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RESEARCH ARTICLE

Social conversation and effective discussion in online group learning

Fei-Ching Chen · Thomas C. Wang

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Abstract This paper studies the social talk of high school students in online discussion forums. On-task talk has generally been assessed as valuable discussion because it contributes directly to productive learning. Off-task conversation, on the other hand, is often regarded as useless and a waste of time. Should this social talk indeed be regarded as an off-task activity? Is social talk such as greeting, excusing, comforting and sharing personal feelings irrelevant to learning? This study analyzes threads and argues that social talk is interwoven with on-task talk. It is interesting to note that a substantial quantity of off-task messages served the latent function of guiding group discussion toward making progress in solving collaborative problems in a subtle and indirect manner. The power of "soft talk" embedded in off-task social conversation is explored and fully discussed.

Keywords Social talk · Effective discussions · Participation · Soft power · Negotiation

Introduction

Computer Supported Collaborative Learning (CSCL) research has demonstrated paradoxical relationship between effective discussion and social talk. On the one hand, CSCL is normally intended to provide opportunities to design and implement methods of advanced learning, such as deep learning, sustained and critical discourse, and effective discussion (e.g., Guzdial and Turns 2000; Hewitt 2005; Aalst and Chan 2007); on the other hand, current insights into the CSCL-environment suggest that social interaction is also

F.-C. Chen (✉)
Graduate Institute of Learning and Instruction, National Central University,
No. 300, Jhongda Rd, Jhongli City 32001, Taoyuan County, Taiwan
e-mail: fcc@cc.ncu.edu.tw

T. C. Wang
Department of Sociology, Fu-Jen Catholic University, No. 510 Chung-Cheng Rd,
Xsin-Chung City 24205, Taipei County, Taiwan
e-mail: 020260@mail.fju.edu.tw

important for a community that supports learning (e.g., Kreijns et al. 2002; Ling 2007). It seems that both effective discussions and social interaction contribute to learning in a virtual community. However, much less attention has been given to the relationship between them. To be specific, previous research is mainly anecdotal and speculative, rather than empirically grounded.

Interestingly, even the definition of "effective discussion," as applied to performance in discussion forums, is a matter of contention. The term"effective discussions" is used widely and with considerable flexibility to describe various concepts involved in positive group learning. For example, Guzdial and Turns (2000) applied the term "effective discussions" to discussions sustained and focused upon topics related to class learning goals. Hsi and Hoadley (1997) used "productive discussion" to refer to situations in which all students "participate actively, generate comments containing a repertoire of scientific ideas, and in a group, students elaborate upon their own ideas, and propose new ones." Of course, some researchers (e.g., Wellman and Marcinkiewicz 2004) have traditionally defined effectiveness, in the context of an online course, as the degree of improvement in post-test scores when compared to the pre-test. It appears that what the above sources consider to be "effective discussion" refers to "cognitive," "on-topic," "on-task," and "sustained" learning processes and excludes all "off-topic," "off-task," "social interaction," and "social talk" activities. This brings us to the question this study seeks to answer. Must a discussion be sustained and on-topic in order to be "effective"?

In this study, we first review literature about the apparently paradoxical relationship between effective discussion and social talk. We propose that effectiveness should be judged not only by teachers and researchers, but also by the learners themselves. A tool called "Pick-n-Choose," similar in concept to the student-directed electronic portfolio (Aalst and Chan 2007), was designed to scaffold learners to be more effective and reflective when working collaboratively in the discussion forum. This tool makes evident exactly what learners themselves view as effective. It is further used to explore statistically the relationship between two types of messages: social talk and on-task communication.

The paradox of the relationship between effective discussion and social talk

The practice of identifying those statements within a computer supported communication environment that comprise the social dimension and sorting them into one independent category can be traced back to Henri's (1992, p. 126) work on content analysis of computer conferences. She defines a social message as a "statement or part of a statement not related to formal content of subject matter." Her study suggests that the frequency of socially oriented statements can provide other information, such as the level of learner focus on the task at hand. A large quantity of socially-oriented messages may be a disruptive element as well as a supportive one, as such communication can be important for social cohesion and a feeling of belonging within the group, while too much can also be disruptive to the learning process.

For the last decade or so, in the wake of Henri's contribution, some research still regards social and on-task communication as two not only separate but antagonistic activities. For example, Arguello and colleagues (Arguello et al. 2006) articulate the less undesirable effects of social talk on effective discussion, while Hara and colleagues (Hara et al. 2000), having examined the relationship between cognitive processes and social cues in a study conducted on a graduate level course, reported that social cues appeared separately from content discussion and described social cues as taking a back seat to student judgment, inference, and clarification, because focusing on the task is a more desirable activity than social interaction. Walther (1996) also argues that the more effective computer-mediated

communication is, the less socio-emotional communication is present. Similarly, some research done by analyzing the percentage of on-topic and off-topic discussion concluded that the ratio of the two determined the effectiveness of learning. Lipponen and colleagues (Lipponen et al. 2001) conducted an online science discussion with elementary students and sought to increase the on- to off- topic ratio, based on the assumption that the more focused the discussions were on educational topics, the more the students would learn. Furthermore, Badri et al. (2003) developed a "filter" to distinguish between relevant and irrelevant contributions and to help instructors identify students who consistently disrupted conversations with off-topic statements. To prevent distraction to the users/learners, some tools have been developed to help lead effective discussions, such as Chat and AcademicTalk (McAlister et al. 2004). These studies all seem to regard effective discussion and social talk as existing in conflict with one another, the one constructive and the other distracting.

There is, however, another body of research revealing the positive effects of social talk on effective discussion. For example, Ling (2007) defines off-topic statements as those that do not reflect content directly relevant to the learning activities, but that are beneficial to developing social relations, or pertain to class management or technical matters. Ling further divides the Off-topic category into three subcategories: social, administrative, and technical. Steinkuehler and colleagues (Steinkuehler et al. 2000), in their study, placed what they described as "seemingly effortless social interaction" into four categories: housekeeping statements, social talk, tangent topics, and "null" statements. They found that the majority of off-topic content appeared to fall into the category of social talk. Both housekeeping statements and social interaction were considered necessary to keep the general conversation on task, to maintain an amiable environment, and to provide a foundation that would insure that participants understood one another. Furthermore, Hobaugh (1997) emphasizes the fact that problems with social dynamics among group members are often a major cause of ineffective group action. In other words, social dynamics play a significant role in group effectiveness. Gunawardena (1995) claims that these kinds of "failures tend to occur at the social level far more than they do at the technical level." These findings reveal the value of social interaction to effective discussion.

