A Comparative Study of Online Discussion Board Protocols and the Impact on Knowledge Construction in High School Students

Distance education is offering students of all ages the opportunity to learn with greater flexibility. Online classes can be accessed whenever and wherever, according to the students’ individual schedules. The increasing appeal and popularity of online courses is evident through the growing numbers of students enrolling in these types of programs, at all academic levels. Although distance education is most well known for offering flexible learning at the undergraduate and graduate levels, the online trend has now funneled down to the secondary level, and even to the middle and elementary education in selected cases.

“Virtual high schools” are proving to be especially popular with students and have shown a dramatic increase in their enrollment numbers in the last five years. As of July 2005, at least twenty-one state-wide programs now exist (Smith, Clark, & Bloymeyer, 2005). State-wide programs are experiencing consistent growth from 50% to 100% on a yearly basis. One of the largest virtual schools is the Florida Virtual School which serves more than 21,000 students and offers over 66 courses to students in grades 8-12 (Watson, 2005). Although virtual schools once predominately targeted at-risk or home-schooled students, they are now offering flexible solutions for all type of students with unique schedule needs whether it is sports, jobs, or simply living in a rural area. Students across the United States are turning to online courses to gain access to opportunities that are not currently present in their local, traditional schools.

It is this rapidly growing popularity of virtual high schools that has some educators worried about the quality of education students are receiving. Many educators are skeptical on
the current pedagogy being employed in these virtual spaces. If more students are going to continue to turn to online classes to supplement their traditional classroom-based studies, it is imperative that the online courses are well designed, maintain a high educational quality, and are appropriate for the targeted age group. Instructional designers must address the unique social, educational, and emotional needs of high school students (National Education Agency, n.d.).

Currently, the majority of research on effective pedagogies regarding online learning has been focused on the college and graduate level, and the findings in these studies have traditionally been applied to the design of online courses at the high school level. This is a problematic practice because there are significant differences in learning styles and cognitive abilities in students of these various age groups and academic levels.

Although there are many factors that contribute to the overall effectiveness of an online course, discussion boards play a particularly important role in online learning environments and will be the focus of this study. Research shows that learner participation is an essential element for active and engaged learning, which can be a challenge to foster in the context of a “virtual space” (Markel, 2001). Online courses typically employ several kinds of communication opportunities for students but asynchronous discussion boards are among the most popular methods. They are advantageous for students because of their flexibility and they offer students the time think before posting messages. In contrast, synchronous communications, like chats, often force students to rush to post and students have to be present at a designated time to participate. High school students have identified the feeling of social isolation as one of the primary difficulties associated with online classes (Lizardi, 2002). Solid discussion board protocols will hopefully promote and facilitate quality online social interaction and learning (Vail, 2001). Socialization in this manner is key because based on cognitive learning theories,
the deepest learning is in the writing and discussions about the content within a community of learners (Markel, 2001). When students interact with each other, the instructor, and the content in forum of a discussion board, students will generally construct a deeper understanding of the content.

The pedagogical advantages of online collaborative learning are well known, but certain formats of collaboration have been found to be more successful than others. The real challenge with discussion boards is that there is often a lack of reflective talk that typically leads students to higher order thinking and knowledge construction. Instead, discussion boards are generally dominated by shallow, repetitive messages between students. What practices can be employed, if any, to help generate more meaningful discussion on the discussion board to promote knowledge construction in students? This question guides the proposed study.

**Literature Review**

The asynchronous communication characteristic of online discussion boards have been found to yield both cognitive and social learning outcomes in multiple studies. Wu and Hiltz found that asynchronous online discussion forums can “promote high levels of cognitive engagement and critical thinking” in students (2004, p.141). Although most research supports this finding, several comparative studies have shown that some implementations and styles of discussion boards have been more successful than others in promoting knowledge construction among online students. In a study by M.J.W. Thomas (2002) with college undergraduates, he found that while online discussion promoted high levels of cognitive engagement and critical thinking, the virtual learning space did not promote the interactive dialogue necessary for conversational modes of learning. Thomas (2002) found the discussions lacked the structural
organization necessary to generate a truly interactive dialogue. Based on these findings, he suggested that the roles of a moderator and/or facilitator are important in promoting coherent conversation in the online discussion board.

