

Factors Affecting Critical Thinking in an Online Course

Simone Conceição, PhD
Assistant Professor
University of Wisconsin-Milwaukee

As online courses become more prevalent in institutions of higher education, instructors begin to explore which teaching strategies are more effective to facilitate student learning based on different learning styles. One teaching strategy that is commonly employed in online courses is the use of discussion forums for the purpose of fostering learners' critical thinking skills. In an online discussion forum, a group of learners engages in a computer-mediated interchange of ideas, using e-mail, chat, or bulletin board technology. As in a face-to-face discussion, each message is seen by all members of the group, but the lack of direct personal contact presents certain challenges. Using online discussion forums in courses, often some students lack effective strategies for participating in this activity. Therefore, this study proposed to explore the relationship between learning style and critical thinking in an online course that used discussion forums and concept maps as teaching strategies. The initial conjecture was that certain learning strategies would help learners be more successful in online discussion forums. To study this issue, an Internet-based course using online discussion forums with the purpose of fostering learners' critical thinking skills was investigated.

Online Course Environment

The Internet-based course was offered in fall 2003 and fall 2004 and included three activities: online group discussions, concept maps, and a team project. The online course was divided into modules during which specific readings were assigned. Participants were expected to complete reading assignments and participate actively in online group discussions and team project interactions.

Online Group Discussions

For the online group discussions, participants were divided into groups of three to five members and required to post a minimum of three messages per week. For each discussion module, two group members were assigned the roles of facilitator and summarizer. In addition, all group members played the role of contributor. The facilitator was responsible for initiating the discussion with one or two questions from the readings. As group members responded to the facilitator's questions, the facilitator extended the discussion by posing new questions on issues that came out of the discussion. The facilitator was responsible for selecting discussion topics based on the readings, setting an agenda for the length of the discussion period, providing brief summaries during the discussion, initiating new topics, and keeping an active and involved discussion going throughout the specified module dates. The summarizer was responsible for providing a brief review of the main issues discussed, the key points that participants made in their group, and any conclusions reached by the group at the end of each module. Contributors were required to respond to questions posted by facilitators and group members, as well as review and comment on the responses of others through the discussion forum environment.

One important aspect of the online discussion was that each response posted by participants had to clearly tie back to the reading materials. Participants could post comments in a variety of different formats: introduce scholarly references from other sources to support or highlight their perspectives, discuss personal experiences, or share professional experiences related to the module topic, but each response had to refer back to a point or points in the reading materials. Participants had to make their arguments, describe experiences, or discuss alternative perspectives within the context of the reading materials. The grading of the online discussion activity was based on two aspects of the students' participation: role

playing (facilitator, contributor, and summarizer) and critical thinking (demonstrate evidence of dynamic reorganization of knowledge in meaningful and usable ways). Assessment of student participation was done individually by the instructor.

Concept Maps

Concept maps allowed students to gain a set of skills to process and generate information and beliefs and to self-assess their own thinking processes. Concept maps were used with the purpose of evaluating participants' critical thinking skills. As part of this course assignment, participants were required to create concept maps that depicted their understanding of the theories and concepts in the readings and online discussion forums upon completion of each module. In addition, at the end of the semester students created a concept map of their understanding of the major concepts addressed in the course throughout the semester. Concept maps were assessed based on meaningfulness of the relationship between concepts, concept map hierarchy, and meaningful and valid connections among segments of the concept hierarchy (Novak & Gowin, 1984). Participants were also asked to respond to reflective questions about their process of creating the concept maps. These questions included:

- After creating the concept map, did you see relationships among concepts that you did not see before?
- What was the easiest relationship among concepts to depict? What were the most difficult relationships to depict? Why were they easy or hard to depict?
- Look at the concept map and think back to the online discussion you participated during this module. Is there a relationship between the concepts you read and the online discussion? Were there moments in the online discussion you felt disoriented or confused? Does the concept map provide any clues about why you felt this way?