The role of social talk in discussion forums from a community perspective has been expressed in detail by Wegerif (1998), who pointed out that: "Many evaluations of asynchronous learning networks (ALNs) understandably focus upon the educational dimension, either learning outcomes or the educational quality of interactions, overlooking the social dimension which underlies this." He notes that "forming a sense of community, in which people feel they will be treated sympathetically by their fellows, seems to be a necessary first step for collaborative learning. Without a feeling of community people are on their own, likely to be anxious, defensive and unwilling to take the risks involved in learning." Rourke (2000) found that certain conditions must exist before students will offer tentative ideas to, or critique the ideas of, their peers, and before they are willing to interpret criticism as a valuable aid rather than as a personal insult. These findings suggest that group cohesion, and therefore social interaction, are required for effective discussion.

Recently, research has investigated the impact of the context provided by "off-task" discussion on the effectiveness of "on-task" discussion. Erickson and Kellogg (2003) analyzed the content of conversations and concluded that "In theory, more topic-oriented discussion is 'supposed' to take place in specific topics; in practice, work talk often grows out of social discussions." Kreijns et al. (2002) concluded that, although social interaction within the social dimension has little to do with task execution, various non-task contextual

settings are likely to foster this dimension of social interaction more than a purely task-oriented context would. Thornborrow (2003) discovered that the interplay between on-task talk and off-task talk provides a discursive context through which the elementary students align themselves to the task as well as the social relations.

It seems clear that the argument that social talk is problematic or in conflict with the effectiveness of learning dialogue has been refuted conceptually by much research. However, little of the research has been conducted in a way that examines this argument empirically or explores the issue of effectiveness in online discussion from the students' perspective rather than that of the teacher or researcher.

Having engaged in statistical exploration of the relationship between effective discussion and social talk, one further question that we need to probe is what it is that cultivates social talk, given the condition of an on-task conversation. It remains unusual to focus upon the role of social talk in productive learning, and upon how the context of social talk is cultivated within an online learning environment.

Analysis of discussion threads will no doubt continue to rely on a scientific approach, but it seems to us that there are other possibilities. It does not really lend itself to accurate quantifiable measurement. As we know, positivism always involves looking for facts, however, some kinds of facts are obscured, are often invisible, and are difficult to measure. Moreover, while we look for facts, truth is wrapped in contradiction. We may not be able to see contradictions but we can see conflicts. By examining where the conflicts occur and how people negotiate to deal with them, we will gain a better understanding of effective discussions and learning.

Scaffolding effective learning: the "Pick-n-Choose" mechanism

Simply making a computer-supported discussion forum available does not guarantee that it will be used effectively to enable learning. During the past decade, many features intended to help guide discussion (e.g., anchoring features in CaMILE, Guzdial and Turns 2000) have been designed in order to increase the likelihood of effective discussion within forums. For example, CSILE provides note types or categories (e.g., new theory or evidence) to classify each contribution (Scardamalia and Bereiter 1991). CoVis Collaboratory Notebook (Edelson and O'Neill 1994) and MFK/SpeakEasy (Hsi and Hoadley 1997) also use prompts to suggest to the learner what to write about or how to start so that online discussion can be more structured and sustained.

In recent years, however, the learner's agency has been emphasized (e.g., ownership, Barab et al. 2003) in CSCL. A compelling example is the principle of epistemic agency designed in Knowledge Forum (KF). KF uses a set of knowledge building principles to guide a portfolio task (Scardamalia and Bereiter 2006; Scardamalia 2002) and designs student-directed electronic portfolio assessment to scaffold collaborative inquiry. Similarly, in our study, we ask the question, "Who determines whether the discussion is effective?" There now exists a mechanism that allows group members to decide which postings are important—"Pick-n-Choose". It allows learners to select important postings in a timely fashion, producing a record which helps to coordinate material later when they need to come up with a group product.

In this study, the concept of "Important Posting" (IP) is identified by the learners as important and useful for later discussion; another concept of "Important Thread" (IT) is defined as providing the environment within which the "IP" appears.

In our inquiry-based science contest activities (Chen and Jiang 2004), we have developed a PORSCIN (PORtfolio-oriented Science Contest via InterNet) model, as shown in

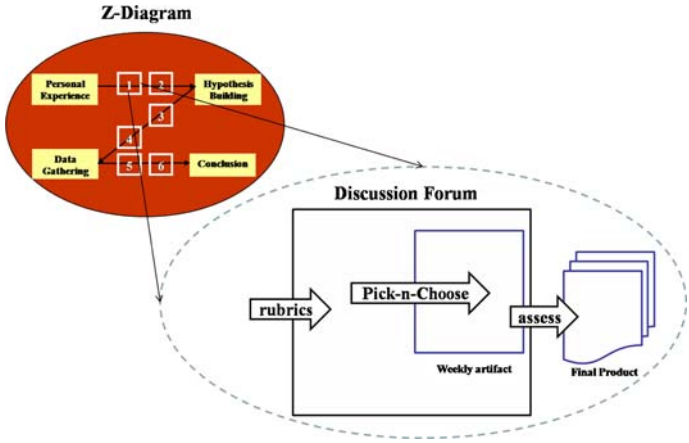

Fig. 1 Learning process in PORSCIN model

Fig. 1, to guide collaborative inquiry and collaborative portfolio activities. The PORSCIN model started as a set of rubrics, which served as prompts to guide group discussion in the forum at each inquiry stage. Group members post their ideas and co-construct their knowledge at the end of each stage, incorporating into their artifacts the IPs from the week, as identified using the "Pick-n-Choose" mechanism. The "Pick-n-Choose" mechanism had the following features:

The focusing features

The focusing features help group members to focus upon specific important elements among the large number of threads created each week. As the virtual group forms, members of the group try to take an active role in building a shared mental model for collaborative inquiry. Any group member has the right and ability to choose the posting that s/he thinks important, and put it in a "Pick-n-Choose" collection. Toward end of each stage, the group members can once again refer to the rubrics and fully focus on only the selected subset of postings in the "Pick-n-Choose" collection. In addition, as shown in Fig. 2, the "Pick-n-Choose" collection is also good for group cohesion because a briefly absent participant can be updated on the most IPs efficiently via the "Pick-n-Choose" collection.

The meta-cognitive features

Many scripts that are supposed to enhance the effectiveness of collaborative learning may instead raise the level of risk (Dillenbourg 2003; Jeong and Jeong 2007). Some existing self-coding interfaces ask learners to classify the article they intend to post before they begin writing. Dillenbourg describes this phenomenon as "over-scripting." The disadvantages include disturbing 'natural' interaction, increasing cognitive load, and 'didactising' collaborative interactions. Instead, in our study, the "Pick-n-Choose" process was carried out after the article had been posted. Postings were reread and judged a second time by any members of the group who wished to do so in order for important postings to be selected for the collection of "Pick-n-Choose." Reviewing postings thusly provided

Fig. 2 A screenshot of Lain showing the ITs on the left and "Pick-n-Choose" button on the bottom of each posting

opportunities for meta-thinking. The "Pick-n-Choose" mechanism was designed to help group members further evaluate their own postings together with those of other members' and to prepare their weekly artifact.

