THOUGHT-LEADERS IN ASYNCHRONOUS ONLINE LEARNING ENVIRONMENTS

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ABSTRACT

The growth of online learning has exposed fundamental gaps in our knowledge, both theoretical and pragmatic. This research investigated some questions of the role of emergent leaders in online leaning and the influence of different behaviors. Firstly are there any common factors that identify thought-leaders? Secondly does the presence of thought-leaders affect student perceptions of online discussion? Finally it addressed the question of perceived influence vs. actual influence. Student interactions in Asynchronous Online Discussion boards were analyzed and student backgrounds and perceptions gathered. Clear patterns of strong emergent leadership behaviors were evident in the majority of courses. Thought-leaders could be distinguished from non-thought-leaders from both their professional backgrounds and the role-behaviors they exhibited. Student perceptions of peers as thought-leaders were highly influenced by factors such as the extent to which students could bring relevant professional experience into the discussions.

KEYWORDS

online learning, discussion boards, collaboration, thought-leaders

I. INTRODUCTION

The growth in online learning over the last 20 years is nothing short of stunning [1-4]. The annual growth rate as of 2009 was estimated at 17% [4], 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, spend time reading prior posts, and reflect on them before making their own contributions [5, 6].We can view online learning environments as having the potential to be communities of inquiry [7-14].

II. DEMOCRACY AND LEADERSHIP IN ONLINE LEARNING

We expect that students cannot benefit from online learning unless they fully engage in it, however this does not mean that all students will be equally active or influential. Some researchers [15] maintain that recognized and strong leadership is essential to the success of online education. Leaders can be regarded as central players in an online network, but can be effective as either triggers or responders [16]. Triggers are participants whose contributions have greater than normal power to invoke responses from peers; for instance a poster may consistently post thought-provoking messages that inspire others to answer. By contrast, responders are participants who more frequently than normal answer the posts of others; some leaders may be both strong triggers and strong responders. While studies of leadership are commonplace in business studies literature [17-20], the study of leadership in online educational communities of inquiry is relatively rare [21]. In general, for online learning we are most concerned with emergent leadership [22], it is unusual to focus on formal leadership roles as these are infrequently assigned, although leadership of online discussions may be designated to individuals for specific discussions [23-25]. A

strong facet of emergent leadership seems to be the importance of communications [21, 22, 26].

Yoo and Alavi [22] studied the performance of US government executives engaged in online learning activities and found that emergent leaders sent more and longer emails than non-leaders and tended to perform initiator, scheduler, and integrator behaviors. The emergent leaders started (or were very near the start) the process of organized activities and assembled individual contributions into a finished product. Interestingly they observed leadership to be highly concentrated in a single individual.

Heckman and Misiolek [21] studied the issue of emergent leadership in online communities of inquiry. In a study of online task-based teaching they found that patterns of emergent leadership could be described as weak or strong. In strong leadership there was a strong consensus on how many leaders there were and who the leaders were. In weak leadership patterns there would be little consensus on how many and/or who the leaders were. Perception of leadership as measured by a perceived leadership index was highly correlated with the frequency of messages sent by and received by individual group members (social, task-process, and task-product). They inferred from this that online leaders could perform both social and task-based roles together. Those rated by others as leaders showed a stronger belief in their own leadership capabilities but at the same time were not concerned with maintaining group cohesiveness. In teams with strong leadership, the leaders both initiated and received more direct messages than non-leaders. In weak leadership teams there was no strong difference between patterns of communication for leaders and non-leaders. In leadership teams leaders initiated more process-related messages than non-leaders. In general terms all but one of their teams adopted a distributed leadership pattern. Haythornthwaite [27] found different network patterns for different relations in online leaders, suggesting different leaders for task and social exchange (e.g., information vs. emotional support).

The above research gives us some valuable insights but leaves a few questions unanswered. In the context of online learning, what precisely are the behaviors or characteristics of participants that set them apart? While the above research uses the term *leaders* I prefer to use the term *thought-leaders*. This term indicates that what we are examining here is shaping of opinion consensus and discourse; we are not expecting an online discussion board to produce a concrete product. If the presence of thought-leaders in online learning communities is important then we are left with several important questions unanswered:

- Are there any common factors that identify thought-leaders?
- Does the presence of thought-leaders affect student perceptions of online discussion?
- What is the connection between perception of thought-leaders and actual influence?

