The impact of Instructor Intervention Style on Student Activity in Asynchronous Online Learning Discussion Boards

Jim Waters
Department of Information Science and technology
Cabrini College
United States
james.waters@cabrini.edu

Abstract: The asynchronous discussion forum is a mainstay of many higher education online learning systems and approaches. This model of interaction requires faculty to rethink previously held models of instructor-student interactions based on face to face courses. Consequently faculty members often find themselves with a steep learning curve. Fortunately there is a wealth of material (pragmatic advice, experience, empirical data, models, theories, frameworks and roles) that educators can draw upon. Much of the advice seems intuitive "be present", "provide feedback and support" and "do not lecture". Less fortunately there is a degree of contradiction and little consensus between the sources of best practices in the field. This paper reviews some selected research in this field and presents case studies comparing the interaction levels of 8 University professors and their effects on student interactions.

Introduction

The growth in online learning over the last 20 years is nothing short of stunning (Hiltz, Zhang et al. 2001; Twigg 2001; Miettinen and Hasu 2002; Allen and Seaman 2007). The annual growth rate as of 2009 was estimated at 17% (Miettinen and Hasu 2002) far greater than the overall growth in higher education. One popular tool for online learning is the use of asynchronous threaded discussion boards. Online learning systems like Blackboard© support asynchronous threaded discussion boards. These discussion boards allow learners to post when convenient and allow participants time to read prior posts and reflect on them before making their own contributions(English and Yazadani 1999; Lipponen 2001).We can view online learning environments as having the potential to be communities of inquiry (Clark 1998; Rourke, Anderson et al. 1999; Anderson, Rourke et al. 2001; Cuthell 2002; Shields 2003; Waters and Gasson 2007). Current thinking regards the online experience as fundamentally composed of three types of interaction: interaction between students and material, interaction between student and student and interaction between student and instructor. All of these interaction types are supported by discussion boards but this paper will focus on the student-instructor interaction.

What is the role of the instructor?

First some advice that probably nobody will disagree with. The instructor or course manager should make sure that the online discussion is a mandatory component properly integrated into the course and not just an optional add-on. Merely providing an online forum without suitable incentive, structure or direction will not guarantee that students are to "jump into group discussions, argue in online debates, or answer questions posed online, just because they are told to participate"(Berge 1995). It is all too easy for students to be passive and simply not participate, making part of the course grade contingent on suitable participation will encourage student involvement(Johnson and Johnson 1975). Similarly stressing the quality of contributions is more important than stressing a minimum number(Swan 2003). Students must be aware that "I agree with Fred" is not a substantive contribution. Instructors must fulfill a managerial role(Berge 1995; COPPOLA, HILTZ et al. 2001) making sure that deadlines are understood, any evaluation criteria are made explicit, that agendas are explicit and important rules of conduct/etiquette spelled out. The preceding is pretty well accepted. Beyond this minimal level things get a bit less universal.

The Instructor as a font of knowledge

Swan(Swan 2003) suggests that instructors should be more knowledgeable than students otherwise they would not be able to design stimulating instruction or motivate student participation. Anderson et al(Anderson, Rourke et al. 2001) define teaching presence as having three components; instructional design and organization, facilitating discourse and direct instruction. Direct instruction here positions learners as "cognitive apprentices"(Collins, S et al. 1991). The more skilled instructor can assist learners who are in the "zone of proximal development"(Vygotsky Translated 1978) but must do this from a position of superior knowledge. They consider the less direct "guide on the side"(Collison, Elbaum et al. 2000) mode to miss an important element:

> *this type of laissez faire approach misinterprets a fundamental element of peer collaboration models. A key feature of such social cognition models is the adult, the expert or the more skilled peer who scaffolds a novice's learning. The role of the teacher, in any context, involves direct instruction that makes use of the subject matter and pedagogical expertise of the teacher.*

Arbaugh and Hwang(Arbaugh and Hwang 2006) add that superior expertise is needed to resurrect discussions that have stalled. Salmon(Salmon 2000) while acknowledging the role of content expertise:

> *"(Instructors must be) confident in having knowledge and experience to share, and willing and able to add own contributions, able to encourage sound contributions from others (and) able to trigger debates by posing intriguing questions"*

suggests that this expertise need not extend beyond a qualification in the same domain and at the same level being taught.