The portfolio features

In CSCL, many project-based learning activities meet with the challenge that students' final products fail to reflect the content of their discussion forum. Yet, consistent with the works of the electronic portfolio (Land and Zembal-Saul 2003; Young and Figgins 2002;

Wolf et al. 1991), the PORSCIN model however, does help to guide groups of learners in focused and effective discussions. The "Pick-n-Choose" mechanism in the PORSCIN model plays a critical role in carrying out the spirit of the portfolio. As indicated in Fig. 1, a group's final product is composed of several weekly artifacts. A weekly artifact is chosen from many IPs in the "Pick-n-Choose" collection and integrated into a well-documented semi-product. It provides learners with opportunities to evaluate postings made during discussion, argumentation, and justification most efficiently as a condensation of the most cogent and relevant posting.

In summary, the "Pick-n-Choose" mechanism serves as a key in this study. Firstly, it reveals students' perspectives on what specific messages are more important than others. Secondly, the threads that include important messages are considered accordingly, as an emerging context for effective learning. This is the context within which we will examine the relationship between effective discussion and social talk.

Research questions

Three research questions are addressed:

(a) What is the nature of the messages within those specific threads that included important messages?
(b) Is social talk related to effective discussion?
(c) What role does social talk play in group learning?

Methods

The community and the tasks

The online community was formed for a web-based science contest in an inquiry-based learning environment called Learning Atmospheric sciences via the Internet (Lain), which was created primarily for high school students to participate in a virtual summer camp. Those volunteer individuals who chose the same topic from a list of five were sorted into groups of 5–7 members. In addition to group members, a pair of volunteers served as mentors in each forum. In general, each pair was responsible for 5–8 groups. Mentors were elementary to secondary school teachers or graduate students with majors in the learning sciences and were paired according to their academic backgrounds, those majoring in the sciences as cognitive mentor and those with non-science majors as affective mentor.

Members of a single group did not normally know each other, nor did they engage in face-to-face communication at any time during the activity. This web-based science contest lasted six weeks with one stage scheduled for each week. The six stages were: Individual claim formulation, Team hypothesis creation, Detailed planning, Data location, Data transformation, and Hypothesis justification (six stages in Fig. 1).

Each group maintained its own discussion forum. Members of groups could read but not add to the postings of other groups' forums. The threaded discussion forum was triggered by inquiry rubrics, which were developed by experts and researchers for each inquiry stage. By end of each week, participants had to finish collaboratively a weekly artifact. During the whole activity period, group members could modify any artifact that they had uploaded before if they chose to do so. By end of the 6th week, each group would have accumulated all of their weekly artifacts and formed a final product for the science contest. Participants

in this activity qualified for a certificate if they completed jointly all required tasks and were nominated by their teammates.

Four hundred and eighty-seven students from one hundred and fifty high schools attended this activity in Lain. Most of the participants were not from elite schools. Inquiry-based learning was therefore a challenging activity to most of them (Chen et al. 2001). As they were voluntary attendees in this virtual summer camp, the weekly questionnaires ($N = 365$) reveal an accurate picture of the actual learning atmosphere.

Six weeks of self-report data show that 46.62% of participants logged in on a daily basis, 36.07% seldom logged in, and 17.18% could not find time to login at all during that week. (see Table 1). Given that each group consisted of 5–6 people, a typical group tended to have one to two members who disappeared on a regular basis, three proactive members, and two to three in-and-out members each week. Obviously, the level of participation among group members varies. Not everyone showed up in his/her group forum everyday. Some of them attended the discussion only intermittently. A baseline analysis of individual participation evokes two questions: How does an online group thus constituted collaborate productively? How does one make sense of these interchanges among group members while taking different levels of participation into consideration?

Unit of analysis

Most of the research done on computer-mediated discourse regards postings as the unit of analysis (Drie et al. 2005). Using this convention, all of the postings are sorted into different categories according to their attributes. Postings are therefore isolated from each other and the context of the dialogue in which they appeared is missing entirely. However, in a threaded discussion (e.g., Hewitt 2005; Jeong 2003, 2005), postings exist within a contextual atmosphere and a posting cannot be fully understood merely by the content of the single posting itself. Better insight into effective discussions can be gained from a macro-view of the threaded context.

In this study, when one or more postings were selected by any group member for the "Pick-n-Choose" collection, the thread that contained this IP was automatically defined as an IT (Fig. 3). Using threads as the unit of analysis, we have attempted to capture empirically the context of important instances of learning and define these as "effective discussion." Log data on records of the "Pick-n-Choose" collection were first retrieved, and the IPs and the ITs identified.

Table 1 Level of participation across six weeks in Lain

Week	Daily (%)	Seldom (%)	Not at all (%)	NA
1	46.08	31.14	22.78	0
2	46.34	32.44	20.98	0.24
3	47.83	36.32	15.86	0
4	41.71	40.88	17.13	0.28
5	46.60	40.12	12.96	0.31
6	51.14	35.50	13.36	0
Mean	46.62	36.07	17.18	0.13
SD	3.05	3.93	4.00	0.15

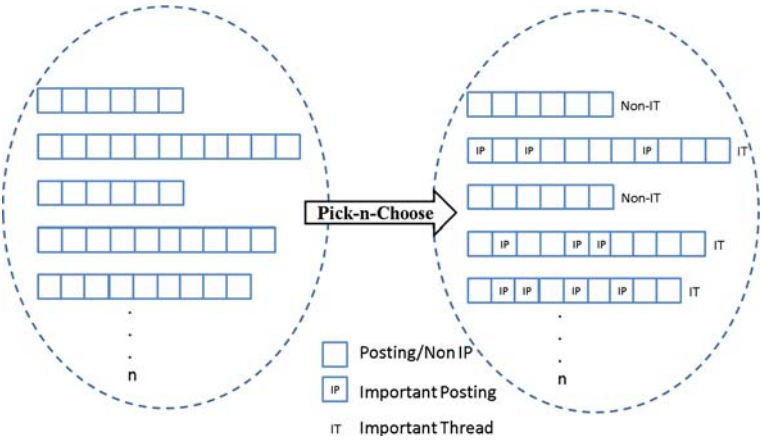

Fig. 3 The "Pick-n-Choose" actions identify the IPs and automatically define the ITs

The sample

In this Lain virtual camp, which was composed of four hundred and eighty-seven high school students sorted into 82 groups of 5–7 individuals each, a total of 34,397 postings were generated within six weeks. The average length of each thread was 6.8 postings. Since our purpose was to investigate the relationship between IPs and non-IPs of different categories, longer threads had to be our main focus. In order to explore the learning context of longer threads, our criteria for selecting a sampling from the huge quantity of data were based upon the number of postings and the length of threads:

1. The groups which are in the top 25% in terms of the number of postings.
2. The ITs whose length is greater than the average length of threads.