III. METHODS

To address these questions we performed a series of analyses on ten graduate online courses conducted completely online at a North American university. A total of 239 students took part in the ten classes. The 10 courses consisted of five sections of Information Systems classes, four sections of Library Science classes, and one a class that merged Information Systems and Library Science material. Courses were chosen on the basis of the possibility of producing lively debate. Courses chosen were run by instructors who strongly felt that online discussion boards were a powerful tool for online learning.

Each week a different set of questions was posted to the discussion boards. The questions were posted by the instructors, and students were asked to make substantive contributions either to the initial question or to answers from their peers; there were no assigned discussion leaders.

There were three sets of data collected. There was a pre-course questionnaire (Questionnaire 1) administered to all students that asked students about their professional background, educational background, and experience with online learning. For one selected course, transcripts from the discussion boards from which all identifying information was removed were analyzed. Finally, a post-course questionnaire (Questionnaire 2), administered to all students, gathered reflections about the course and asked students to rate peers as being thought-leaders.

Questionnaire 1 (pre-course questionnaire):

1. What is your general background, and what was your undergraduate major?
2. What industry sector do you currently work in, and how long you have been working in it?
3. How many years of work experience do you have in total? Are they all in the same field?
4. Have you changed career, or are you planning to change career?
5. Do you have any experience of this topic area?
6. How many online courses have you taken prior to this one? Do you prefer online learning to face-to-face learning? Why? Which was your favorite online course and why?
7. Why did you enroll for the program--career change, in order to prepare to change career, get a promotion, or some other reason?
8. What would you like to get out of THIS course?
9. An important part of this online course is a weekly question-driven discussion board. Do you enjoy collaborating in online discussion?
10. What is your age range?

    _ 18 – 22, _23 – 30, _31 – 40, _41 – 50, _51 – 60, _61+, _I prefer not to say

Questionnaire 2 (post-course questionnaire):

1. My **expectations** for this course were met.
2. Overall I was **satisfied** with this course.
3. I found the online discussion board to be a **valuable** part of this course.
4. The online discussion contributed to my having a greater **understanding** of the topic.
5. I frequently found myself in a strong leadership role in the online debate.
6. Apart from yourself, who else did you feel were the most important contributors to the online debate (thought-leaders)?

Students were asked to answer each question using a 5 point Likert scale; answers were scored as follows: Strongly Agree (4), Agree (3), Undecided (2), Disagree (1), Strongly Disagree (0).

IV. DATA ANALYSIS

The questionnaire data for all ten courses was coded and aggregated. Due to the sheer amount of data collected, one course, IS-1B, was chosen for this study for detailed content analysis of the discussion board transcripts. Other courses will be analyzed for future studies. The course in question was chosen as it had an above average level of participation, though not the greatest; in terms of messages posted, it was the third highest. More importantly, this course was chosen as a good model for collaborative learning since it was the course which had the highest percentage of student-to-student messages in the discussion boards. This is deemed essential since it requires students to actively focus on collaborating with their peers and not with the instructor.

A. Content Analysis

Each week, between two and four questions were posted by the instructor. Students were required to post a minimum of two substantive messages to the discussion board per week. For the course chosen, there were1 426 messages posted by a total of 24 students (average 59 messages, maximum 105, minimum 17) in 352 message threads, as well as 32 instructor messages.

A message thread is a complete self-contained sequence of several messages. The sequence is started by one student participant posting an answer to an instructor question or simply starting a discussion topic. A second participant will then post a reply to this initial message. This reply may itself be replied to, or more students may reply independently to the initial message.

It was decided to use a representative sample of message threads for analysis which showed a range of

discussion quality from poor to very good. It was hoped that good threads and poor threads would show different patterns of interactions. Thus, a sufficient number of threads of differing quality levels were needed.

The following general sampling process was chosen.

