Why Are You Quoted by Others Within A Thread?

Bo Liang
Saint Vincent College
bo.liang@stvincent.edu

Debra L. Scammon
University of Utah
debra.scammon@eccles.utah.edu

Abstract

Social learning is an important part of consumers' lives. A major limitation of previous research in social learning is the lack of attention to the development of discussions among posters in online communities. Within a thread in an online forum, when a post is made referring to a previous post, a discussion is built between the poster of the current post and the referenced post. We propose three hypotheses related to the factors associated with the social learning process within threads demonstrated by discussions between posters. We investigated 15 threads with 298 posts in a health-related online community using mixed methods. First, we used qualitative analysis to explore data collected from the community. Specifically, we adopted message analysis, which is designed to examine not only the content of messages but the reference relationships between two messages in online learning groups. We also used social network software, UCINET, to generate graphs showing patterns of reference relationships between posters. Secondly, we applied regression analysis to the data collected in the first step. The results support our three hypotheses that discussions between posters in a single thread are significantly associated with posters' engagement in previous community activities and content of posts (inquiries and sociality) in the thread. Our study provides important implications for health care professionals in facilitating consumers' social learning process in health-related online communities.

Key Words: Threaded Discussion, Social Learning, Social Networking, Online Community, Health Communication

Introduction

In today's healthcare environment, it is difficult for consumers to get all the support they need through communication with their doctors within a 20-minute clinic visit. Online communities are becoming a common means for health communication. Social learning theory suggests that people learn in their social contexts (Bandura, 1971). Online communities may be of value in facilitating health-related social learning. Online social learning is attracting a great deal of attention among researchers. A major gap in this line of research is the lack of attention to discussions among posters and the role of these discussions in social learning process in online health communities.

The essential feature of social learning is that people learn within social structures. Following Walther (1992, 1996), we view social learning in online communities as a process in which participants learn from each other through interactional activities such as referencing posts. Within online communities, participants create threads and within threads, participants can make a post. When a post is made quoting/referring to a previous post, an interaction or a discussion is built between the poster of the current post and that of the referenced post. It is important to determine the role that discussions have in online social learning.

Previous research in communications and education in online contexts has used message reference analysis to explore the role of discussions between students in facilitating online learning (Ahern, Peck, & Laycock, 1992; Bullen, 2007; Ingram & Hathorn, 2004; Pena-Shaff & Nicholls, 2004; Wise, Hamman, & Thorson, 2006). Through observation of several health-related forums, we identified two types of threads based on reference relationships between posts: Q & A threads and discussion threads. Examples of the two types of threads are shown in Figures 1.
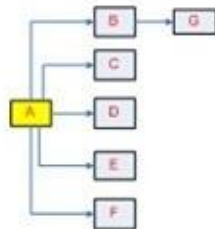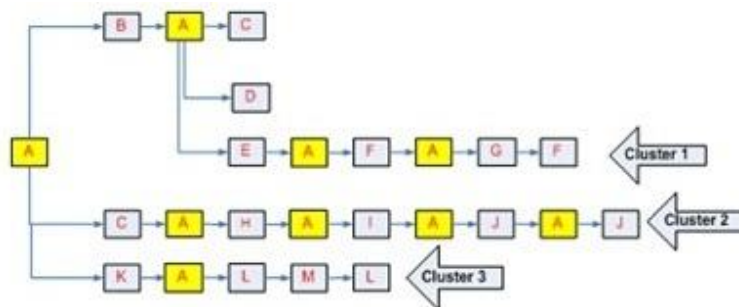
Figure 1 *Thread 1*   **Figure 2** *Thread 2*

The two figures illustrate two different types of threads. In the figures, each rectangular box represents one post with the poster identified by a capital letter; each line with an arrow represents a reference relationship between two posts. In both threads, the first post was made by the thread initiator, poster A. Thread 1 consistes of seven posts. In that thread the first and only post by the thread initiator, "A", was referenced by five unique posters and the post by poster "B" was referenced by one poster. Thread 2 consists of a total of 26 posts and demonstrates a more complex pattern of relationships between posts than does thread 1. Thread 2 includes three clusters of posts, each suggesting a continous learning process with a number of posts connected with one another: cluster 1 with six connected posts, cluster with 10 connected posts, and cluster 3 with five connected posts. In each cluster, posts are connected by being referenced by other posters or referencing to other posters. These clusters reveal multiple-time and two-directional referencing of posts between posters. These represent stronger connections/relationships.

A Q & A thread is featured with one-time and unidirectional relationships between an initiator and one or multiple responders. Thread 1 is an example of Q & A threads. This thread illustrates a simple thread in which the initial post (question) is mainly referenced by five unique posts (answers). A discussion thread is featured with multiple-time and two-directional referencing of posters and represent stronger interactions. Thread 2 is an example of discussion threads. This thread illustrates a complex pattern of interactions between posters. It includes three clusters of posters, each suggesting the opportunity for a continuous learning process with a number of posts connected with one another.

