Looking for Critical Thinking in Online Threaded Discussions

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Abstract

Threaded discussion forums have been a popular topic for the past few years in distance education research and studied as a factor in student participation, satisfaction, learning outcomes, social presence and interaction. Only recently has it been considered as a potential vehicle for the development of critical thinking skills and deep learning. Thirty-seven current studies on critical inquiry, deep learning, presence and interaction in distance education were synthesized. The studies were compared for findings about participation quality, participation quantity, critical thinking skills and deep learning, and recommendations. The synthesis revealed that current literature touts the potential for development of deep learning and critical thinking skills through online threaded discussions. For the most part, however, research does not show this happening at a high level or to any great extent. Confounding the issue is the fact that current research is predominated by examination of education and graduate level online classes and is mainly focused on student perceptions and outcomes. This is at odds with the profile of today's "typical" distance education student. The need for more instructor involvement and effort is indicated in much of the research, but bulk of the research has focused on students and not teachers.

Introduction

Learning through discussions or conversations is a fundamental part of teaching and learning, particularly in higher education. New communication technologies enable discussions to be held online as well as in the classroom. These discussions may form a component of a totally online distance education class or be used as a supplement to a traditional face-to-face class. The discussions can be synchronous, with participants "talking" at the same time, or asynchronous, where communication turnaround can be delayed by hours or days.

Online threaded discussions provide students with access to the forum twenty-four hours a day, seven days a week. Students can thus participate whenever they have the time and desire and at their own pace. This online "talk" can be more thoughtful since it offers the chance for reflection. Students have time to read each other's contributions and to think carefully about their own contributions. Messages can be composed and revised as needed and this writing may encourage discipline and rigor in thinking and communicating.

The characteristics of anonymity may also serve to promote enhanced and more intensive discussion. Students can concentrate on the content of the message instead of the presenter and may be more open and honest about themselves. They may divulge information that is more personal and revealing which will, in turn, encourage others to do the same.

On the other hand, threaded discussions are written discussions and lack the affordances of oral conversation. Some students feel that these discussions are just a series of messages and there is no sense of community. The lack of facial expressions and voice make the process less human. The fact that there are no nonverbal clues to guide them can also lead to misunderstandings and misinterpretations. Asynchronous discussions may lack the speed, the spark and energy of a face-to-face conversation and hinder the development of dynamic and interactive discussion [1]. Fewer teacher prompts online and the "out of sight, out of mind" adage may serve to increase student procrastination. Further, multiple simultaneous threads can be confusing to follow and to respond to. Some students may overpost and others suffer from "communication anxiety". They feel detached and are not sure who is really out there, when to expect a response and what kind of a response it will be [2].

Discussion

Threaded discussion forums have been a popular topic for the past few years in distance education research and studied as a factor in student participation, satisfaction, learning outcomes, social presence and interaction. Only recently has it been considered as a potential vehicle for the development of critical thinking skills and deep learning. In an effort to determine the efficacy of threaded online discussions in this regard, thirty-seven current research studies were analyzed and synthesized. The volume of research within these areas in recent years is substantial. In an effort to condense and summarize the research, a chart was constructed. The chart is shown at the end of this section of the paper. The research studies are listed alphabetically by author followed by date of the study. The next column indicates whether the study was conducted with a graduate, undergraduate, professional or high school level group. The purpose of the study as stated in the journal article is shown next, followed by the methodology used. The next column indicates whether the class was totally online or if just the discussions were online as a part of a face-to-face class. The last column contains the major findings of the study.

Of the thirty-seven studies reviewed, nineteen studies evaluated classes at the graduate level and eleven at the undergraduate level. Although this paper deals with college level distance education courses, several other studies were included because they were cited frequently within other studies and considered valuable literature. Of these seven, two were on a high school level and five were on a professional level.

The majority of studies were performed with education classes. Of the thirty studies involving college classes, thirteen were education classes. Five were business related classes and four were computer related classes. The other classes varied across discipline.