- Select the "best" threads
- Select some "good" threads
- Select some "average" threads
- Select some "poor" threads

Without examining threads in details it was impossible a priori to evaluate the highest quality threads. Thus, as a proxy for this process a number of commonly used criteria [28-31] were chosen. These were

- Number of messages in the thread (M)
- Maximum depth of the thread (D)
- Number of *different* participants in the thread (P)

The details of each of the 352 threads were loaded into a spreadsheet. Three different sorts were performed on the thread details Messages-Depth-Participants (MDP), Depth-Participants-Messages (DPM), and Participants-Messages-Depth (PMD). This produced three ordered lists of threads where each fundamental characteristic of interest was equally influential. From these lists a set of 32 threads was selected which included the 14 best threads, 8 randomly selected good threads, 5 randomly selected average threads, and 5 randomly selected poor threads.

V. RESULTS

From the ten courses chosen for basic analysis there were a total of 239 students. From these 239 students, 137 students (57%) returned a completed Questionnaire 1 and, of these, 107 (78%) also completed Questionnaire 2.

The categorization of students as thought-leaders was based on how many and what percentage of the respondents nominated them. The criteria are laid out in Table 1; so, for instance, to be considered a strong thought-leader, a student must be nominated by 50% of respondents where the number of respondents is at least 10; if the number of respondents is less than 10, the percentage nominating the student must be higher i.e. 4/7 (57%) or 3/4 (75%). The choice of 50% (while somewhat arbitrary) indicates at least some measure of consensus between respondents. Raising the percentage requirement for smaller numbers of respondents prevents the importance of a student who was voted thought-leader by 100% of one or two voters from being exaggerated.

Strong thought-leader		**4 Points**
Minimum percentage of Voters nominating given student	Minimum number of Votes for that student	Votes/Voters
50%	5	5/10, 6/12, 7/14…
57%	4	4/7
75%	3	3/4
Moderate thought-Leader		**3 Points**
Minimum percentage of Voters nominating given student	Minimum number of Votes for that student	Votes/Voters
40%	4	4/10
50%	3	3/6
Weak thought-Leader		**2 Points**
Minimum percentage of Voters nominating given student	Minimum number of Votes for that student	Votes/Voters
30%	3	3/10

33%	2	2/6
Marginal thought-Leader None of the above but a minimum of one vote		**1 Point**

Table 1. Criteria for assessment of Thought-Leaders

A total of 35 students were nominated by their peers as thought-leaders; this number varied from two to five per course (average 3.4). Sixteen were strong thought-leaders, six were moderate thought-leaders, and thirteen were weak thought-leaders. On a course by course basis, the maximum percentage of students considered to be thought-leaders was 23% and the minimum was 8%.

B. Are there any common factors that identify Thought-Leaders?

Forty-six students volunteered information as part of the question asking them to list who they felt was most important in the online discussions. There were a number of strong recurring themes. The strongest one was the extent to which that participant could bring in relevant personal experiences to bear on the discussion. This was mentioned nineteen times. A further six comments referred to "personal insights." Some examples are presented below:

- *…many years work experience in public or school libraries, which allowed them to contribute strong real world examples.*
- *S7 and S17 because they were able to put their experiences into context for the discussion*.
- *backed it up with strong points gained from the class or previous discussion and personal experience*.
- *based on the "experiences" they had in the industry.*
- *S18 had a lot of war stories to share in this subject. It was interesting to read them and compare it to my work. S17 was another example of having good war stories to share.*
- *I like it when people can extrapolate information from class and explain how it can be used in the real world as opposed to just rewording what is said in the book or from the lecture.*
- *It was clear that S5's comments were tempered with experience.*

The next most common theme was a general sense of students posting "quality" contributions. Terms such as "interesting," "thoughtful," and "quality" were mentioned sixteen times:

- *S9 S12/S15/S14/S11/S1 - I really can think of no way to rank these contributors. They are five contributors I found especially interesting to read*
- *S1 and S3 posted thoughtful responses interjecting their own experience and responding to other's posts, not just posting a dissertation as many folks tended to do.*
- *S19, S2, S24. Not just the quantity of their posts, but also the quality*.

