>0.038</b>
Total	41	37	90%	44	31	70%	2.28	<b>0.023</b>

Table 3. The number and proportions of “Yes, I would like to use the discussion in future courses.”

**Perception of Learning**

The perception of learning that occurred in the online discussions may rely on the type of notion that each student holds for what defines learning. As Dart (1998) explained, “Learning is about developing meaning and understanding, through such activities as reading widely about the topic, discussing one’s view with colleagues, and attempting to relate the new information to what is already known, and then seeing if one can explain the material in a coherent manner and apply it appropriately” (p. 32). Perception of learning and the respective conception types that students reported are presented in Figure 2. The learning conceptions were reported for both types of online discussions (AODS and AAODs). Students conceptualized their learning in various expressions, an affirmation that learning is indeed a complex concept, best understood from multiple viewpoints (Purdie and Hattie, 2002; Rovai et al., 2009). Due to the multi-dimensional nature of learning and for the sake of clarity, we chose to list only the codes that have direct links to learning. Learning was expressed as: 1) understanding of the subject matter, 2) problem solving, 3) comprehension, and 4) other breeds of learning.

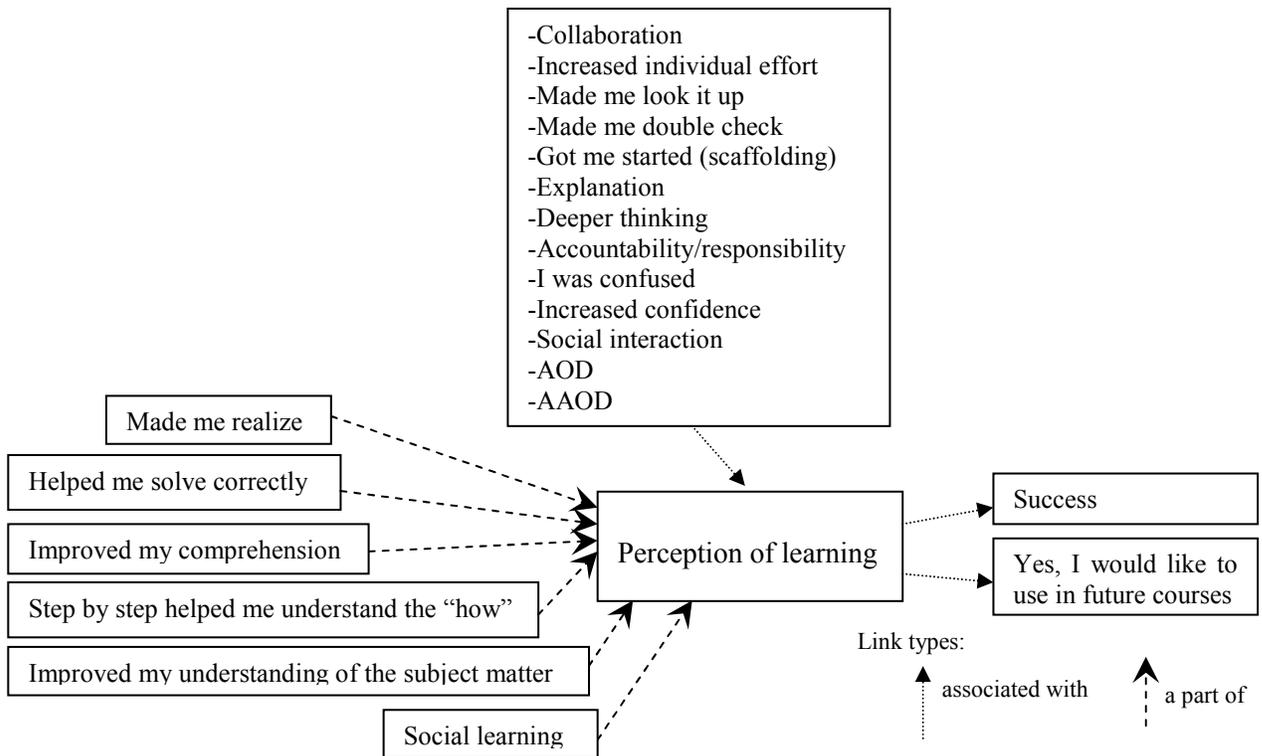


Figure 2. A view of the “perception of learning” category

Figure 2 shows a graphical view for the “perception of learning” category. In this view, there are many perceptions associated with learning. For example, “made me look it up” has an “associated with” learning type of relationship, in which the student learned from having to look up a particular concept. “Collaboration” also was viewed as helping improve learning. Figure 2 also shows other types of relationships, for example, “improved my understanding of the subject matter”

is “a part of” learning. Learning is also a reason for the students wanting to use the OD again. This is expressed as an “associated with” relationship between “perception of learning” and “yes, I would like to use in future courses” (see Figure 2). Some students conceptualized their perception of learning in terms of the following learning conceptions: 1) improved understanding of the subject matter, 2) problem solving, 3) improved comprehension, and 4) social learning. These conceptions are discussed in the following subsections.