Another study by Aviv et al. (2003), again with college level students, revealed that a structured asynchronous learning network had a positive impact on the knowledge construction process. Analysis of discussion board transcripts revealed higher levels of critical thinking in student responses when utilizing a structured format. On the contrary, the study revealed that the knowledge construction process reached a low phase of cognitive activity in the student responses that were using a non-structured, open-ended network.

In a similar study, Moore and Marra (2005) conducted a comparative analysis of online discussion participation protocols with two sections of graduate students. One section followed a structured protocol (argumentation style) and the other section followed a more open-ended, non-structured format on the discussion board. The findings in this study were in contrast to what Aviv et al. (2003) found in undergraduates. The structured protocol that was designed to facilitate knowledge construction did not show evidence of having that effect. There were fewer postings overall and content analysis of the transcripts revealed a lower number of postings indicating knowledge construction. The instrument used to analyze the transcripts was the IAM (Interaction Analysis Model) which is designed to detect evidence of knowledge construction (Gunawardena & Anderson, 1997).

McLaughlin and Luca (2000) also used a content analysis method to investigate whether learners were engaging in high levels of cognition when utilizing the discussion board. This study was with college level students and it revealed that most of the forum messages were not at the knowledge construction level and instead were only at the level of comparing and sharing
information. This study did not use a structured protocol and confirmed the typical shallow nature of discussion board dialogue.

In summary, previous studies with asynchronous discussion have seen varying levels of knowledge construction in student responses. There is some evidence that structure and facilitation is important when using a forum to help promote discussions on the level of knowledge construction. Regardless, the majority of research in this area has been focused on undergraduates and graduates at the university level. With the dramatic increase in number of high school students enrolling in online classes, it is important to know what can be done to foster knowledge construction in that level of students. This study is designed to investigate what effect, if any, the format of a discussion board protocol has on the level of participation and knowledge construction in high school students.

**Research Hypothesis**

*Null Hypothesis*: The structure of an online discussion board format has no effect on participation and knowledge construction in high school students taking an online Health course.

*Motivated Hypothesis*: High school students that use the structured discussion board protocol will display a higher level of knowledge construction and increased participation than those students who use a non-structured discussion board protocol.

**Methods and Procedure**

*Design*: The study is a Stanley and Campbell True Experimental Design: Posttest-Only Control Group Design (Design #6): R X O

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The independent variable in this study will be the participation protocol used—either structured (peer-to-peer facilitation) or non-structured (basic). The dependent variables of interest will be knowledge construction and participation (number of student postings). The procedure is modified from a similar experiment carried out by Moore and Marra (2005) with the exception of the level of students and the type of structured protocol utilized for comparison. The study will be conducted at the micro level.

**Participants:** This study will be implemented in an online high school Health class which lasts for one semester. Forty students will be randomly divided into two online sections, each with twenty students. Students in each section will be a mix of 10-12 graders, all of which have voluntarily signed up to take the online class. All course content will be identical in the two online sections except for the discussion protocol students will be expected to follow.

**Discussion Board Protocols:** Students in both sections will be given general guidelines on the nature and number of the required postings for the semester. Students will be directed to make concise postings and to make a minimum of three postings per each weekly discussion topic. Participation on the discussion board is mandatory and will count 5% of their overall course grade. Students in section one will be directed to follow only the general guidelines, which will be known as the ‘basic protocol’. Students in section two will be asked to follow an additional set of guidelines, which will be known as the ‘structured protocol’. The structured protocol will employ a peer-to-peer facilitation technique, where the following pre-assigned roles based on Roby’s discussion types will be used: Initiator, Supporter, Challenger, Summarizer, and Monitor (Baylen & Sorensen, 2001). By utilizing peer teams as online discussion leaders, there
will be no authoritarian presence that has been shown in previous studies to lead to a shallow recitation-like structure (Rourke & Anderson, 2002). Research has also shown that student facilitators tend to learn more about the topics in discussion and exhibit higher levels of content mastery when they were facilitating the discussion (Vonderwall & Zacharia, 2005; Rourke & Anderson, 2002).