The majority of the education classes were at the graduate level. Only one undergraduate education class was researched. It is assumed that this is because education professionals are more interested in distance education research than researchers in other disciplines and they have access to education classes and students as subjects. Why so many researchers have chosen graduate level instead of undergraduate level education classes is not known. The predominance of graduate level classes for research, however, is at variance with the current statistical profile and demographics of current distance education students. The changing nature and demographics of the distance education student are discussed later in this paper.

As stated previously, studies were selected for review if the article indicated that the purpose of the research was to investigate critical inquiry, deep learning, presence, and interaction. The methodology varied and a number of studies used triangulation. Content analysis of class

transcripts, discussion threads, or listservs was a popular method. These archived records have only been available for research the last five or ten years and as a result, are a popular newer method of data collection and analysis. It was used to some extent in 22 of the 37 studies. This content analysis was generally performed in an effort to analyze student responses. These student responses were then often categorized for quantity or quality. Some studies ranked student responses using a scale or taxonomy such as Bloom's Taxonomy, Biggs' SOLO Taxonomy, or Garrison's Four Cognitive Processing Categories.

Another common research design was to compare student conversations online with face-to-face classes. Seven studies followed this methodology. Student interviews and questionnaires were also popular, frequently in addition to other methods. Of the 37 studies, fifteen interviewed or questioned students.

2.1 Research Findings

Kreijns, Kirschner, and Jochems in a 2002 study stated that there is a concomitant body of research that reports low participation rates, varying degrees of disappointing collaboration, low learning performance and quality of learning in distance education [3]. The analysis of these 37 studies supports some of these findings.

2.2 Participation Quantity

Some studies did report low participation rates [4] [5] [6] [7] [8] [9] [10]. Other studies specifically studied "lurkers" or low participants [4] [11] [12], but found that these "lurkers" do learn by observing others. Hung and Nichoni in a 2002 study further stated that lurking is a necessary step in getting familiar with a particular culture [12]. A 2002 study by Picciano found that there was no difference in learning outcomes for low, moderate and high participants [10].

Chen and Zimitat in a 2004 study found that online classes had more participation than in-class discussions [13], but the more common finding was widely varying degrees of participation by students in the same class [14] [10]. Hara, Bonk, and Angeli in a 1998 study reported that online participation by students was limited to the mandatory number required by the instructor [15].

2.3 Participation Quality

Online discussions were described as less personal than face-to-face discussions [16], perfunctory [5], less interactive and lacking in speed, spontaneity and energy [5] [17] [1]. However, some studies reported more honest reflective discussion online [18] [14] [15] [17] [19]. Online participation was described as good for information exchange [20] [21], but not for creative problem exploration and idea generation [22].

Other studies reported that threaded discussions do not encourage team building or group processes [8] [23]. Some online environments culturally condition students to agree with each other and challenging each others ideas in discussion is considered a personal affront. There is little social discord [24] [25] [26]. Vonderwell in a 2002 study found that students claimed to all have similar ideas and thus there was nothing to really talk about [16].

2.4 Critical Thinking Skills and Deep Learning

Chen and Zimitat in a 2004 study reported that deeper understanding was shown in face-to-face classes than online classes [27]. On the other hand, similar amounts of critical thinking were found in face-to-face and online classes by Newman et al. in 1997 [22]. Hara, Bonk and Angeli in 1998 did find cognitively deep, lengthy postings with peer references, but still noted that students posted only the required number of postings and that comments were highly dependent on the directions of the discussion starter [15]. Heckman and Annabi in 2002 stated that based on their work, online discussions can generate cognitive levels equal to a face-to-face discussion [28].

When critical inquiry or deep learning was categorized in hierarchical levels, most messages or responses were ranked at the lower cognitive levels [1] [20] [21].

2.5 Literature Recommendations

Despite the difficulties cited above, most of the studies stated that online discussions have the potential for the development and fostering of critical thinking skills and deep learning. However, overwhelming it was stated that this was not yet happening at a high level or to a great extent.

Recommendations and suggestions to improve critical thinking skills development and deep learning included combining online discussions with other activities such as collaborative group work [26], case studies [26], production of tangible products [8], and problem and project based learning activities [19]. Other recommendations included developing more appropriate teaching and social presence [29] [24].