Participants used Inspiration and Cmap Tools software to create concept maps. Assessment of concept maps was completed by instructor through written feedback posted in Desire2Learn.

Team Project

In this assignment, participants worked with the same group members they worked in the online group discussions, but they had to work as a team to complete team project tasks. Based on the course readings, resources from the Internet, and personal experience, team participants worked collaboratively online throughout the semester to design an educational program. Teams completed six tasks due every two weeks. These tasks consisted of:

TASK 1:	Define target audience and learner characteristics, develop program goals and objectives
TASK 2:	Determine program content and resources
TASK 3:	Determine methods of delivery (interactive/non interactive applications), instructional strategies, and technologies
TASK 4:	Determine components of the educational program (e.g., student survey, student orientation, syllabus format, learning activities, etc.) and select scope and sequence of components
TASK 5:	Develop strategies for evaluating student learning and assessing program effectiveness
TASK 6:	Present the educational program to the class via course management tool

At the end of the semester, each team presented their educational program online through (1) a 500 word overview of the educational program; (2) a 2,500 word description of the educational program; and (3) evaluation instrument or procedures used to evaluate the program's success.

Assessment of the team project involved a self and team members' evaluation in four aspects of participation: (1) intellectual contributions (an individual's contribution to the content of the educational program); (2) logistical contributions (posting, typing, editing, presenting, etc.); (3) creative contributions to the design of the educational program; and (4) leadership contribution (the driving force behind the operation at one time or another). Each evaluation aspect had to be backed up with comments to substantiate the evaluation points. These evaluations were only shared with the instructor, who averaged the results.

Methodology

This study was based in the following research questions: Which learning styles are most likely to be successful in courses that use online discussion forums? Which students (based on learning style) are most likely to succeed in online discussion forums?

Data Collection

Data were collected using quantitative and qualitative methods: learning style inventory adapted from Kolb's (1984) completed by learners in the beginning of the course, records of participants' online discussions during five modules, six concept maps of their understanding of the theories and concepts addressed in the readings and online discussion forums, and self-reflections on the concept maps immediately after they created them. Study participants included students enrolled in a distance education course in fall semester 2003 (N=8) and fall semester 2004 (N=13).

Data Analysis

Records from online discussion forums were examined to verify if students demonstrated evidence of dynamic reorganization of knowledge in meaningful and usable ways. The learning style inventory results were used to place learners in the following categories: Doers (N=12), Thinkers (N=3), Feelers (N=4), and Watchers (N=2). Concept maps were quantitatively scored based on Novak and Gowin's (1984) scoring model. The records of the self-reflections were examined qualitatively in order to gain additional insights into the relationship between learning style and ability to demonstrate critical thinking in online discussion forums.

Study Findings

Tables 1 and 2 show the learning style inventory score per group per class and individual concept map scores. Concept maps were analyzed in two ways to identify patterns of achievement in the two courses: (1) concept map scores of participants with the same learning styles and (2) concept map scores of groups. Concept map scores for both analyses show no relationship between learning style and critical thinking. Concept map scores were not constant based on students of a specific learning style. The scores also varied from module to module. These findings suggest that individual and group factors influenced the ability for students to demonstrate successful critical thinking in online discussion forums.

Student (Group)	CMap 1	CMap 2	CMap 3	CMap 4	CMap 5	Final CMap
Doer (A)	26	101	122	91	51	166
Doer (A)	106	139	140	140	203	220
Doer (A)	77	311	358	156	79	157
Doer (A)	259	523	180	142	194	410
Doer (B)	172	218	195	223	151	288
Thinker (B)	392	118	226	190	105	318
Watcher (B)	233	266	141	156	428	353
Doer (B)	131	134	105	177	118	274