Based on these two criteria, 21 groups were identified. Of the 471 ITs identified in the 21 groups, 321 were longer than the 82 groups' average of 6.8 postings. The 321 ITs (Fig. 3), which contained 2,678 IPs (Table 2), were considered our sample and were further analyzed.

Due to the time-consuming nature of the task of categorizing 10,490 postings manually, we randomly selected one tenth of 321 ITs to be sorted instead. As a result, 28 threads containing 1,055 postings (Mean = 37.7 postings) were used as our sample and were sorted into three categories.

Table 2 ITs and IPs sample selection from the 21 groups

Types of ITs	ITs	A.L.	Postings	IPs
Single (1 post)	19	1	19	19
Short (2–6 posts)	131	4	506	263
Long (>6 posts)	321	33	10448	2678
Total	471	14	11973	2960

A.L. average length of thread

Data analysis

Forum discussions can be analyzed in different ways. One way is to examine postings by quantitative approach. The other is to capture the holistic and highly contextualized sense of what transpired in a thread (Dennen 2008; Dennen and Paulus 2005).

Coding the postings in the ITs

To investigate further what ITs were composed of and how IPs emerged, three main categories were distinguished: Domain, Coordination, and Social talk, as had been done in much existing research on computer-mediated discussions (e.g., Dillenbourg 2003; Drie et al. 2005; Prangsma et al. 2006; Ling 2007). Because each posting within each thread was coded independently, researchers often encountered difficulties related to the presence of multiple attributes in individual postings. The synchronicity between multiple coders became problematic. To solve the problem, the raters decided to code each posting into all the categories to which it appeared to belong, and then confer on the single coding procedure and recode any posts that had been coded into multiple categories.

The aforementioned 28 threads, with each posting categorized, were then made into a figure (Fig. 4) to illustrate the organization of these types of IPs and Non-IPs in each IT. The proportion of important messages that were perceived by learners to be effective discussion in each category was also identified.

Examining statistically the correlation between social talk and on-task postings

We then deal with the question of whether social talk related to effective discussion. The question of social talk co-existing with effective discussion is tested by statistical approaches. Examination of the surrounding supportive context of these Important Postings is essential to exploring the interrelatedness of social talk and on-task messages within Important Threads. Pearson Correlation was used to test the following two assertions, based on the aforementioned coding results:

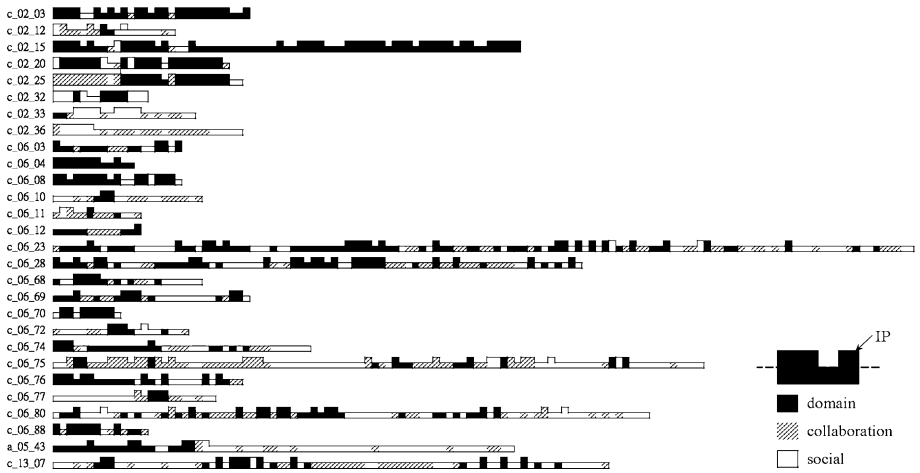

Fig. 4 The interweaving of varied postings in 28 threads

1. To determine the relationship between social talk and on-task talk, dependent and independent variables were operationalized in the following way. We first defined the independent variable as "the number of phase changes from social talk to on-task talk within each thread, which includes domain and coordination categories." For example, in Fig. 4 the number of phase changes in thread 06_23 is 21, 7 in thread 05_43, 8 in thread 06_75, 5 in thread 06_10, etc. We then counted the total number of postings in the domain and coordination categories and defined this as the dependent variable. With these numbers, we could determine if the threads that contained the most on-task messages also contained the highest number of social talk to on-task talk phase changes. With this hypothesis, we have attempted to test whether or not social talk correlates positively with on-task talk.
2. To determine what the relationship is between social talk and effective discussions, dependent and independent variables were operationalized in the following way. We first defined the independent variable as "the number of phase changes from social talk (white color) to IPs (bars with double height In Fig. 4) within each thread." For example, in Fig. 4 the number of phase changes in thread 06_03 is 2, 1 in thread 02_32, 4 in thread 06_76, 0 in thread 02_36, etc. We then counted the total number of IPs slots and defined this as the dependent variable. For example, the number of IPs in thread 06_23 is 15, 3 in thread 05_43, 13 in thread 06_75, 1 in thread 06_10, etc. With these numbers, we could determine if the threads that contained the most IPs also contained the highest number of social talk to IP phase changes. With this hypothesis, we have attempted to determine whether or not social talk correlates positively with IPs.

Capturing social talk in context

Aside from examining statistical connections, the question remains: How does social talk contribute to effective conversation? To make sense of the role that social talk plays in group learning, an ethnographic perspective guided discourse analysis (Gee and Green 1998) follows. A watershed in the history of analysis methods for examining online discussion, discourse analysis is used to focus more on the context, complexity and interrelatedness of messages within a dialogue (Dennen 2008; Dennen and Paulus 2005). Using a micro-ethnography approach, discourse analysis could be used to examine the moment-by-moment interactions with which participants coordinate (or fail to coordinate) interaction, what positions (roles and relationships) they take, what rights they grant each other, and what obligations they impose upon each other and hold each other accountable for. In this way, we can discover how participants in a group construct the structures of everyday life.

The question is: how best to apply discourse analysis in Lain? As all 82 groups were formed by members previously unacquainted with each other and who participated at widely varying levels during the six weeks, the contexts were neither given nor static, but were continually subject to negotiation, modification, and change. The dynamic nature of the online behavior of members shaped and was shaped by the context that was being dynamically constructed. We therefore explore the meaning of social talk, not at the level of the single message, but we examine the practice as a whole.

To be specific, we identify what members of an online group need to know, produce, request, apologize for, and be accountable for in the discussion forum, so as to gain a better understanding of how they can participate appropriately and, through that participation, learn. For example, turn-taking rules are tacitly generated (Garfinkel 1967), even in the

context of online forums. By capturing how a group deals with a situation in which a member is unresponsive or absent, the emergent group rules can be identified and defined. Similarly, by looking for how, when, under what conditions, and with what outcomes social talk was developed by group members, we deepen our understanding of the effects and significance of social talk in the group.