The Instructor as a facilitator

Heuer and King(Heuer and King 2004) suggest that as facilitator, the instructor performs two roles, that of guide and learner and that they need to "operate democratically" to ensure that all participants are allowed to express their opinions fully. Waters(Waters 2012) suggests however that not all contributions are equally valuable to discussions and that contributions by "thought-leaders" should be subtly encouraged. Blignaut and Nagel(Blignaut and Nagel 2009) note that how instructors see themselves can contribute to a sense of disconnection from other learners, they lament that "many online facilitators do not budge from their positivist stance and wish to remain kingpin in their courses" .Lu and Jeng(Lu and Jeng 2007) found that instructors who operated both as co-participants and facilitators inspired more messages and greater levels of new knowledge construction compared to instructors being more outside the discussion, student perceptions of their learning under the two models however were not notably different. Beaudin(Beaudin 1999) notes the importance of managing discussions to ensure they stay "on topic" by use of good design, guidelines, periodic summaries and reframing questions on the fly when discussions divert from the main topic. Berge(Berge 1995) defines the facilitator as operating in 4 separate roles: Pedagogical, Social, Managerial and Technical. In the pedagogical role the facilitator needs to encourage participation, maintain a non-authoritarian style, be objective and actively ask for contributions. In the Social role facilitators need to praise and model required behavior, uphold etiquette and attempt to draw lurkers into the discussion. The above section implies that instructors as facilitators should be fairly active within online discussion boards, as may be expected both the optimal frequency of interventions and the nature of interventions for encouraging rich discussion are open to debate

How *visible* should instructors be in online discussion?

Sher(Sher 2009) found that students' level of perceived learning was directly related to the extent to which they perceived facilitators to be supportive, interactive and providers of suitable feedback. More perceived

facilitator intervention also led to more satisfaction with courses. Swan(SWAN 2002) discusses the importance of instructor immediacy (psychological distance between communicators) and that despite forums having no physical presence instructors could project their personalities by verbal means alone. Swan found that there was a strong correlation between perceived levels of instructor-student interaction and both perceived learning and satisfaction. Arend(Arend 2009) paradoxically found that students reported higher levels of critical thinking learning strategies when the instructor responded less often.:

> *In fact, in one course from the higher critical thinking use group, the instructor did not post at all in one of the units and the discussion was observed to be just as long and contain the same apparent quality of responses as the other units where the instructor was more active.*

Jonassen et al(Jonassen, Davidson et al. 1995) suggest that a social-constructivist model where students use each other as co-learners requires much less instructor-student interaction, they put this at between 10 – 15% of message volume compared with 80% of verbal material being presented by instructors in face to face classes. Mazzolini and Maddison(Mazzolini and Maddison 2007) in a large scale study of 400 discussion forums and 500 survey responses found that "the percentage of instructor postings within a forum showed a significant negative correlation with the length of discussion thread" and that the more threads that the instructor started the shorter the threads would be and the lower the student posting rate was. Bedi(Bedi 2008) suggest that high level of faculty postings are important for high student satisfaction but does not attach a number to this instead suggesting that the level should be sufficient to provide regular feedback and incite critical thinking. Berge(Berge 1995) advises instructors to be responsive and explicitly recommends a response to every contribution either individually or in summary messages. Baker(Baker 2010) explores the effect of immediacy (ibid) and presence. Presence relates to social presence theory and is "the feeling that the group members communicate with people instead of impersonal objects" When instructors were felt to be more visible students self-reported higher levels of affective learning, cognition and motivation. The same effect was not found for immediacy.

What kinds of interventions should instructors make in online discussions?

We might first ask what kind of interventions can instructors make? At a broad level there are some common themes that emerge. Berge(Berge 1995) refers to pedagogical, social, managerial and technical. Hootstein(Hootstein 2002) suggest that the instructor "wears four pairs of shoes --acting as instructor, social director, program manager, and technical assistant". Garrison et al(Garrison, Anderson et al. 2000) talk about teaching, social and cognitive. Jung(Jung, Choi et al. 2002) narrows the key themes to Academic and Social while Coppola(COPPOLA, HILTZ et al. 2001) cites cognitive, affective and managerial. Blignaut(Blignaut and Trollip 2003) specifies administrative and affective but draws finer distinctions between the pedagogical elements defining corrective, informative, Socratic as separate classifications.