#### *Improved understanding of the subject matter*

Some students expressed their learning conceptions in terms of improved understanding. For example, a student from Class A using AAODs wrote:

*“Monse's post influenced a big understanding for me in this article. The [This] person helped me realize the different conditions and variables behind the events. I could have easily believed that these events could have been dependent on each other after reading the article, but the person's explanation assured me that these events are independent. After developing a better understanding of the subject, I contributed by agreeing with the person's idea because I saw that such factors as weather or an increase in either the sharks or people in the area can lead to very different outcomes. As others, and the article, have said, there's bound to be more attacks if more people are swimming in areas with more sharks.” [Trate, Class A, AAODs].*

A student from Class B using AAODs expressed her improved understanding and correction:

*“My calculated constraints...are as follows: C1:  $X1 + X4 \leq 5,000$  [Max of Com 1] C2:  $X2 + X5 \leq 10,000$  [Max of Com 2] C3:  $X3 + X6 \leq 10,000$  [Max of Com 3].. I found this post to be very helpful to my understanding for the linear programming problem. I remember when looking over the case I was having difficulty finding all of these constraints. I had posted a previous post stating that I had found 10 constraints, but I was not sure if they were correct. After looking at this post I realized what I had done wrong by looking at Amanda's notes in parentheses. These notes explained the constraints, and helped] me fully understand where the numbers were coming from. I did reply to this post stating that I found similar constraints, but the numbers were slightly different. I found that by replying to the thread it would help others in the class take note of similar mistakes.” [Vanessa, Class B, AAODs]*

While a different student from the same class, but who used the AODs expressed,

*“Shark Attacks was another remarkable discussion thread that helped me to understand the Poisson distribution. Even though three shark attacks occurred in a very close time frame they just are three different independent events. Therefore I think a shark attack is a Poisson distribution because there is no control over the “n” (number of people getting attack [ed]). And a person getting attack[ed] is random so there is a probability of another attack on the same spot or in a different spot. Also there are other variables that are related to shark attacks as breeding season, food chains, density of water, etc.” [Danaji, Class A, AODs]*

A separate student from Class B using AODs expressed his understanding:

*“Valeria posted was helpful to me because it helped me understand how PERT CPM can be utilized in everyday life. She said that she could use it in her personal life to decide which career goal to pursue. After inputting information into the system, she could determine the critical activities that cannot be delayed. If they are, her whole goal will be postponed as well. I think this is interesting and could be beneficial to many students. I replied to the thread twice-once asking whether or not it would be worth the effort to input the information. Instead, you can just compare alternatives by looking at the various graduation requirements and pathways-this would be a lot easier.” [Jake, Class B, AODs]*

For example, “step by step helped my understanding of the ‘how’” and “made me realize” have the “isa” type of link with “improved my understanding of the subject matter” because both of these two codes describe two instances of “improved my understanding of the subject matter.” The “isa” link type is a link instance where it describes an instance of that link, for example “made me realize” is an instance of “improved understanding of the subject matter.” It can be considered that “improved understanding of the subject matter” is a generalization of “made me realize.” Other codes such as “helped me solve correctly” and “increased my confidence” were observed to be “associated with” “improved my understanding of the subject matter.” Additionally, “improved my understanding

of the subject matter” is “a part of” the reason for the “yes, I would like to use in future courses” as cited by some of the student participants.

Although both online discussions were perceived to help improve understanding of the subject matter, AAODs were more likely to be perceived as helping improve the understanding of the students among undergraduate students. There were more specific examples and evidence to support this type of learning. For example, one student noted,

*“This thread helped me to understand that it was a binomial problem and I needed to solve for z. This affected my learning in a positive way because it was right before one of the midterm exams, so it was a great review for me.”* [Yvonne, Class A, AAODs]

This student also wrote:

*“If I asked questions on how and why we do this, my classmates will quickly respond and help me understand.”* [Yvonne, Class A, AAOD]

Another student stated,

*“Tankev’s post helped me understand this article on the statistical side. It helped me realized that the events can be compared to coin tosses to see that there are high chances of finding matches no matter what.”* [Trate, Class A, AAOD]

### **Problem Solving**

Many students used the online discussions as a tool and a reference. Even though some of them may not have contributed directly to a particular thread, they still found it useful for improving their problem solving skills. Jonassen (1997) argued that “Problem solving engages higher-order skills and is believed to be among the most authentic, relevant, and important skills that learners can develop” (p. 86). In a well structured domain, as in this case, practicing problem solving can help learners form appropriate representations of concepts (Jonassen, 1997). Moreover, Jonassen (1997) recommended helping the learners in constructing meaningful representations and supporting them in finding and trying different solutions. Jonassen (1997) suggested using instructional design interventions to scaffold problem solving and support learners’ efforts. This view of problem solving as a meaningful kind of learning and thinking was indicated by the students.