The initial discussion prompts in both sections will be identical and will be supplied by the teacher at the beginning of each week. The prompts will be varied in style and structure, but all will be composed to encourage higher-order thinking. Students will be directed to reflect on course readings, skills attained during the class, and personal experiences in their responses. There will be a new posting each Monday, and that discussion thread will close the following Sunday. The teacher will maintain a similar presence in each discussion board as needed to clarify misconceptions. In the ‘structured protocol’ section two, for each weekly discussion posting, five of the twenty students will randomly be assigned to one of the above Roby roles to facilitate the dialogue on the discussion board. The remaining fifteen students will make up the ‘general community’ and will be expected to contribute a minimum of three times per discussion topic, and at least one of those must be a reply or follow-up posting to another student’s posting and one original posting. Original postings will challenge students to contribute new perspectives on a topic by thinking originally and independently. On the other hand, students will exercise their critical thinking skills as they evaluate and respond to those perspectives shared by other students (Rourke & Anderson, 2002). The next discussion topic will have five different students in the facilitator roles. The rotation of students will continue randomly in this way, providing all the students in section two the opportunity to be both a facilitator and general community member.
Data Analysis

Student responses from both sections will be analyzed for knowledge construction using the Interaction Analysis Model (IAM) (Gunawardena et al., 1997). As defined by the IAM phases, knowledge construction and negotiation of meaning occurs at Phase III and above. Discussion board transcripts for both sections will be coded by two teachers who have taught Health before, so they are familiar with the content. Inter-rater reliability checks according to Chi will be used to resolve coding differences between raters (as cited in Moore & Marra, 2005). Chi square analysis will be used to determine whether there is a significant relationship between the participation protocol (either peer-to-peer or basic) and the IAM phases noted. The number of student postings will be averaged for each section to determine whether the discussion protocol had an effect on participation, which will be measured by the number of student postings. The data analysis of this study will follow closely the analysis of data in a similar study performed by Moore and Marra (2005).

Results/Discussions of Findings

It is my prediction that the section two using the structured, peer-to-peer facilitation, format will yield more postings that display higher knowledge of construction than the unstructured protocol. Similar studies with larger sample sizes will need to be conducted to strengthen the external validity of the study. These findings will be in contrast to the findings of Moore and Marra (2005) in a similar study dealing with graduate level students that did not show improvement when using a structured (argumentative) protocol. It is my feeling that younger students will likely reach higher levels of learning, when using a more structured format on the discussion board. Younger students might benefit more from a structured communication protocol than un-structured because of cognitive differences. Younger students are still learning
how to argue/comment effectively, while it is likely that the older students have already cultivated this skill, and do not need the extra encouragement a structured protocol provides.

**Conclusions and Recommendations**

By comparing the results of this study to similar studies, it will provide additional evidence that “one size doesn’t fit all” when it comes to online learning. Even if the structured argumentative protocol didn’t facilitate knowledge construction with graduate students in Moore and Marra’s study (2005), it cannot be inferred that a structured protocol would have the same results with all levels of students. Findings from this study will reveal practical implication for effective design of online discussion that may improve the quality of learning specifically for high school students in online courses. Additional research on this age group is advised to further determine additional effective online pedagogies with high school students. In conclusion, the enrollment numbers indicate the popularity of virtual high schools isn’t slowing down, so more research targeted at this specific age group is necessary as it relates to effective online pedagogies.
References