Our study aims to explore the development of threaded discussions by investigating reference relationships between posters in ongoing threads. Our study makes both theoretical and managerial contributions. We develop a conceptual framework that incorporates reference measures into the understanding of online social learning. Previous studies have used the number of friends listed on an individual user's friend list to measure the social influence of a user on other members in online communities. We argue that influence can be better understood by exploring the interactions between users. We investigate the actual interaction between users demonstrated by reference relationships. We then suggest strategies for social media marketing that could enhance opportunities for health-related social learning.

Theory Construction

We construct our conceptual framework of reference relationships by a social network approach. A social network approach extends beyond the specific attributes of individuals, and focuses on relationships between individuals over time (Borgatti & Cross, 2003; Wasserman & Galaskiewicz, 1994). This approach can be helpful in understanding the dynamism of interactions among posters in online communities.

According to attachment theory, people are more willing to develop relationships with individuals whom they trust (Hazan & Shaver, 1987). Individuals build trust from others through demonstrating their engagement in activities in online communities. In an ongoing thread, posters may be more likely to interact with those who have shown their engagement in previous community activities. Researchers have primarily used group participation behaviors as a measure of engagement in online communities. Engaged users are defined as users who have high scores on variables such as frequency of site visit, number of page views, and number of posts made (Calder, Malthouse, & Schaedel, 2009; Faraj & Johnson, 2011; Pawan, Paulus, Yalcin, & Chang, 2003; Ransbotham & Kane, 2011). Our first hypothesis is:

H1: *Posters who are engaged in community activities are more likely to be referenced by other posters in an ongoing thread.*

Jayanti and Singh(2009) articulate the consumer social learning process as a progressive inquiry-action process including four elements, (1) problem-focused experience, (2) inquiry, (3) knowledge generation (i.e., reflecting, reframing and exploring), and (4) action-focused experience. First, from self-experience, individuals identify problems, which motivate inquiries ("why" and "what if" questions). Then, inquiries motivate individuals to participate in collective learning by reflecting (i.e., interpreting experience to form assertions or beliefs), refining (i.e., reframing problems by integrating others' and self-experience), and exploring knowledge (i.e., develop hypotheses). Finally, individuals take actions based on the knowledge acquired in the learning stages. Our second hypothesis is:

H2: *Posters who post advanced learning content (e.g., inquiry, knowledge generation) are more likely to be referenced by other posters in an ongoing thread.*

Written social communication is an important component of online communities (Ellison, 2007; Schau, Muñiz, & Arnould, 2009). There are two major types of social messages in online communities, social functional messages (e.g., greetings and gratitude) and expressive messages of personal feelings and emotion (e.g., happy; Chen & Wang, 2009; Ingram & Hathorn, 2004; Schau, Muñiz, & Arnould, 2009). Previous work on online education highlights the positive role of sociality-related communication in online discussion groups (Chen & Wang, 2009; Ingram & Hathorn, 2004). Sociality-related messages are off-task but "important in creating an environment that supports collaboration, such as introductions…". An online community is a social networking environment in which participants learn from others as they develop ties with others. Our third hypothesis is:

H 3: *Posters who post social content are more likely to be referenced by other posters in an ongoing thread.*

Methodology

We used mixed methods to assess our three hypotheses. First, we used qualitative analysis to explore data collected from an online forum related to diabetes. We developed and implemented a coding scheme allowing us to create measures of patterns of communication and content of posts in the threads analyzed. Secondly, we applied quantitative analysis to the data collected in the first step in order to determine the association of reference relationships and posters' engagement in community activities and the content of communication in ongoing threads.

Study setting

According to The Centers for Disease Control and Prevention (CDC), diabetes is one of the major health concerns facing US consumers. Diabetes can lead to serious health complications and premature death, but people with diabetes can control the disease by taking steps such as maintaining a healthy diet. Because of the growing population with diabetes and the significance of self-care in managing the disease, we selected one diabetes forum (http://www.diabetesforum.com) as the online community for this research. At the time the data for this study were collected, the forum had 25,000 members.

Data collection

We randomly collected 15 threads with a total of 298 posts. Each thread contained at least 4 posts. A variety of information useful in understanding the context of the forum was available on the website. The web page of the forum displayed the titles of all the discussion threads ordered by date. Clicking on the title of each thread showed the thread page and the data used for this study including the complete text of each post, the posting time of each post, and name (online identity) of individual posters. A hyperlink from each poster's name to each poster's profile page was also available. The profile page showed the statistical data of the poster's communication history in the forum, including the average number of posts per day and the total number of threads by the poster.