Results

The organization of ITs

In general, ITs are found in varying combinations of the three categories of postings. Few threads were composed entirely of domain-related postings. Domain-related discussions tended instead to be mixed together with coordination discussion, and were frequently surrounded by social talk.

To be specific, these 1,055 postings from 28 threads were sorted into three categories. The average number of postings in each thread was 37.7. The number of messages within each thread, when sorted into domain, coordination, and social talk categories, were 16, 8.6, and 13.1 postings, respectively. Of these postings, 314 of them were IPs and 741 were non-IPs. Seventy-seven percent of the 314 IPs were in the domain category, 11% in coordination and 12% in social talk (see Table 3). It was surprising to discover that, from a learner's perspective, nearly one-fourth of postings categorized as social talk and coordination were identified as important postings, and turned out to be elements of effective discussion. This result reshapes the role of off-task talks, as perceived by most of the researchers in this community.

The categorization of the 1,055 postings was also displayed in Fig. 4 to show the relationship among adjacent postings in each IT. Each line represents one IT. The order of ITs is determined by the number of postings in the domain category, with the highest domain-related postings at the top. Black, shading, and white represented the Domain, Coordination, and Social talk categories respectively. IPs were represented by bars of double height. The interweaving of white and black in this figure reveals that domain related discussion was contingent upon social talk. Important postings are nurtured in environments in which three types of talks are juxtaposed and interwoven. It is also clear from examination of ITs such as c_06_75, c_06_28, c_13_07, that social talk does not terminate effective discussion. On the contrary, it tends to trigger it.

Table 3 The categorization of 314 IPs and 741 Non-IPs in 28 Important Threads

	Domain	Coordination	Social talk	Total
IPs (*N*)	241	33	40	314
IPs (%)	77	11	12	100
Non-IPs (*N*)	207	208	326	741
Non-IPs (%)	28	28	44	100
Total (*N*)	448	241	366	1,055
Total (%)	42	23	35	100
Avgerage in a thread	16	8.6	13.1	37.7

The relationship between social talk and on-task postings

The results of Pearson Correlation analyses for each of the assertions are presented in separate tables below. Significant correlations were observed between the number of on-task messages in a thread (mean = 24) and the number of social talk to on-task talk phase changes (mean = 4), r = .5, $p < .01$ (Table 4). The threads that contained the most on-task messages also contained the largest number of social talk to on-task-talk phase changes. Social talk did have a positive correlation with on-task talk. It is statistically clear that social talk is not a troublesome factor in a discussion forum.

Significant correlation was also observed between the threads containing IPs slots ($N = 135$) and the number of social talk to IPs phase changes ($N = 65$). Between the number of IPs slots and the number of social talk to IPs phase changes, we found $r = .81$ and $p < .01$ (Table 5). The threads that contained the most IPs also contained the highest number of social talk to IP phase changes. Social talk did have a positive correlation with the emergence of IPs.

Statistically speaking, we could reasonably conclude that there is a positive correlation between social talk and effective discussion, based on the data generated from a "Pick-n-Choose" mechanism, reflecting the perspective of the learners. However, we are still curious about the actual mechanism of social talk in effective discussion. It is with the purpose of discovering the role of social talk as a learning mechanism that we report the follow-up investigation.

The contextualized meaning-making of social talk

Three episodes were excerpted from the 28 ITs. They came from group C_06 and developed during the 2nd, 3rd, and 5th weeks, respectively. This group as a whole posted 933 messages with an average of 19.04 messages per thread. Even though their postings were very productive when compared to the average postings of 419.48 across 82 groups, C_6 also encountered situations involving disparate participation levels among members (Table 6). There were five regular attendees. Some of them were proactive members and some were "in and out". None of them emerged as an obvious leader of the group. Given these different levels of participation, how did they in fact collaborate?

Table 4 Pearson Correlation between "Phrase change" and "On-task"

	Phrase change	On-task
Phrase change	–	0.527**
On-task	0.527**	–

** Correlation is significant at the .01 level (2-tailed)

Table 5 Pearson Correlation between "Social-talk to IP" and "IP"

Variable	Social talk to IP	IP
Social talk to IP	–	0.812**
IP	0.812**	–

** Correlation is significant at the .01 level (2-tailed)

Table 6 Level of participation in C_6 group

Id	Online	Post	No. of Initiating a thread
Latte	109	167	5
Little grass	160	467	15
Angela	107	138	2
Brad0303	26	41	8
Roy7577	40	33	2
Set2001	2	0	0
Tau/Mentor A	305	42	11
u7102109/Mentor B	233	45	6
Total	444	933	49

We attempt to illustrate group dynamics by focusing upon the particular practices that are embedded in the interplay of these postings. To see what roles social talk can play depends largely upon how negotiation develops among the proactive and "in and out" members.

Social talk as flexible as a springboard

In this episode, students were engaged in working with their fog hypotheses. The first episode is part of a thread which was consisted of 127 postings and lasted for 8 days. There were a total of 22 IPs in this thread with 10 IPs before, 11 IPs after, and one (#57), within the episode. What is it that's going on here? Reading this excerpt, a number of interesting features about the construction of the IT are worthy of note. Firstly, social talk quite often appeared in each message and was mixed in with the domain-related discussion. Secondly, turn-taking was not quite clear in most cases, but the access ritual was pervasive. Thirdly, questions directly related to domain knowledge were not discussed as often as they were supposed to be. How do these observations correlate with members having different levels of participation?

No.	Id	Content (L3_C6_23_#57 ~ #65)
#57	Latte	"Under the condition that south-north bound wind does not have influence on the formation of fog, fog and rain do not happen simultaneously." Does this statement hold true?
#58	Angela	I am so sorry that I logged off too early last night. I am content that we focus on "the factors related to the formation of fog." According to my recent search of the weather database for task 1–1, there were no records on foggy weather in eastern Taiwan.
#59	u7102109	Re: 23–45 What Little grass was trying to say is that the factors related to fog include temperature, front, pressure, altitude, time, and environment. Do I understand it correctly? The hypothesis Little grass proposed was based on our previous discussions, information collected, or on our living experiences. That was great! Does anyone have anything to add?