Sher(Sher 2009) considers that students most value instructor postings that consist of feedback, encouragement, "interaction as an individual", and course progress. Collison(Collison, Elbaum et al. 2000) suggests a "guide on the side" moderation strategy where instructors behave with humility, exercise restraint and avoid projecting their opinions into discourse. Arend(Arend 2009) also supports a neutrality of tone when responding to students and stresses the importance of more explicit instructions as to how to participate in discussions. Blignaut and Nagel(Blignaut and Nagel 2009) suggest that under a constructivist model we expect students to be active in a peer teaching role and used an instructor masquerading as a student "Virtual Jane" to guide students. Jung(Jung, Choi et al. 2002) found that Social interactions between students and instructors were more effective in producing higher levels of self-reported learning than collaborative work between students. Garrison and Cleveland-Innes(Garrison and Cleveland-Innes 2005) whilst agreeing that social presence was important for setting up the conditions necessary for critical discourse found that beyond a "socializing" introductory week it was more effective to have instructors engaged in "focused critical discourse". Sherry et al(Sherry, Billig et al. 2001) warn that critique needs to be tempered with praise. Lim(Lim 2004) considers it important that instructors answer queries are active in participation and pose conflicting views to elicit more thinking. Bedi(Bedi 2008) discusses the impact of the length and frequency of instructor interventions. Bedi suggests that instructors should use short messages frequently to provider continual feedback (informative and corrective postings) but use longer (profoundly insightful) messages

less frequently to provide direct instruction. Where student participation is low Bedi recommends Socratic postings to draw out discussion. Anderson et al(Anderson, Rourke et al. 2001) identify six categories of activity important for facilitating discourse: Identifying areas of agreement/disagreement, seeking to reach consensus/understanding, encouraging, acknowledging, or reinforcing student contributions, setting climate for learning, drawing in participants, prompting discussion, assessing the efficacy of the process. Finally Xie and Bradshaw(Xie and Bradshaw 2008) encourage the use of "question prompts" as a scaffolding mechanism. The found that students who received question prompts did much better when solving complex/badly structured problems than students working collaboratively with peers but without question prompts.

The case study: A tale of 8 professors

The subjects were students taking 12 completely online (10 week) graduate IS/LIS courses at a North American University in winter 2008. A total of 282 students took part in the 12 classes, 60% were female and 40% were male. The 12 classes consisted of five sections of Information Systems classes (IS-1A, IS-1B, IS-2, IS-3, IS-4) five sections of Library Science classes (LIS-1A, LIS-1B,LIS-2A, LIS-2B, LIS-2C), and two section of a class that merged Information Systems and Library Science material (COM-1A, COM-1B). A, B and C identifies sections taught by different instructors to the same syllabus. Courses we chosen on the basis of the possibility of producing lively debate and covered a wide range of material basic and advanced, theoretical, pragmatic, social and ethical. Courses chosen were run by 8 instructors who strongly felt that online discussion boards were a powerful tool for online learning and who were committed to using discussion boards for learning. In the last week of the course students were asked to complete a short questionnaire. This questionnaire asked students about their experience of the course (learning and satisfaction).

The effect of instructor posting frequency on student posting frequency

Table 1 shows the number of instructor posts and student posts for each course and the ratio of student posts to instructor posts. There was a large variation in both the volume of posts and the posting. Overall the correlation between instructor posts and student posts was 0.697 but the both table 1 and fig and fig 1 show that the relationship is not linear with instructor 1 being over three times more interactive than any other instructor and instructor 2 being effectively invisible.

	Instructor Posts	Student Posts	Instructor Instructor	Ratio
IS-1B	32	1426	INST-2	44.56
COM-1B	46	788	INST-4	17.13
IS-2	51	305	INST-8	5.98
IS-3	68	429	INST-8	6.31
LIS-2C	91	618	INST-6	6.79
IS-4	99	605	INST-8	6.11
LIS-2B	130	1071	INST-3	8.24
LIS-1B	132	897	INST-4	6.80
COM-1A	134	670	INST-7	5.00
LIS-1A	172	520	INST-3	3.02
LIS-2A	225	1721	INST-5	7.65
IS-1A	735	2010	INST-1	2.73
Correlation between instructor posts and student posts = 0.697				