The third strong theme was the importance of a student in starting or prolonging rich discussion. This theme was mentioned nine times:

- *S5 - also started some good discussions.*
- *…generated a lot of discussion and started new threads.*
- *S2 started some interesting dialog.*
- *S21 was especially controversial at times and thereby stimulated often further discussion.*
- *S19 and S21usually stimulated further conversation*.
- *S20 and S19: They often kept the conversations going*.
- *S12 - seemed to start better discussion threads.*

The last strong theme was one of simple activity or volume of posts. Frequency of posting was cited seven times as an important factor:

- *S19, S17, and S22 seemed to be very active.*
- *There were a few people who were very active—S20, S14, S10.*

- *S12, S10, and S20 all being active on the discussion board.*

The four strong themes mentioned above dominated the comments made by students. There were other less frequent comments on elements such as "enthusiasm," "domain knowledge," "asking questions," "responsiveness," and being "on-topic."

Overall, the three most important aspects to students appear to revolve around the ability of students to apply personal experiences, to post thoughtful posts, and to start or promote rich discussion, while raw volume appears to be the fourth most important aspect. These findings could have potential as the basis of a rubric for threaded discussion participation and may also be a foundation for instructor training on how to model leader-like behaviors.

C. Relationship between domain experience and perceived discussion promoting power

Nine students were specifically named as being important by virtue of starting or promoting rich discussion. Analyzing their demographic data from Questionnaire 1, it was found that all nine had substantial relevant professional domain experience. This ranged from four to twenty years of relevant professional domain experience.

D. Knowledge domain differences in thought-leader experience levels.

Analyzing the demographic data for strong thought-leaders did reveal a difference between the backgrounds of strong thought-leaders in Information Systems and Library Science domains. For strong thought-leaders in the Information Systems domain, the average professional domain experience is 8.3 years (n=9); for strong thought-leaders in the Library Science domain, the average professional domain experience is 1.3 years (n= 7). A t-test was performed between the two groups (Information Systems domain strong thought-leaders and Library Science domain strong Thought-Leaders) using years of professional domain experience as the test variable. This result shows a significant $F(1,16) = 6.037$, $p = 0.028$) difference between the two groups. In fact the average professional domain experience for Library Science course students was 3.6 years, so the Library Science domain strong thought-leaders were relatively inexperienced even compared to their peers.

E. What is the concordance between perception of peers as thought-leaders and actual influence?

There are some objective measures that can be used to assess the relative importance of participants in the discussion threads. For this purpose a number of commonly used objective measures [28-31] were chosen. These were the number of threads started, the number of messages in threads started, the number of participants in threads started, the number of thread branches inspired, the number of messages following a given message, and the number of conceptual segments [32] following a message.

For the course under detailed study, three students were nominated as thought-leaders (S7, S14, and S17). By ranking the students by each of the criteria above (24 points for 1st place, 1 point for 24th place), an overall picture of the objective measures of influence is created. Overall S20 scores 144, S7 scores 134, S12 scores 130, S14 scores 125, S10 scores 124, and S2 scores 117. So the objectively most influential participants are S20, followed by S7 with S12 and S14. Two of the student recognized as thought-leaders (S7 and S14) were really highly influential, but the most influential poster (S20) was only regarded as a thought-leader by one respondent. S17, regarded by all respondents as a thought-leader, played a relatively average part.

F. Does the perception of presence of thought-leaders affect student perceptions of quality of online discussion?

Results from question 6 of Questionnaire 2 were aggregated, and for each course a number of thought-leaders reported was generated. This was used as the independent variable for an ANOVA, using

"Expectations," "Satisfied," "Valuable," and "Understanding" from Questionnaire 2 as dependent variables.

	Number of thought-leaders Reported	Mean score	Std. Deviation	N	Significant?
My expectations for this course were met	2	3.55	.572	29	df=3 f= 4.738 p = 0.004
	3	3.50	.516	16	
	4	3.18	1.014	33	
	5	2.79	.940	29	
	Total	3.22	.872	107	
Overall I was satisfied with this course	2	3.48	.688	29	df=3 f= 4.216 p = 0.007
	3	3.50	.632	16	
	4	3.21	.857	33	
	5	2.83	.848	29	
	Total	3.22	.816	107	
I found the online discussion board to be a valuable part of this course	2	3.00	.756	29	df=3 f= 8.887 p = 0.000
	3	3.44	.814	16	
	4	3.09	.980	33	
	5	2.03	1.322	29	
	Total	2.83	1.120	107	
The online discussion contributed to my having a greater understanding of the topic	2	3.21	.620	29	df=3 f= 7.121 p = 0.000
	3	3.31	.873	16	
	4	2.88	1.111	33	
	5	2.14	1.246	29	
	Total	2.83	1.094	107	

Table 2. Reported presence of thought-leaders and student perceptions

Answers to the four questions were scored as follows: Strongly Agree (4), Agree (3), Undecided (2), Disagree (1), Strongly Disagree (0).