No.	Id	Content (L3_C6_23_#57 ~ #65)
#60	Angela	My partners ~ ~ It's 6:51 on Saturday now. I just selected some postings using "Pick-n-Choose" for our weekly assignments. I don't know if my judgment is OK. If anyone is free, please double check that I did not miss anything valuable. p.s. If I am shown as being online in the list but am quiet and unresponsive at the same time, I may be doing something else off line. I will come back very soon. Don't assume that my computer is down.
#61	Roy7577	Little grass asked me to tell everyone that she may not login today as someone is coming to fix her computer.
#62	Angela	My partners ~ ~ it is twenty-eight past eight ~ ~ ~ I have been online for two hours ~ ~ What the hell is our team hypothesis? Is it "the formation of the fog"? I really don't get it. I have filled in some paragraphs for task 2–1 but am having trouble in the general description part. I beg you to give me some help. Everybody please get online as soon as possible.
#63	Angela	Hello ~ ~ roy7577 ~ ~ You are online!! What is our team hypothesis? I want to write down something for task 2–1 but I need to make sure what our team hypothesis is first.
#64	Little grass	Sorry ~ ~ ~ ~ ~ something was wrong with my computer earlier…….After I consulted with my cousin, I tried to fix it. It's finally okay…. Today is not my day. As soon as I woke up (09:30), the power was shut down. It only occurred in our village. Uh. The power was not turned on until 2:30 pm. What was worse, my computer was down again. I was so frustrated. Ok. ……..Now we'd better catch up and get back on schedule. Please be online, my teammates ~ ~~
#65	Angela	Hello ~ ~ Little-grass. Roy7577 just told us that your computer did not function. Congratulations on your computer being okay now. I have been thinking about how to write the general description of our task 2–1, but I don't really know what our team hypothesis is.

In this episode, domain-related questions, either from Latte in #57, or from Angela, in #60, 62, 63, and 65, were not responded to directly. Instead, Roy7577, in #61, made an announcement on behalf of her teammate; Little grass had confessed how she had spent the day on technical problems rather than on being responsive to teammate's questions. Even Roy7577 had been asked for a response by Angela in #63, and did not respond. In an interview she said: "I just don't know what to say even though I know they want me to delurk." When regarded individually, such off-task messages appear entirely personal, irrelevant and off task. However, from a contextualized viewpoint, the inability of members to respond in a timely manner to the team hypothesis was a sign of potential problems for sustained discussion. These messages were quite relevant to task talk in the sense that, if we ignore them, we also fail to see the picture of how some group members were encountering difficulties.

On-task talk coupled together with off-task talk seemed to be typical of the dialogue this group engaged in. On-task messages followed immediately after brief social talk. For example, in #58, Angela apologizes for not being able to stay online longer the other day. She then begins to show her approval of the direction her teammates' current discussion is taking. In #63, Angela says hello to Roy7577, who attended the discussion only

intermittently, and asks for opinions about the team hypotheses right away. Also in #65, Angela congratulates Little grass on having her laptop functional again, and asks her the same question. These learners differ substantially from one another and have different personal aspirations and problems in respect to this energy-intensive activity. What makes a productive group possible out of this medley of people is the mutual influence their responses have upon daily dilemmas and aspirations. Social talk is just a bridge to serious talk. Incorporating social talk into serious talk is a necessary way of working together in such a group.

Turn-taking was not common in this group. Of the 9 interchanges which spanned 9 hours in this episode, Angela proposed her concerns about team hypotheses and weekly joint tasks four times, but these went largely unnoticed. She was even so anxious for a response that she did not wait before sending a second message. Based on the number of postings shown in Table 6, this does not mean that her teammates were not responding at all. Indeed, they had productive discussion directly following these messages, discussion which was full of eager anticipation for a response. With different and limited time frames for team projects online, each member was under a great deal of pressure to respond when receiving messages conveying urgency. If they were not ready for discussion as soon as they logged in, social talk filled in for a while.

Different levels of participation in this group introduce different levels of competence with respect to valued enterprises of the group. Unlike face-to-face learning environments in which learners can be fair company by saying nothing, in computer-mediated communication environments, learners must post messages to demonstrate their participation. In comparison with proactive members, in-and-out members participated less and had more difficulty reorienting themselves and getting into the swing of things after an absence. Finding ways to speak out instead of remaining silent must be recognized as part of the competence of online participation. In group atmospheres such as that in C_6, we found a considerable amount of remedial interchange (Goffman 1971; Williams 1980) taking place.

Giving an account is one example of speaking out. In #61, Roy7577 announces the reason for Little grass's absence that day; in #64, when Little grass is able to login, she once again gives an account of another technical problem that kept her from joining the forum: a localized power outage that afternoon in her village. No matter who provides the account for whom (or for himself/herself), giving an account is a necessity in online group learning.

In addition to accounts, these excerpts also demonstrate apology and request activity. In #58, Latte apologizes not for her absence but for not holding up her end – being unable to stay online as long as the others. It is therefore not surprising to find that the common requests in #60, 62, and 64 emphasize the importance of being logged in simultaneously. The same request can be expressed in another way in #60. Angela makes an announcement in advance about possibly being unresponsive while logged in and present in the online member list. She wants to avoid having her teammates get the wrong impression about her short presence.

Demonstrating access rituals in the beginning of a message is a third way learners developed to embed their epistemic stances in soft talk within the group. Taking #63 and #65 as an example, Angela begs for teammates' opinions and does so in a context of warm and joyful support. It is a particular ways of inviting more engagement from "in and out" members.

Group norms, therefore, emerge including: frequent logins, announcement of one's schedule to others in the group, apologies given in advance for being unable to join a discussion in time, apologies after the fact with accounts provided, excuses given for lack

of participation, and so on. For members of an online group, these are required and legitimate issues to share with others. These norms serve also to allow "in and out" members to have more involvement in discussions when they have had difficulties responding to domain-related discussions. By observing the emerging social order of this group, we propose that trust, the key to a successful community (Barab et al. 2003), is built upon the accounts given by members and coated with social talk; enabling engagement (Wenger 1998) is achieved through a sound combination of access rituals and remedial work. Taking social talk more into account in the analysis of contextual threads suggests that, as people engage in joint activity, they not only focus on on-topic interchanges but also skillfully reconstruct the context with flexible use of social talk as a springboard for more engaged group learning.

The tripartite symbiosis: Social talk, task talk and soft power

In the previous section soft talk often serves as a ladder to more comfortable participation for "in and out" participants. In this section, however, much social talk functions as room for negotiation and is shown to have soft power embedded in it.

The second episode is excerpted from part of a thread which consisted of 22 postings and lasted for 7 days. The thread is set in the context of teammembers working on the first day of the 3rd week. Students were in the process of collecting data for hypotheses testing. They discuss the causal relationship between temperature and fog generation and to be specific as to whether an increasing or decreasing temperature would be better for testing hypotheses. The group was struggled in selecting from among lots of cases in the digital dataset to prepare for data transformation.

In a naturalistic context like Lain, engagement is always a variable in quality collaboration. Different levels of participation introduce tensions among teammates working together. This episode, which immediately follows 4 consecutive IPs, shows how they develop shared ways of doing things together. One of the proactive members, Little grass, takes the initiative to develop strategies for cohesive teamwork by proposing questions to her teammates.