Mentioned most often as needed for improving deep learning in online discussions was better instructor efforts [30] [5] [6] [26] [18] [31] [1] [32]. Along these same lines, setting of clearer goals for discussion topics was frequently mentioned [14] [33]. Problems relating to a lack of clear goals or shared purpose for discussion was discussed in a number of studies [34] [35] [20] [14].

Most researchers placed responsibility for social interaction squarely on the back of instructors. It is up to the instructor to create a sense of online community and make a space for social interaction to take place [36]. This space must foster intimacy, openness and connectedness. The teacher then must direct online discussions, influence the discussion by entering new topics, share new material and redirect conversational patterns as necessary [3].

It was stated that an interactive teaching style is the best pedagogical approach to Internet-based learning [37] [30] and the type of questions the instructor asks are extremely important. The questions must be interesting as well as probing and prodding. They must elicit self explanations from the learner, critical clarification and refinement [38].

Instructors are also responsible, according to the literature, for providing the scaffolding that allows students to advance from passive to deep learning. Teachers are the content experts and must guide and assist students in their quest for knowledge. They must diagnose misconceptions, inject knowledge from diverse sources, and respond to technical concerns [39]. On the other hand, there are researchers that recommend a “guide on the side” approach with a laissez faire approach to moderating student discussions. There is some conflict between these two approaches and disagreement about whether the teacher in an online class

should be a facilitator or a content provider. Further disagreement exists about which of the two approaches is more student centered.

It is interesting to note that although better instructor efforts were mentioned frequently, there were not many studies that actually interviewed or focused on instructors. Mortera-Gutierrez in a 2002 study conducted three unstructured interviews with three instructors and found that the pragmatic approach of the instructor affects class interaction, skills, and strategies [40]. In 2003, Trollip and Blignaut categorized instructor postings and classified them as affective, administrative, other, corrective, informative and Socratic [32]. Li, in a 2003 study, interviewed one teacher to learn of problems of first time online students [9].

2.6 Other Factors

Some of the studies did not take place in entirely online classes. Students taking a blended class where they have some face-to-face meetings with the instructor and other students may not require the same level of social and teacher presence online. Students in these blended classes may have more time to devote to developing in-depth conversations since less time is needed for developing social connections. Also, the face-to-face discussions may stimulate idea generation for later online discussions. These opportunities are not available for students taking classes that are totally online.

Three of the studies also used synchronous discussions. Synchronous and asynchronous conversations have their own advantages and disadvantages and are not comparable in many ways. As mentioned with the blended classes above, students in classes with synchronous discussions may not have the same needs for development of teacher and student presence.

Lastly, some of the studies did mention that other factors affect critical thinking. Bullen in a 1998 study and LaPointe in a 2003 study mentioned the importance of learner characteristics [25] [41]. Guzdial et al. in 2002 and and Rourke et al. in 1999 discussed the influence of discipline and culture [6] [24]. Students enrolled in technical disciplines are accustomed to a more didactic lecture approach and are not accustomed to discussing controversial or ethical issues. These students have been taught correct procedures and how apply them, not how to discuss these procedures.

In summary, perhaps the most consistent finding was that deep learning does NOT happen spontaneously [41] and that when it does happen; it is difficult to measure [43].

2.7 The Changing Distance Education Student

The original target group of distance education was adults with occupational, social and family commitments wanting to improve and update professional knowledge. Distance education has traditionally been interwoven with adult learning theory and lifelong learning. In 1991, Verduin and Clark described distance education as a form of adult education traditionally offered through extension units of colleges and universities, offering a choice of time and location, and designed for adults with the adult learning traits of self direction and internal motivation [44]. The typical online student has been generally described as over 25, employed, a caretaker, who has already completed some higher education. These learner demographics may have been true in the past, but are no longer valid.

The National Center for Education states that online enrollment now spans all age groups. As of December 31, 1999, 65% of l8 year olds had enrolled in an online course. It was also

reported that 57% of traditional undergraduates aged 19 to 23 have been enrolled in an online course. These students are taking online classes at the same time as face-to-face classes. Online classes are not replacing face-to-face classes, they are being offered as supplements or alternatives within traditional college certificate and degree programs. Combining distance education with traditional degree programs is becoming a dominant theme [44].