It is important to note that in many of the threads, a single code was not sufficient to accurately describe the segment; there were a significant number of codes overlapping other codes. For example, in the following segment, this student learned vicariously without having to contribute to the thread,

*“Romdan’s post helped me solve this problem. Actually, everybody’s posts helped me with this problem set assignment because I had a lot of trouble understanding the material. I wasn’t able to grasp the steps to solve the problem. In class I was able to understand it because with the teacher’s help I had a guide to solve it. However, when I had to face these problems alone, I was able to attempt it, but would get stuck in certain areas.*

We also observed that AAODs were more conducive to helping improve problem solving skills among undergraduate students. For example, as one student wrote,

*“When I did that problem for practice, I got it wrong. Because I looked at the example Monse worked though, I was able to successfully do that problem myself.”* [Quang, Class A, AAODs]

### **Improved Comprehension**

A few students expressed their learning in terms of improved comprehension. Sullivan-Palincsar and Brown (1984) identified three main factors that can enhance comprehension: 1) “reader-friendly” texts, 2) familiarity with text according to the reader’s prior knowledge, and 3) the active and constructive strategies employed to enhance understanding and retention. In the online discussion, the content (text) is created (posted) by student peers. They most likely write at the same level thereby using familiar wording (language). They also decide on how and when to create a post or respond to others. Hence, the availability of these factors in the ODs should improve comprehension. For example, one student using AAODs wrote,

*“All these threads that I have chosen have helped me comprehend the lecture a little better.”* [Yvonne, Class A, AAODs]

Another student from the AAOD group in Class A noted,

“The way the user Ezell laid out the process was very helpful for my comprehension of the subject matter.”  
[Rick, Class A, AAODs]

However, the “improved my comprehension” type of learning was only stated in Class A, which suggests that AAODs were more likely than AODs to be perceived as helping improve comprehension among some undergraduate students.

### Social Learning

In the context of this study, social learning (SL) centers on the learning that happens within the online discussions as a result of the interaction among student peers. SL encompasses observational learning, imitation, and modeling (Ormrod, 1999). The general principles that shape SL describe learning (Ormrod, 1999): 1) occurs by observing the behavior of others (observational learning), 2) can occur with creating a behavioral change, 3) can be affected by the consequences of behavior, 4) can be affected by cognition. The manners of social learning require attention to details, remembering, motivation, and application (i.e., relating the concept to real world examples, material learned in the classroom, and problem solving) (Bandura, 1986). The social learning in this study is a result of observation (observational or vicarious learning) and social interaction among peers (peer learning).

### CONCLUSION

Much of the learning reported by the students varied in terms of the learning conceptions that students held for what learning is. The students’ conceptualization of learning ranged from improved comprehension and realization to improved understanding and problem solving. These conceptions are contained in the cognitive domain of learning. The peer, collaborative, and social learning produced more satisfaction with the learning experience, which belongs mostly to the affective domain of learning. There might be some reasons as to why students may have gained more from using one discussion over another; one reason could be due to the anchoring feature as perhaps aiding constructivist learning compared to an OD system without this feature. AAOD may have also assisted in reducing information overload because of the ease of the interface and enjoyment in using a Web 2.0 technology (Bawden and Robinson, 2009). AAOD was found to support many of the learning aspects such as improving understanding, problem solving, and peer learning.

The findings of this research reveal that overall the students were most likely to favor AAOD over AOD. Some students who had previously used an AOD recommended that the selection (highlighting) feature of the AAOD should be integrated with the university’s system (AOD). These findings provide considerable and useful insights about the use of anchoring in AODs to increase sharing of ideas, exchanges of perspectives to improve the understanding, comprehension, and peer learning of students.

A key limitation of this study is that the first author was the instructor for the classes. As noted above, efforts were made to treat students the same way regardless of which discussion board they used. The researcher’s perceptions and preconceptions embody the biases within the researcher. As a result of the awareness for such biases, steps were taken to minimize potential threats to the findings. In this effort, the data were collected, saved, and analyzed based on the data itself. Awareness of the responsibility to obey the rules made reporting the findings as they are a critical matter, whether they match or contradict the researcher preconceptions. The view of the researcher is that any finding is a potential contribution.

Most of the students in the study cited “requirement” as a reason for participation because participation was mandated by the course. In this study, positive experience and enjoyment are found to be important motivators for continued participation. A future study could be more revealing if it was designed as an experiment that would specifically measure the effects of anchoring in ODs on participation and enjoyment based on factors such as: 1) required versus optional, 2) with incentive versus without incentive (i.e., extra credit), and 3) student’s motivations and change over time (i.e., trend). This type of experiment can be given to a larger sample size for the same course.

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