No.	Id	Content (L3_C6_68_#8 ~ #20)
#8	Little grass	It's Monday. It's time to start working on our assignment. Who would like to be the coordinator for that? We will start to work tomorrow so that we won't feel too rushed when Saturday comes.
		Would you guys like to meet online? Of course we can still meet online any other time besides the scheduled times. As a matter of fact, I do think that if we discuss the project online, we can get quicker response from each other. ~ ~ ~
		What do you think? How about 8 pm ???
#9	Roy7577	I have to go to cram school every night from Monday to Wednesday
		so I can only get online weekdays after Wednesday.
#10	Angela	I can be online at 8 pm.
		I also feel that it will be more convincing if we can find more data to support [our thesis].
#11	Angela	….I forgot to say that I have downloaded Yahoo Messenger, but it couldn't be installed in the computer at home.(I don't know why). So I can't use it.

No.	Id	Content (L3_C6_68_#8 ~ #20)
#12	Anglea	Attention! Whenever we upload our files, the file name is unified as C_N-N (Taking the assignment of 1th week of group C9 as C_9–1for example; the assignment of 2nd week in group C10 as C_10–2, and so forth. This information was forwarded from the Mentor's Diary Board. Please name files accordingly whenever you upload!
#13	Little grass	Hmmm ~ I got it ~ ~ Should we rename all the files uploaded before or not bother?
#14	Little grass	Hmmm ~ Maybe your hard disk is not big enough ~ ~ Actually it doesn't matter. It will be okay as long as you make contributions in our forum frequently. ~ haha ~ ~ ~ ~
#15	Little grass	Hmmm ~ ~ roy7577 and *I have the same schedule for cram school*, – Monday through Wednesday. I even have one more class on Sunday morning. I will not be able to get online until 10 pm on these three days. On the rest of the days I will be available as soon as the class is dismissed. There will be only two whole-day classes for those on the social science track, but I am on the science track and therefore have whole-day class Monday through Friday during summer……+.+‖
#16	Little grass	Hmmm ~ It would seem that we will have to modify our team hypothesis and strategies for testing the hypothesis.
#17	Little grass	~ Why didn't I see your messages?? Have you been busy recently? ~ ~ haha ~ ~
#18	Latte	Hmmm ~ ' Actually I am not too busy…I studied around the clock on Monday and then slept all day on Tuesday. I went out to see a doctor last night…Little-grass I admit that I haven't been in a position to join you and make contributions. This is because I haven't downloaded the information successfully. It may be due to the internet jam-up I encountered each time, but I just can't stand myself any more. I've got an idea. I saw that you guys need someone to re-upload all the files with unified filenames. I kept all the files from the assignments of the first two weeks. I can undertake this job if necessary. Let me know; I will do as you say. BTW, Angela, I had the same frustrating experience that you did when I downloaded Yahoo Messenger last time. But when I tried it again, it worked.…I still can not figure it out anyhow.
#19	Little grass	Hmmm…OK …I understand. I also stay up late and wake up very early to go to school everyday. ~ ~ I dozed away the whole morning in the class even though I tried hard to stare at the teacher in order to prevent myself from getting sleepy. ha ha …I am not a good example. ~ ~ ~
#20	Latte	Hmmm ~ '' roy7577, listen, I didn't get your letter in my Sina's mailbox until yesterday. Sorry ~ ~ I haven't checked the mailbox for a long time. Since my classmate told me that she sent a letter to me in that mailbox and it bounced, I seldom check that mailbox. Ha…I dreamed of seeing you last night. It was probably because I could hardly stop thinking about our work before I went to bed. Does my nickname look boyish? "Latte" is just a symbol. …The reason I joined this activity is that I thought it was our required assignment during summer vacation. Actually I found a lot of students didn't register for this activity. They did something else instead. And in response to the question "which school are you in?"…I am not a student of Miaoli senior high school, but I am also in Miaoli County. Hmmm…We can chat more via Yahoo Messenger after the deadline on Sunday night. It's Wednesday already. I have been anxious about the progress of our assignment…. Because …I cannot have Little grass do everything all by herself!? I just found that the postings I downloaded from the discussion forum were not saved successfully. All of the files were empty. I have to download them again. To tell you the truth, the trip to Kenting was so so …I swallowed a lot of seawater … and spent a lot of time stuck in traffic.

Different levels of participation bring up the issue of synchronous discussion. In a networked world, assumptions are made about which people can benefit from logging in anytime and anywhere. Surprisingly, the high school students in Lain are quite bothered by this aspect of the environment, in particular by the fact that that members login at different times which introduces a factor of unpredictability in that it becomes difficult for a contributor to know when there has been a reply to his/her posting. This results in the problem that this asynchronous discussion becomes ineffective as students conclude that synchronous discussion speeds up interchanges and benefits the quality of collaboration.

As shown in the above excerpt, negotiating a regular login time can be a troublesome issue, even though everybody prefers synchronous discussion. There are four persons involved in this conversation. Little grass voices her concerns in #8 about coordination at the very beginning of that week. She proposes a specific time for synchronous discussion. Her teammates are called on to respond to her request. Little grass attempts to remind them of mutual accountability: "Who is responsible for this part of the task this week?" Simply put, Little grass is assigning her teammates their respective tasks and trying to get them to commit themselves to assuming roles in the upcoming joint enterprise.

As a second person, roy7577, defensibly claims in #9 that she has to go to cram school three nights a week. Angela, the third member, admits in #10 and #11 that she can only login around eight o'clock in the evening. She also declares that she was unable to install MSN messenger and could therefore not join the regular synchronous group discussion. Apparently, many of the members claimed to be having difficulty participating at the proposed time.

What is the meaning of participation in this group? It is clear that even though the proactive members contributed much more time than did their "in and out" colleagues, they never received a bonus for their tireless dedication. This ideal level of engagement was not acknowledged nor recognized by the group as a whole. Rather, the meaning of participation has various degrees of currency. "In and out" members have various degrees of control over the meanings that the proactive members produce, and thus differential abilities to make use of them and modify them. From the perspective of communities of practice (Wenger 1998, p. 200), the negotiation of meaning of participation involves bids for ownership. The above episode with lots of social talk was a revelation of the group members' bids for ownership of the meaning of participation.

Collaboration is made possible through active involvement in negotiation. What would the proactive members do if "in and out" members simply confessed their inability to contribute? The first tactic they used for negotiation was rebuttal. Little grass, a proactive member, demonstrates her rebuttal in a mild manner. For example, in #15 Little grass mentions that she actually has the same schedule of after-school classes in the evening, and even has one more day of classes than does Roy7577. What distinguishes the proactive members from the "in and out" members in this study is that Little grass is still able to find time to login after the cram school. During the rest of the week, she would login right after school. Little grass firmly maintains that "You can do it too." Hidden in some trivial talk about school life, Little grass seems to engage unintentionally in face-saving practices (Goffman 1967, p. 24).