Table 1: Instructor posts and Student Posts

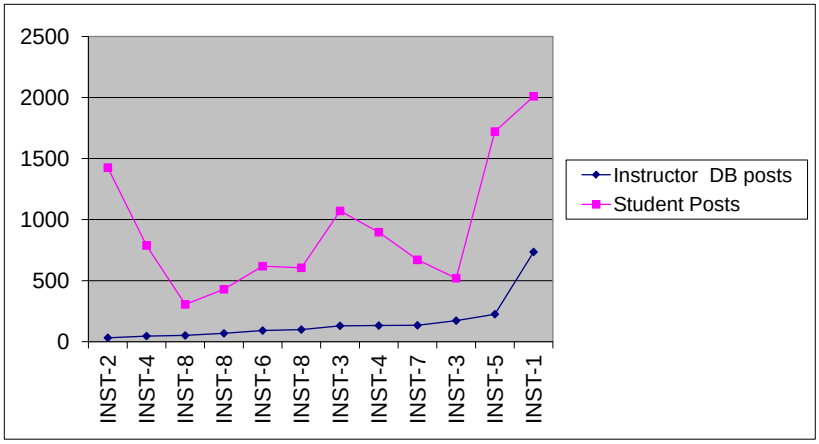

Figure 1: Instructor posts and Student Posts

Instructor posts and student satisfaction

In the last week of each course a short anonymous questionnaire was administered to each student. There were 4 key questions relating to "expectations being met", "overall satisfaction with course", "the value of the discussion board" and "the contribution of the discussion board to greater understanding of the topic". Questions used a 5 point Likert scale ranging from Strongly Agree (4) to Strongly Disagree (0).

	Instructor Posts	Student Posts	Expectations Met	Overall Satisfaction	Value of DB	DB contribution to Understanding
Instructor Posts		0.697	-0.020	0.206	0.278	0.365
Student Posts			0.138	0.249	0.507	0.445
Expectations Met				0.940	-0.017	-0.009
Overall Satisfaction					0.126	0.063
Value of DB						0.853

Table 2: Correlations between posting frequency and student satisfaction

The frequency of instructor posts is not highly correlated with measures of student satisfaction. The highest correlation was 0.365 between instructor posts and contribution of discussion board to understanding. However the level of student posting is moderately highly correlated with perceptions of the value of the discussion board (0.507) and the contribution of the discussion board to understanding (0.445). No meaningful correlations were found between the ratio of instructor/student posts and any measures of student satisfaction from which we may tentatively infer than instructor responsiveness is not related to satisfaction

The effect of the number of questions set on student posting frequency

Overall the more questions set by the instructor in the discussion boards over the 10 week period the more student posts would be generated, the correlation being 0.725. The correlation between the number of questions asked and the number of student posts per question was an insignificant 0.06. However the highest levels of student responses were for questions which were tightly related to the course material, relatively open-ended but avoided having too many clauses, the least inspiring question:

I would like to examine policies to engender customer trust. For example how do we set policies that affect how an ICT-mediated information service, such as a website, is managed to engender trust (in the information content and/or in the service provider)? I would like to consider the following questions:
1. How might we create a workable trust policy? What things would we want to communicate or do? There is a really great discussion of some trust policy factors in Table 4, at
http://www.health.gov/communication/healthypeople/obj1104/methodology4.htm
Which ones do you think are the most important and why?
2. What are the problems of implementing these elements of a trust policy? Just defining a policy does not make it happen (think of codes of ethics, for example). The report linked to above (at health.gov) raises some issues. Does anyone have any more?
3. Has anyone experienced trying to implement any of these policy factors? What would you conclude?

gave students too much material to consider and led to a flat discussion where students typically answered one or two subparts but did not respond to peer posts to any great extent. The same was true for questions in course COM-1A which were generally very long and inspired the lowest average number of responses each.

A tale of two professors

Since there were two sections of course IS-1 working to the same syllabus and hosted by instructors with very different interaction strategies, it seemed like a good opportunity to investigate the impact of the differences in instructor approach. The instructors for both sections were experienced instructors who were former industry professionals of similar ages, backgrounds and experiences. The instructor for section IS-1A took a minimalist approach to intervention and in the 10 weeks posted 32 messages (2.25% of the total messages) of which half were in a "Ask the professor" help forum but typically did not intervene in the question-based discussions, nor did this professor take part in the week 1 introductions. This professor had little "social" contact with the students, did not project their personality into discussions and was highly task-focused. The instructor for section IS-1B by contrast was very hands-on and posted 735 messages representing 25% of all messages in the discussion board. This professor was highly interactive being active in all question-based discussions and very "social" in the student week 1 introductions where they posted much revealing information about their hobbies and interests including weather, music, Disneyworld, cooking, children, Dickens, vintage cars, pets, gardening, insects, Star Wars, birds, Nintendo, Scrabble, foreign films, beer and so on. This "social" aspect did not extend into their formal discussion participation which was very much on-topic.