Student (Group)	CMap 1	CMap 2	CMap 3	CMap 4	CMap 5	Final CMap
Feeler (C)	441	182	185	210	188	173
Doer (C)	83	60	85	74	98	187
Doer (C)	85	140	122	159	168	169
Doer (C)	88	137	159	101	97	138
Watcher (C)	112	113	114	149	84	135
Feeler (D)	70	141	228	135	185	135
Doer (D)	68	98	93	114	81	52
Thinker (D)	106	156	146	148	126	95
Doer (D)	71	125	116	110	132	90
Doer (D)	68	0	185	154	166	135
Feeler (E)	155	109	81	84	79	88
Feeler (E)	88	142	109	120	88	239
Thinker (E)	126	151	168	174	152	125

Individual Factors

Individual factors included: (1) learner's ability to use the concept map software, (2) learner's motivation about topics discussed in the online group discussions, and (3) individual learning style. According to learners' self-reflections, individuals who did not know how to use the concept map software constructed a very basic graphic representation of the relationship among concepts in the readings and online discussions. Learners stated that concept maps flowed naturally when the subject included relationships easy to break down into manageable topics, when topics were taken from personal experience, and topics that were more interesting in online discussions were easier to depict in the concept maps. Learners stated that difficult relationships among concepts to depict were the ones that understanding the theories and breaking them down was a complex task, interrelating a chapter with other chapters was not easy to do, and when the topic was least interesting. Individual learning styles affected how learners participated in the discussion. Doers were more inclined to provide examples from concrete experience and active experimentation and did not provide an in-depth analysis of topics during the online group discussions. Thinkers tended to provide in-depth reflection of topics during the online discussions, but felt overwhelmed and confused at times. One Thinker stated that after completing the concept map, the concept map provided big clues for the confusion when discussing theories during the online discussions. Watchers provided a mix of reflective observation and concrete experience, a nice balance during the discussion and creation of concept maps.

Group Factors

Group factors consisted of (1) a combination of students' learning styles in a group and (2) group roles (facilitator and summarizer). Group A was formed with Doers and Groups B, C, D, and E had a mix of learning styles. Group A based most of the online group discussions on concrete experiences and active experimentation. For the group project, Group A was on task by setting timelines and dividing roles; however, for the online discussions Group A participants were brief addressing the issues and lacked in-depth critical analysis of topics. For the other Groups, the online discussions involved reflection and analysis of concepts based on concrete experience and reflective observation. Though for the team project for Group B it was not until after several weeks of discussion that they figured out what and how to accomplish the group assignment. Groups C, D, and E had a nice mix of learning styles that the team project had good focus and active participation of group members throughout the semester. Another factor that influenced effective critical thinking in online discussion was group roles. For each module, one participant was the facilitator and one summarizer for each group. If the facilitator did not involve group members in the online discussions or did not provide enough questions in a timely manner, some students felt disappointed. But when the facilitator provided good directions to the group, it became easier for participants to create a framework for building their own concept maps. In addition, the summarizer had an important role in the creation of the concept maps. Group members relied on the summary to start working on their concept map at the end of each module.

Implications for Practice

The findings of this study suggest that understanding how learning styles affect learners' success in online discussion forums can assist instructors in providing better guidelines to learners when designing online courses. At the beginning of a course, learners can be told which learning strategies are most effective when participating in online discussion forums. This can be particularly helpful for learners whose personal learning style does not emphasize those strategies. One valuable lesson that this study offers is that a mix of learning styles in a group can make the learning experience more balanced. Thus, instructors should consider combining students with different learning styles when setting up groups in the beginning of an online course.

References

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Biographical Sketch

Simone Conceição is an Assistant Professor at the University of Wisconsin-Milwaukee School of Education Department of Administrative Leadership and holds a Ph.D. in Adult Learning and Distance Education from the University of Wisconsin-Madison and a Master's degree in Administration and Development of Adult and Continuing Education Programs from the University of Wisconsin-Milwaukee. Her research interests include adult learning, distance education, impact of technology on teaching and learning, instructional design, learning objects, and staff development.

Address: University of Wisconsin-Milwaukee
School of Education
P.O. Box 413
Milwaukee, WI 53201.

E-mail: simonec@uwm.edu

URL: <http://http://www.uwm.edu/~simonec>
Phone: 414- 229-4615
Fax: 414-229-5300