The National Center for Education also reported that over one-half of the increase in distance education classes from 1997-8 to 2000-01 was attributable to public two year colleges. This is particularly impressive, since general enrollment in four year colleges has been outpacing enrollment in two year colleges [45].

Schools granting associate degrees had the largest number of students taking at least one online course, representing about half of all the students studying online. Strong increases were predicted by all classes of schools offering associate degrees [45].

Fourteen years ago, Verduin and Clark described three major types of programs for adult learning and distance education: adult basic education for acquiring basic skills needed to function in a changing, increasingly technology based society; career education; and leisure and enrichment education [46]. The nature of online education has changed as well as the typical (if there is a typical) online student. A more common online student today may well be a young, full time associate degree student taking college courses online as well as in the classroom.

Table 1: Current Research

Levels: G = graduate; U = undergraduate; P = professional; HS = high school

Author	Level	Discipline	Purpose	Methodology	All Online?	Findings
Anderson 2001	G	Education Health	Create a model to evaluate teacher presence	Content analysis of class transcripts	Y	Tool created is useful because of its simplicity and diagnosis capacity.
Arbaugh 2000	G	MBA	Determine factors that make online courses an effective learning experience	Survey of students	Y	Student learning is related to instructor efforts to create interactive environment. Instructor must foster intimacy and provide interesting discussions for learning.
Armitt 2002	G	Health	Evaluate SYNCHRONOUS communication to develop deep learning	Transcript analysis using SOLO	Y	Deep learning does NOT happen spontaneously. Groups that interact effectively develop cognitively more quickly.
Aviv	U	Comput	Evaluate ALN	Content	N	High level reasoning can

2000		er Science	performance	analysis 2 weeks ALN discussions		result IF there is effective cooperation and group dynamics. Actual results are difficult to measure.
Beaudoin 2002	G	Education	Determine if non-participants and low level participants are learning	Survey of low level participating students	Y	Learning occurs behind the scenes. Some learners are more reflective and need less stimulation and interaction.
Bullen 1998	U	CIS	Find factors that affect critical thinking and participation	Student interviews	Y	Effectiveness is dependent on student characteristics, course design, and facilitation. It is not a simple task.
Chen Zimitat 2004	G	Computer Science	Determine quality of higher order learning outcomes from online SYNCHRONOUS discussions compared to F2F blended class	Content analysis of transcript using SOLO	Y for online class	More discussion in online class. Deeper understanding shown in F2F blended class.
Ellis 2004	U	E-commerce	Evaluate what students learn through discussion and how they learn it	Compared F2F and online discussions	Y for online class	Online students more reflective due to control over time. Reflection not found in F2F. Significant misunderstanding about goals obscured purpose of discussion. Wide variety of levels of participation. Participation quantity and quality attributed in a large part to instructor/tutor.
Eustace	G	Policy studies	Find Educational value of online	Examined chat room transcripts	Y	Peer dialogue provides mechanism for deep

2003			SYNCHRONOUS participant interaction			learning experiences. Can be combined with problem and project based learning activities. Analysis of chat records by students can promote peer review and reflective practice
Garrison Anderson, Archer 2004	G	Education Health	Judge nature and quality of online critical discourse	Analyzed and categorized message units for three one-week exchanges	Y	Critical, practical inquiry can be created and supported online with appropriate teaching and social presence. In this particular study, there were not many higher level message units.
Goodell 2005	G	Education	Describe attempts to develop a community of practice among students engaging in online dialogue	Analyzed Web CT records and transcripts	N	Only 75% of students participated. Students did not respond to each other. Postings were perfunctory. Instructors did not participate. There was no recognition of the benefits of online discussion.
Guzdial Carroll 2002	U	English Comp	Determine learning that occurs when participation is low in online discussions	Student interviews	N	Learning arises from construction of a shared understanding. Students don't have to participate if others present their questions and explanations. Learning arises from the inquiry and reflection even if no posting occurs.
Guzdial Ludoice Realff Morley Carroll 2002	U	Math, Science, Comp science	Find reasons for the failure of online collaboration in certain areas	Interviews Questionnaires	N	Students and faculty did not participate due to cultural issues in areas of engineering, mathematics, and computer science. Did not see the need for collaboration, did not feel it was appropriate for these disciplines. Felt lecture based, competitive classes more appropriate.