The effect of "Number of thought-leaders reported" is significant for all four dependent variables at $p < 0.01$ as shown in the table above. Where there are two or three thought-leaders reported by students, the extent to which students reported positive outcomes was greater than when there were four or five reported thought-leaders. It seems that two or three recognized thought-leaders is the sweet spot. Where there are five thought-leaders reported, all four dependent variables show their lowest values. There is no immediate reason for this. It may be that a larger number of thought-leaders resulted in too much content in the discussion to keep track of; similarly it may be that having only one thought-leader made the impression that the thought-leader was showing off or dominating the discussion.

G. Presence of strong thought-leaders and student perceptions

There was no effect of number of strong thought-leaders reported on the level to which students felt their expectations of the course were met. The effect on the other three dependent variables, however, was highly significant ($P < 0.05$); this time the best perceived outcomes were always achieved when exactly two strong thought-leaders were reported.

H. Are there any common factors that identify student recognized thought-leaders

I used two questionnaires to gather this data. The pre-course questionnaire (Questionnaire 1) collected background data from students. The end-of-course questionnaire (Questionnaire 2) gathered attitudinal data from students, including asking each participant whom they regarded as most influential in the online discussion; i.e., who the thought-leaders were.

I. Coding of student background data

From answers given by students to questions in Questionnaire 1, a numeric value of between 0 and 5 was given as below. Attitude towards online discussion was estimated from comments.

Theoretical Domain Knowledge (prior courses in this domain)
None (0) 1 – 4(1) 5 – 8(2) 9 – 12(3) >12(4)
Domain Experience in years
None (0) <5(1) ≥ 5 & ≤ 10(2) ≥ 10 & ≤ 15(3) >15(4)
Work Experience in years
None (0) <5(1) ≥ 5 & ≤ 10(2) ≥ 10 & ≤ 15(3) >15(4)
Number of prior online courses
None (0) 1 – 4(1), 5 – 8(2), 9 – 12(3) >12(4)
Attitude towards online discussion
Very negative (0), mildly negative (1), Neutral (2), mildly positive (3), highly positive (4)
Age in years
18 – 22(10) 23 – 30(10) 31 – 40(2) 41 – 50(3) 51 – 60(4) >60(5)

J. Student theoretical domain knowledge vs. thought-leader status

Theoretical Domain Knowledge(years)	N	Mean thought-leaders Status	Significance
0	31	1.65	$F(4,135) = 3.03$
1 - 4	42	1.00	$P = 0.02$
5 - 8	9	0.89	
9 - 12	7	0.57	
> 12	47	0.70	
Total	136	1.01	

Table 3. Theoretical domain knowledge and Thought-Leader status (means)

An analysis of variance showed that those with zero or little theoretical knowledge tend to be more frequently considered as thought-leaders than those with strong prior theoretical experience. Effect is significant at 5% level, $F(4,135) = 3.03$, $P = 0.02$.

K. Student Professional Domain Experience vs. Thought-Leader Status

If theoretical knowledge is not positively correlated with thought-leader status, what about actual professional domain experience? Table 4 shows the values for professional experience against thought-leader status.

Professional Domain Experience(years)	N	Mean thought-leaders Status
0	37	.86
< 5	40	1.30
≥ 5 & ≤ 10	42	0.61
≥ 10 & ≤ 15	9	1.33
>15	8	2.00
Total	136	1.01

Table 4. Professional domain knowledge and Thought-Leader status (means)

An analysis of variance showed that those with the very highest level of professional experience (more than 15 years) were more frequently considered as thought-leaders than those with less prior professional

experience, effect is significant at 5% level $F(4,135) = 3.19$, $p = 0.015$.

L. Effect of other dependent variables on thought-leader status

No significant relationships were found. It seems that general professional experience, student age, initial attitude toward online discussion boards, and prior online education experience were not connected with thought-leader status. Other participant characteristics, such as reading/writing skill level and self-perceptions about communication ability, were not investigated but may be informative.