Coding and Measures

We diagramed each message (one post) into statements. A statement is a complete sentence or a complete idea within a sentence. We used Yoshikoder (a cross-platform multilingual content analysis program) to code the content of each message into one of the four categories: experience, inquiry, knowledge, and sociality. We constructed a dictionary containing the four categories of content based on the Linguistic Inquiry and Word Count (LIWC) dictionary as shown in Table 1.

Table 1 *Coding Scheme for Content of Posts*

| Category	Description	Dictionaries
Experience	Statements related to personal experiences (I/my as references + any verb)	LIWC: First-person single pronoun, Present and past verbs.
Knowledge	Statements of opinions or ideas, factual information (non I/my as references + cognitive word)	LIWC: First-person plural pronoun, Second-person pronoun, Impersonal pronoun, Noun, Article, Cognitive process.
Inquiry	Direct questions	Question mark: "?"
Sociality	Supportive statements and statements related to personal feelings and desires.	LIWC: Affect. Self-defined category: Greeting and gratitude.

For each post, we coded the establishment of a reference relationship, or weak tie as "1" and "0". If one post was referenced by other posts, we coded it as "1", and otherwise "0". The references are clear if the posters use the "Reply with quotes" command. For posts without "quotes", we coded the references by identifying the terms such as "your message…" or "Yes, I agree." From each poster's profile page, we acquired the average number of posts per day and the total number of threads by each poster. We use these data to measure poster's engagement in the community.

Analysis

We first used the social network software UCINET to generate patterns of posts for each of the 15 threads in which nodes represent unique posters, and lines with arrows represent the reference relationships between posters and between posters and initiators (Figure 2).

Figure 2 *Graphs for Social Networks representing 15 Threads*
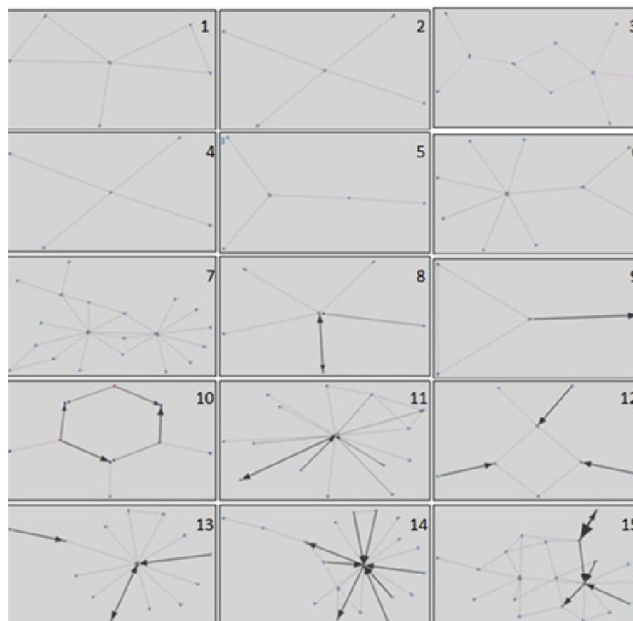
The width of the lines represents the strength of reference relationships. Multiple-time and two-directional reference relationships are stronger reference relationships indicated by wider lines. The graphs show that the patterns of posts within each thread vary widely in the number of nodes and reference relationships. Threads 1 to 7 shows networks constructed with weak reference relationships, whereas threads 8 to 15 shows networks constructed with strong reference relationships.

Next we undertook logistic regression analysis to test our propositions. The dependent variable is the likelihood of a poster being referenced in a thread. The independent variables are the poster's engagement in the community and the content of the poster's post.

Results

Overall, the results provide substantial evidence that establishment of reference relationships in an ongoing thread are significantly associated with posters' engagement and the content of communication in an ongoing thread. Descriptive statistics for all of the variables included in the analysis are presented in Table 2. Within the 218 posts, there are a total of 856 statements indicating experience, 661 statements indicating knowledge, 87 statements indicating inquiry, and 206 statements indicating sociality. The categories of experience and knowledge are the top two categories of content of the threaded posts in the community.

Table 2 *Descriptive Statistics for Post Analysis*

Measure	Minimum	Maximum	Mean	Std. Deviation
Post is referenced	0	1	0.468	0.500
Number of posts per day	0	11	2.760	3.049
Number of previous threads	0	268	35.530	51.162
Number of statements indicating experience	0	21	1.876	2.965
Number of statements indicating inquiry	0	4	0.151	0.490
Number of statements indicating knowledge	0	22	3.339	3.7373
Number of statements indicating sociality	0	28	0.817	2.433

The Hosmer and Lemeshow Test for goodness of fit shows a nonsignificant chi-square indicating that the data fitted the model well ($p = 0.143$). Table 3 shows the logistic regression coefficients, Wald tests, and odds ratios for each of the predictors. The coefficients of two predictors are significant at $p = 0.05$ level. As the number of statements indicating inquiry increases ($B = 1.448$, $p = 0.005$), the likelihood of being referenced will increase. As the number of previous threads increases ($B = 0.011$, $p = 0.014$), the likelihood of being referenced will increase. The coefficient of one predictor is significant at the $p = 0.1$ level. As the number of statements indicating sociality increases ($B = 0.234$, $p = 0.074$), the likelihood of being referenced will increase. The results also show that there is not a significant relationship between knowledge and likelihood of being referenced.