Hara Bonk Angeli 1998	G	Education Psych	Examine supplementary online discussions	Content analysis of teacher and student messages	N	Students posted only the required number of postings. Postings were cognitively deep, embedded with peer references, and lengthy. Comments were highly dependent on the directions of the discussion starter.
Hawkes, Romiszowski 2001	G	Education	Compare F2F discussions with online discussions for critically reflective discourse	Content analysis	Y for online	Online dialogue was less interactive than F2F. Online dialogue was more reflective.
Heckman Annabi 2002	G	Education	Compare F2F and ALN discussions	Content analysis of discussions	N	When combined with case studies, ALN discussions can generate cognitive levels equal to a F2F discussion.
Hung Nichoni 2002	-		Analyze peer apprenticeship learning concept to foster working relationships between novices and masters in an activity context	Case study ethnography observe after school learning clubs programs	N	Social learning techniques help students cooperate and collaborate. Learners then move from peripheral to central participation. "Lurking" is a necessary step in getting familiar with culture.
Kanuka 2002	P	Education	Explore how teaching and learning principles can be applied to facilitate higher levels of learning in distance education	Surveyed experts and scholars in field of distance education	-	Online discourse is often ineffective because instructors do NOT facilitate guided discourse effectively. Collaborative group work and threaded discussions can be combined with case studies to help students understand complex problems.
Kanuka Anderson	P		Understand and assess online learning	Used a constructivist interaction analysis	-	Overwhelming number of messages were lower phase of knowledge construction – sharing/comparing.

1998				model and a student telephone survey		Participants valued the form for sharing and receiving information – not constructing new knowledge. Little social discord.
Kehoe 2005	U	Business	Find perceptions of learners on flexible delivery methods	Student survey	Y	50% of students would prefer traditional lecture mode. They took online courses for practical reasons. Online is not a replacement, but a supplement. 37% were reluctant to participate in online discussions. 33% said they would not come to a F2F class if points were not awarded for attendance and participation.
Kippen 2003	-		Examine relationship of reflection to deep learning	Theoretical – analyzed theories of learning and connected them to teacher reflection online	-	Reflection can promote deep learning online. Students are more honest in online discussions. The teaching environment online must be adapted.
Klemm Snell 1996	U		Compare student groups and tangible work products to threaded topic discussions	Observed educational list servs and threaded discussions	Y	Threaded discussions do not encourage team building or group processes. There are lurkers and superficial participants. Learners should produce tangible products – not just give opinions.
LaPointe 2003	U	Varied	Determine variables influencing peer interaction and	Online questionnaires	Y	Found 5 variables that influenced interaction and outcomes: self –construal, teaching presence, task

			learning outcomes in CMC			design, prior CMC experience, and course requirements.
Li 2003	U	Human Environ-ment	Study problems of first time online students	Interviews with students and one teacher Document review	Y	Only 44% of students participated regularly. Students were initially confused, frustrated, and not comfortable. Most changed attitudes by the end of the semester.
Mason 1991	Prof	Mgmt Skills	Determine the nature of moderating skills needed	Conferenc e messages Interviews		The moderator must play several roles including organization, social and intellectual.
Meyer 2003	G	Educati on	Compare experiences of F2F discussions with threaded discussions Evaluate threaded discussions for higher order thinking skills	Content analysis using Garrison's 4 cognitive processing categories Student interviews		Critical thinking did occur, but 51% was at the exploratory level. Faculty need to be more directive in guiding discussion. Online was more reflective but students found it lacking in speed, spontaneity, and energy.
Mortera-Gutierrez 2002		Varied Discipli ne	Analyze design strategies and interaction of instructors.	Unstructur ed interviews with 3 instructors	-	Instructors have different sets of interaction than students. The pragmatic approach of the instructor affects interaction, skills, strategy, etc.
Murphy Coleman 2004	G	Educati on	Find purpose and value of online discussions	Content analysis of threaded discussion s	Y	Some students dominated conversation leaving others excluded and alone. Some felt inadequate when no one responded to their posting. Shift of control from teacher is not beneficial if passed to dominating students. Discussion can support more reflection, constructions and critical thinking, but these benefits