M. Student message posting patterns vs. thought-leader status

For each individual course, I calculated the average number of student posts to the discussion board. For each student within each course I calculated their post frequency relative to the average for the course. This could vary from about 0.1 to 3 times the average. Then I ranked each student within the context of the given course as Low (1 Point - well below average) Average (2 Points) and High (3 points - well above average).

An analysis of Variance showed that there was a strong effect of frequency of posts (relative to course average) on thought-leader status. This effect was highly significant $F(2,135) = 25.46$, $p = 0.00$ Those posting with greater frequency appear to be more frequently considered as thought-leaders than those with average or below average post frequency.

Message posting frequency relative to average for specific course	N	Thought-leaders status
1 (Low Post Frequency)	41	0.17
2 (Average Post frequency)	61	1.05
3 (High Post Frequency)	34	1.97
Total	136	1.01

Table 5. Posting frequency and thought-leader status (means)

N. Student visiting patterns vs. thought-leader status

For each individual course, I calculated the average number of student visits to the discussion board. For each student within each course, I calculated their visit frequency relative to the average for the course. This could vary from about 0.1 to 4 times the average. Then I ranked each student within the context of the given course as Low (1 Point - well below average) Average (2 Points) and High (3 points - well above average). Table 6 shows visit frequency against thought-leader status.

Visits	N	Mean thought-leader status	Standard Deviation
(1)Low	39	0.51	0.79
(2)Average	60	0.92	1.18
(3)High	37	1.70	1.52
Total	136	1.01	1.27

Table 6. Visit frequency and Thought-Leader status (means)

An analysis of variance showed that there was a strong effect of frequency of visits to the discussion board (relative to course average) on thought-leader status. This effect was significant $F(2,135) = 9.77$, $p=0.00$. Those visiting with greater frequency appear to be more frequently considered as thought-leaders than those with average or below average post frequency.

O. Will students regarded as a thought-leader in one course be regarded as a thought-leader in other courses?

This question asks if being a thought-leader is a kind of transferable property or if there is some kind of underlying latent trait that thought-leaders have that allows them to be influential in several different

contexts. Several students (46) took part in more than one online course under study. I wanted to ask whether a student who is regarded as a thought-leader in one course also be regarded as a thought-leader in other courses. Thirteen of these students were considered to be thought-leaders in one of their courses. Four of these thirteen students (30%) were regarded as thought-leaders in both courses. Nine students were regarded as thought-leaders in one course but not in the other. The probability of any student being regarded as thought-leader in his or her course is 28%. Being regarded as a thought-leader in one course does not appear to have a strong effect on whether a person will be regarded as a thought-leader in other courses. This would suggest that being regarded as a thought-leader may be context dependent and that there may not be a general property of being a thought-leader that carries from one setting to another.

P. Student assessment of self as a thought-leader vs. thought-leader status

This section examines the extent to which student perception of their status as thought-leaders within a discussion board were related to the extent to which they were actually perceived as a thought-leader. Table 7 shows the relationship between this self-assessment and actual thought-leader status.

I was a Thought-leader	N	Thought-leader status	Std. Deviation
0	8	0.25	0.46
1	40	0.80	1.20
2	43	1.00	1.25
3	11	2.00	1.55
4	5	1.80	1.64
Total	107	1.01	1.30

Table 7. Self-assessed thought-leader status and thought-leader status (means)

Those who agreed or strongly agreed that they frequently performed leadership roles in the online discussion board were more likely to be thought-leader, this was significant $F(4,106) = 3.26$, $p=0.01$. Students appear to have a fairly accurate view of how important they were in the discussions.

Q. Do thought-leaders show increased participation in longer message threads?

For course IS-1B, student participation in the fourteen longest threads was measured. This was compared against whether a student was perceived as a thought-leader. Of the seven most frequent participators in the best threads, none of the student-recognized strong thought-leaders (S14 & S17 – voted for by 100% of voters) showed notable levels of participation, appearing in 4 out of 14 and 3 out of 14 of these threads respectively. S7, regarded by students as a weak thought-leader, did appear in 9 out of 14 threads. S20, a marginal thought-leader (one vote), appeared in 9 out of 14 top threads, as did S19, who was not regarded as a thought-leader. S1 and S2, both regarded as marginal thought-leaders appeared in 7 of the top 14 threads; S3 (not regarded as a thought-leader) and S10 appeared in 6 of the top threads.