Students	Discussion Board Visits	Posts	Topic Threads	Posts/ Thread
23	24095	2745	67	40.9
Student Posts	Student Posts/Thread	Formal Questions	Student Posts/ Question	Average Thread Depth per question
1648	24.7	30	67	8.6

Table 3: Basic statistics for discussion board participation for section IS-1A

Students	Discussion Board Visits	Posts	Topic Threads	Posts/ Thread
24	13079	1458	352	4
Student Posts	Student Posts/ Thread	Formal Questions	Student Posts/ Question	Average Thread Depth per question
1334	3.79	14	95.3	5

Table 4: Basic statistics for discussion board participation for section IS-1B

The above two tables seem to suggest that there is significantly more overall activity in the section hosted by the more interactive professor, though each formal question gets more attention in section IS-1A. To investigate this further we chose six discussion board questions that were the same in both sections and analyzed the activity for these.

Question	IS-1B (intervention)	IS-1A (no intervention)
Systems Analyst as problem solver	69	74
Agile methods	96	97
Project design	150	97
Requirements Analysis	96	83
Fact Finding	85	90
Data Modeling Practice	182	180
Average	112	103

Table 5: Comparison of messages posted for sections IS-IA and IS-1B

Table 5 does not seem to show much difference in activity between the two sections. To dig a bit deeper we chose 3 of the questions at random to look at in more detail. Table 6 illustrates the number and types of messages posted by students in the two sections.

Agile methods	IS-1B (intervention)	IS-1A (no intervention)
Total Messages	96	97
Instructor – student messages	16(17%)	0
Student-instructor messages	52	24
Student-student messages	28	73
Systems Analyst as Problem solver	IS-1B (intervention)	IS-1A (no intervention)
Total Messages	69	74
Instructor – student messages	17(24%)	0
Student-instructor messages	25	25
Student-student messages	27	52
Project design	IS-1B (intervention)	IS-1A (no intervention)
Total Messages	150	97
Instructor – student messages	44(30%)	0
Student-instructor messages	53	23
Student-student messages	53	74

Table 6: Message type comparison for sections IS-1A and IS-1B

Table 6 shows that for each question students in section IS-1B spent less effort communicating with their peers and more communicating directly with the instructor. It seems that in this case extensive instructor interaction detracts from peer to peer interaction. Finally, we examined the individual messages posted by students for each of

these questions. As a crude first step measure we took the length of each message as a proxy for the quality of the message. Table 7 shows the length of messages for the same questions discussion in the two sections.

	IS-1B (intervention)	IS-1A (no intervention)
Agile methods (Words)	8823	21203
Agile methods (Messages)	80	97
SA problem solver (Words)	5220	15714
SA problem solver (messages)	52	74
Project design (Words)	12227	20211
Project Design (Messages)	106	97
Tot messages	238	268
Tot words	26270	57128
Average words/student message	110.38	213.16

Table 7: The effect of intervention on message length

The table above shows that messages posted by students in the "no intervention" condition were significantly longer than messages posted by students where there was significant instructor intervention. The different approaches however did not seem to alter student perceptions. There was no significant difference between student satisfaction, perceived value, understanding or level to which expectations were met in the different sections. Student grades for discussion board participation were comparable for the two courses. Two anecdotal differences did emerge, students in section IS-1B showed more satisfaction with the course (and with the instructor) in the week 10 wrap-up, but students in section IS-1A were more openly positive about the contributions made by their peers.

Conclusions

The case study suggests that online discussions can be equally successful with wildly varying levels of faculty interaction, that it is not crucial for instructors to intervene at all opportunities. In fact there may be a downside to excessive faculty intervention in that it takes the focus away from the peer interactions and makes the instructor the center of the social network for a discussion. Students may feel obliged to respond to instructor interventions in preference to answering peer posts; their peers after all do not normally grade their contributions. This works against the social-constructivist model of collaborative learning and reifies the instructor as a didactic figure or purveyor of expertise. Overall frequency of instructor posts does not seem to impact students' satisfaction but the level of student participation in discussion boards does positively impact perceived value of the discussions.

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