Table 3 *Results for Post Analysis*

Predictor	B	Wald	P	Odd ratio
Number of previous threads	0.011	4.048	0.014	1.011
Number of posts per day	-0.074	1.368	0.242	0.929
Experience	-0.063	2.232	0.154	0.945
Inquiry	1.448	7.816	0.005	4.255
Knowledge	-0.012	0.273	0.364	0.962
Sociality	0.234	3.078	0.074	1.296
Constant	-0.348	2.512	0.153	0.707

Discussion

Research in social learning has been increasing in recent years. However, there has been limited research on the mechanisms by which social learning is formed and advanced within threaded discussions. In this study, we investigate threaded discussions focusing on reference relationships between posters in ongoing threads. The establishment of each reference relationship is measured by the occurrence of references between two posts. Our analyses of online communication demonstrated consistent results: the establishment of reference relationships in ongoing threads is significantly associated with posters' engagement in community activities (**H1**) and the communication content of posts (**H2** and **H3**).

Posters' engagement in the community plays an important role in the establishment of discussions in an ongoing thread. Users develop engagement with the community through activities such as making posts or contributing to threads. Our study shows that users who are engaged with the community by initiating threads are more likely to be quoted by other posters in an ongoing thread.

Further, the establishment of discussions between posters is cultivated in an environment that supports inquiry and sociality. The number of statements indicating inquiry is positively associated with the possibility of posts being referenced by other posts. Posts with inquiries act as a bridge between problems and knowledge in the learning process. The number of statements indicating sociality is also positively associated with the possibility of posts being referenced by other posts. Posts with the content focusing on sociality create a supportive environment in which social learning is continued and advanced. Posts focusing on knowledge, part of more an advanced learning process, did not show a significant association with reference relationships between posts. These finding reveal that the main function of online health communities is to help users solve real-life problems and socialize with similar others rather than providing pure knowledge.

Implication

Our study suggests two factors related to the continuation of the social learning process in an ongoing thread, (1) posters' engagement with communities, and (2) posts that contain inquiry and sociality content. General online communities such as Facebook provide users opportunities for a variety of social activities (e.g., event creation and invitation, photo sharing). However, topic-specialized online communities, especially health-related online communities, provide only a limited number of functions for social activities. Our study shows that users' engagement is an important factor for discussion extension in online communities. Users learn as they develop their engagement with their online communities. We suggest that topic-specialized online communities should increase and diversify social tools to facilitate users' engagement with communities.

Users extend discussions as they ask and answer questions and socialize with others. Online communities should create tools to facilitate inquiring and socializing among users. For example, beside a "quote" button, online communities may provide two new buttons for each post: a "question" button, and an "answer" button. A new poster could click either of the two buttons and post a question or an answer to this post. By doing so, other posters will easily recognize the "questions" and "answers" posts, and may be stimulated to develop more questions or answers. Research has shown that emoticons help improve communications among online users (Derks, Bos &Grumbkow, 2007). To facilitate socializing among posters, online communities may provide more emoticons for posts. New posters could then choose the emoticons that best express their feelings as they reply to the post.

Indentifying "hot" discussion topics is a key strategy for target marketing. Suppliers of online social networking services such as Facebook and Google are developing algorithms to target advertisements to individual users. Social media marketers have not taken full advantage of the discussion component of social media. Our study suggests that social media marketers could identify popular discussion topics in online communities by identifying threads which involve more quotes. These topics indicate the areas in which consumers need more information. Furthermore, posters who are involved in these topics are active participants in online communities and are more likely to become disseminators of new information.

Future Study

Our study investigated how poster's engagement and the content of posts is associated with the establishment of discussions in health-related online communities. Research is needed to explore the factors that influence the establishment of discussions in other types of online communities such as general communities (e.g., Twitter, Facebook). Especially, research is needed to explore the factors that influence the probability of retweeting. Retweeting is an important function in Twitter, indicating the behavior that users re-post someone else's tweets. Re-posting others' tweets is an action similar to quoting others' posts and could extend the social learning process.

Our study measures behavioral engagement in

an online community using variables such as the number of posts previously made in the community. Research using surveys to investigate the psychological factors (e.g., trust, credibility) underlying online behavioral engagement could provide additional insights about motivations for the observed patterns of behavior.

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