						may NOT be achieved. Students may misunderstand, misinterpret, and not participate.
Newman Johnson Webb Cochrane 1997	U	Info Mgmt	Compare F2F seminar with computer conferencing Evaluate discussion as a means of promoting deep learning and critical thinking	Content analysis Student questionnaires	N	Similar amounts of critical thinking in both classes. Higher depth in computer conferencing. Students in that class brought in more outside information from personal experience, other sources, etc. F2F was better for creative problem exploration and idea generation since it was more spontaneous.
Picciano 2002	G	Education	Examine online performance in relation to student interaction and sense of presence	Student survey Discussion board statistical analysis	Y	No difference in outcome for low, moderate, and high participants.
Rourke et al. 1999	G	Education	Determine implications and benefits of assessing social presence	Analysis of discussion transcripts	Y	Fairly high levels of social presence are necessary to support development of deep and meaningful learning. Further study is needed to determine the optimal amount. Too much social presence may be detrimental.
Sherry 2000	HS		Create guidelines for online conversations	Analysis of online conversation Student focus group	N	Each conversation should have a published goal and guidelines. Combine with creating a project. Make supportive comments.
Singleton 2003	G	Education	Gain insight into learner perception of online learning	Student survey	Y	Students felt course design was the most important factor. Challenges were lack of community, time management and unclear

						goals.
Tolmie Boyle 1999	G	Education	Compare F2F seminar with online seminar	Examination of conference records Student logs of activity and contact Student questionnaire	N	Computer conferencing was used for information exchange. Overall usage was not high. There was a particular need for shared purpose.
Trollip Blignaut 2003	G	Business	Create a taxonomy to measure teacher presence	Analysis of teacher postings in threaded discussions Survey of decision makers	Y	Categorized instructor postings as administrative, affective, other, corrective, informative and Socratic. Found a wide range of expectations as to ideal performance.
Vonderwell 2002	U	Education	Analyze student perceptions regarding interaction and quality of learning online	Student interviews Analysis of email Analysis of discussion transcripts	Y	An increase in number of messages does not necessarily increase quality of learning. Students felt online was less personal and missed the 1 to 1 with teacher. They wanted faster feedback. Students felt they did not learn from each other since they all had similar answers.
Woods 2002	G .	Org. Comm	Find out if more instructor initiated personal emails outside of class discussion would affect	Divide class in groups Each group received a	Y	No difference in rating faculty/student relationships.

			student perceptions	different number of personal emails from instructor Student survey		

Conclusion

Current research literature touts the potential for development of deep learning and critical thinking skills through online threaded discussions. For the most part, this has not yet happened at a high level or to any great extent. Further research is needed to investigate the nature of this disparity. The need for more instructor involvement and effort is indicated in much of the research, but the brunt of the research has focused on students and not faculty. There is thus a need for additional research conducted from the standpoint of the instructor. What do instructors hope to achieve by using an online threaded discussion and have they succeeded in this quest? Is deep learning the main objective or are there other goals and objectives that are just as important in these virtual discussions?

Another confounding problem appears to be a mismatch between the target groups under research and the actual online student population. Current research is predominated by examination of education and graduate level online classes. The typical online student is not a graduate student and does not take education classes. The changing nature of online students must be taken into consideration in future research. Student characteristics, education level and academic discipline/course may affect the teaching methods and objectives of online instructors.

The preponderance of the research is also of a quantitative nature. Class databases are counted, summarized, categorized and graphed. There is a need for rich, in depth data which would call for research of a qualitative nature, particularly from the point of view of the online instructor.

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