R. Do thought-leaders promote better discussions?

To what extent do different participants initiate or continue discussion? In a discussion, one participant posts a message and others respond to it. If nobody responds, it is a poor thread. A number of elements are of interest in assessing how well a person promotes discussion. These are:

- Number of threads started (thought-leaders as triggers [16])
- Number of messages in threads started (quality of threads started)
- Number of participants in threads started (how much student engagement is inspired)
- Number of branches inspired (how much deep engagement is inspired)
- Number of messages following post (quality of discussion created by post)
- Number of segments following post (quality of discussion created by post).

Table 8 shows which participants started the largest number of discussion threads.

Participant	Threads started
S20	6
S12, S24, S7, S9	3
S10, S11, S14, S2,	2
S1, S15, S17, S21, S22, S23	1

Table 8. Most frequent thread starters

S20 (marginal) started six threads; S17 (thought-leader) and S19 (marginal) both start three threads, as do S12 and S24. S14 (thought-leader), S10, S11, and S2 (all marginal) both start two threads each. Table 9 indicates which thread-starters were most successful in encouraging discussion by drawing other participants into the threads and by starting longer threads. S20 is by far the most successful thread-starter encouraging 43 participations in threads which they started.

Participant	Threads started	Messages in threads started	Participants in threads started	Thought-leader?
S20	6	60	43	Marginal
S12	3	23	16	No
S14	2	21	15	Strong
S7	3	24	14	Weak
S9	3	15	13	No
S24	3	12	11	No
S2	2	21	10	Marginal
S10	2	13	10	Marginal
S11	2	11	10	No
S15	1	11	9	No
S21	1	9	6	No
S17	1	8	5	Strong
S1	1	4	4	Marginal
S22	1	2	2	No
S23	1	2	2	No

Table 9. Messages and participants in threads started

S20 started six threads that comprise 60 messages. S7 (thought-leader) started three threads that comprise 24 segments. S12 started three threads, which have a total of 23 messages. S14 (thought-leader) started only two threads, but these have a total of 21 messages. S2 started two that total 19 messages. S9 started three threads that total 15 messages. Threads started by S20 bring in 43 participants, almost three times as many as S12 (16). Both S7 and S14 (thought-leaders) drew a large number of participants into the threads they started.

S. Branches inspired

One measure of discussion-promoting power is the extent to which a person can inspire others to respond directly to their messages. Only one person can start a thread, but numerous people can alter the direction by invoking responses that cause the thread to deepen. A particularly interesting post will inspire a direct response (reply-to), which causes the thread to branch. The number of branches inspired does not include threads started. Table 10 describes participants in terms of their ability to inspire others to contribute to discussion by causing a thread to deepen (branch). The table shows the number of branches inspired the total number of segments inspired by participant posts.

Participant	Branches inspired	Segments after post	Messages after post	Thought-leader?
S20	14	96	40	Marginal
S7	9	30	17	Weak
S10	7	39	17	Marginal
S14	7	25	16	Strong
S2	6	25	11	Marginal

S12	6	32	14	No
S19	5	7	5	Marginal
S1	4	12	7	Marginal
S3	3	13	5	No
S13	3	8	3	No
S16	3	10	3	No
S17	3	7	4	Strong
S21	2	16	8	No
S6	3	8	4	No
S11	2	15	7	No
S8	2	4	2	Marginal
S9	2	23	10	No
S22	1	1	2	No
S4	1	1	1	Marginal

Table 10. Branch inspiring power of participants

S20 inspired more branches than any other poster with a total of fourteen. S7 inspired nine branches; S10 inspired seven, as did S14; S2 and S12 inspired six and five respectively; S19 (marginal) inspired five. S1 (Marginal) inspired four, as did S3 (not a thought-leader). S17 (thought-leader) inspired three.

T. Messages following post

S20 directly inspired 40 messages in 14 branches (2.86 messages per branch). S7 (thought-leader) inspired 17 messages in 9 branches (1.9 messages per branch). S10 inspired 17 messages at 2.43 messages per branch. S14 (thought-leader) inspired 16 messages. Again S14 and S7 (thought-leader) show a high ability to encourage threads to lengthen.

U. Segments following post

S20 dominated this pattern, inspiring 96 segments. S10 inspires 39; S12 inspires 32; and S7 inspires 30, followed by S14 and S2, who both inspire 25 segments. S17 inspires seven segments.

V. Were the most objectively influential participants regarded as thought-leaders?

Rank	Participant	Influence Score	Thought-leader?
1	S20	144	Marginal
2	S10	134	Marginal
3	S14	130	Strong
4	S12	125	No
5	S7	123	Weak
6	S2	117	Marginal
7	S19	109	No
8	S17	96	Strong
9	S1	87	Marginal
10	S16	86	No

Table 11. Correspondence between objective scores and thought-leader status

Using the criteria outlined and explained above (Threads started, Messages in threads started, Participants in threads started, Branches inspired, Messages following post, and Segments following post) presents an overall picture of how objectively important a participant was in terms of their ability to start or promote discussion. The most objectively influential participants are S20, followed by S10 with S14 and S12 in third and fourth places, with S7 in fifth. So, two of the student-recognized thought-leaders (S7 and S14) were very influential, but by far the most influential poster, S20, was only regarded as a thought-leader by one respondent. S17, regarded by all respondents as a thought-leader, played a relatively modest part in eigth place. It is apparent that objective measures of influence do not always completely influence students' perceptions of others as thought-leaders.

IV. DISCUSSION OF FINDINGS

Overwhelmingly, domain-relevant professional experience was the greatest predictor of a student being regarded by peers as a thought-leader. This emerged clearly both in the large scale background information and in the testimonies volunteered by students. However, for the Information Systems and Library Science domains, the scale of professional experience required to be considered a thought-leader was quite different. Library Science thought-leaders had far less experience. Similarly, students who posted more messages, or even visited the discussion board more frequently, were more likely to be regarded as thought-leaders. There was no evidence to suggest that being a thought-leader was transferrable from one context to another. Although many students were taking multiple online classes simultaneously, it was rare for a student to be a thought-leader in more than one class. The perception that there were definite thought-leaders certainly altered students' overall attitudes towards the experience. The sweet spot for this was two or three thought-leaders. When two or three thought-leaders were present student attitudes were notably more positive; when the leadership was less clear-cut student or concentrated attitudes were less positive. The link between students being perceived as thought-leaders and students being objectively more influential was less clear-cut. From the limited data analyzed the strongest thought-leaders did not universally contribute substantially more to the creation or maintenance of deep rich threads; however they were frequently perceived as being responsible for this.

V. LIMITATIONS OF STUDY

The detailed analysis of threads was performed on only one of the classes for which data was collected. To determine whether the patterns found were common, it will be necessary to analyze data from the remaining courses. The content of individual messages for the one course under detailed scrutiny was analyzed, but the results are not presented here. To examine whether student perceptions of thought-leaders as providing more personal domain-relevant insights is objectively accurate requires more study. Since students perceived as more influential were often not so in fact, this is a reasonable question to ask. The conclusions regarding thought-leadership being transferrable are tenuous given the small number of students in more than one course.

VI. CONCLUSIONS

There are some valuable contributions from this study. The presence of students perceived to be thought-leaders clearly has a positive effect on the student learning experience from a perceptual standpoint. Secondly, where students are able to bring in relevant personal experience, the threads are perceived to be richer and the participants more influential. Pragmatically it would be possible for an instructor to gauge the backgrounds of a cohort and then gently encourage potential thought-leaders. Further, subtly fine-tuning course material so that students felt able to contribute in a more personal manner may add to the richness of the threaded discussions. One might even break up a large group into smaller ones and then 'seed' different discussion groups/sections with 2 thought-leaders each, when available.

VII. ABOUT THE AUTHOR

Dr. Jim Walters received the degrees of PhD in Information Science (2009) and MS in Information Systems (2002) from Drexel University iSchool, as well as an MSc in Organizational Psychology from the University of Hertfordshire (1992) and BA in Psychology from the University of Warwick (UK). He served as co-chair of the HICSS mini-track in Social and Distributed Cognition in Knowledge Management Systems for two years, in 2007 and 2008.

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