Another example of soft persuasion can be found in #16–18. Little grass expresses her concern for the last member's (Latte's) absence. Her message is mitigated somewhat with a certain amount of friendliness by adding "ha～ha～" at end of her post. Latte's reply is quite a long one. She first mentions that she has been working around o'clock and needs to catch up on sleep. After some excuses, Latte begins to admit "*I admit that I haven't been in a position to join you and make contributions.*" She mentioned that what she had done was

to download information but that she was not successful in getting the files. She knows that this is not going to work out unless she changes her working attitude and becomes more productive. The words: "I got your message" fully explain what Little grass was trying to point out: be more work-oriented! Negotiating through soft talk proved to have a certain influence on cohesive teamwork.

The same strategy, putting "ha～ha～" at end of a message, used by Little grass when she intended to criticize or blame group-mates, can also be found. In #11 as Angela fails to install MSN messenger and is thus unable to join the synchronous discussion. In addition to discussing possible problems in installing MSN, Little grass's way of comforting Angela in #14 is by saying "as long as you frequently make contributions in our forum." This can be considered really harsh criticism even in the form of social talk.

A second negotiation can be found in concessive interchanges. With Little grass's soft talk delivered in #17, Latte admits that she has made little contribution to group work. By offering to do more trivial work for the group, Latte is moving herself toward being a more engaged partner. "I kept all the files of assignments of first two weeks. I can take this job if necessary. Let me know, I will do as you say." With Little grass's prodding interchange in #17, Latte voluntarily takes responsibility for some minor work. In #20, after a very long interchange, Latte expresses her worries: "It's Wednesday already. I have been anxious about the assignment…. Because …I can not have Little grass do everything all by herself!?" A commitment to teamwork on the part of less involved participants can thus be shaken into place.

When viewed this way, social talk can clearly be seen to convey a great deal of soft power in the facilitation of on-task discussion. Major strides are made in group collaboration if less active participants can be persuaded to take responsibility for minor work. Social talk has been proven to be an appropriate way/channel to integrate individuals with diverse aspirations into a group engaged in productive teamwork.

The third type of negotiation could be considered to be the monolog. Communication within the asynchronous online forum normally takes the form of dialog. However, when a proactive member visits a forum to find that nobody else has shown up in the forum and feels frustration, a monolog may result, which, through irony, flattery, or sarcasm is intended to coerce, entice, or shame other members into participating.

The following episode is excerpted from part of a thread which consisted of 28 postings and lasted for 4 days during the 5th week. There were a total of 9 IPs in this thread, with 7 IPs occurring before and 2 IPs after this episode. Except for two messages produced by one other member toward end of this thread, all postings were developed by Little grass (20 postings) and the mentor of the group (6 postings). Little grass, the proactive member, is typical of the monologist. What happened to the rest of her teammates?

No.	Id	Content (L3_C6_76_#18 ～ #22)
#18	Little grass	T.T ～ *Why haven't you logged in*, my dear team members? I have lots of questions to ask T_T
#19	Little grass	*I cannot finish the assignment without your input. You are so important to me.* I will write the conclusion part first ～ I have to go to cram school tomorrow night.
#20	Little grass	I have done this part. It is not well written. Actually this is not my point. *My point is that none of you are willing to login still?* I have questions but I find nobody to discuss them with. I've got to take a bath now.

No.	Id	Content (L3_C6_76_#18 ~ #22)
#21	Little grass	You are my angle ~ ~ ~ ~ ~ Angela ~ ~ ~ ~ ~ ~. How wonderful to find you are online now. I am going to take a bath. I am glad that I don't have to modify my nickname to "Lonely" little grass.
#22	Little grass	Why did you leave in such a hurry, Angela? ? I have decided to modify my nickname to "Lonely" little grass.

The messages from Little grass are very clear. All she is trying to accomplish is to make co-presence in the forum a reality. She left messages fawningly in an effort to keep team members together. "I cannot finish the assignment without your input. You are so important to me"(#19). From #18 to 20, Little grass's expectations of group members include: asking them to login, asking for company, asking questions, asking for suggestions and comments. Meanwhile, she expresses her mood after she has accomplished the team assignment. "I have done this part. It is not well written. Actually this is not my point. My point is that none of you are willing to login still?" She points out to her teammates that her time limitations are as restrictive as theirs are. All of them are in the same boat having to balance both school work and Lain activity.

Lack of mutual engagement from her teammates was extremely frustrating. Little grass was very upset, mostly due to lack of responsiveness on the part of her peers. She kept on waiting and trying to share her feelings, but in vain. What was even worse was the fact that, when someone did show up eventually, the Internet connection goes wrong. One of her team-mates logged in and logged off right away. Like online forum systems, IDs of all online participants are automatically listed. These records are unfortunately not always reliable and what happened was that Angela did not actually logoff right away though the system showed that she had done so. Little grass expected Angela to join and engage in discussion. After she took a shower, her teammate disappeared. In #21 and 22, she was extremely disappointed by the actions of her "in and out" teammates.

The expectation gap between proactive members and less engaged members manifests itself clearly. Proactive members expect everyone to be deeply involved and hope that teammates will do their best. However, what really matters in online context is that a group establishes what it means to be a competent participant, an outsider, or an "in and out" member. If a member does not engage enough, s/he would not be able to become competent in collaborative forum discussion. Knowing can be recognized as competent participation in practice. Toward the end of the six weeks, the joint project became more complicated than ever and the group members became less capable of contributing messages if they had not maintained sustained participation. Little grass had to have discussions with the group mentor instead when she really wanted to get constructive input. The difficulties the less involved members encountered may not have been evident to the proactive members. As this excerpt shows, Little grass never ceased to beat the drum of co-presence for she believed that every teammate would eventually come back. Uneven negotiability and contested ownership among participants continues to emerge in social talks, and ideal "co-presence" is continuously re-negotiated between proactive members and their "in and out" teammates in the form of social talk.

The tripartite symbiosis may be a means of description. Soft power was practiced within social talk, especially by the proactive members. Social talk was exerted to make teammates work and leave postings. Soft power was implemented implicitly by "in and out"

participants to assert their presence and demonstrate a degree of participation, albeit on a less active level than that of their proactive teammates. Obviously social talk is not merely an exchange of personal interests involving school, friends, and worries. Underlying their small talk, is a constant negotiation of the meaning of online teamwork. The presence of this negotiation of meaning reflects the inherent fluidity of member relationships in the collaborative learning environment. Both proactive and "in and out" members make use of and modify these meanings to differing degrees. Social talk is the cover for negotiation of the degrees of currency of meanings among group members. Task talk is interrupted whenever such negotiation is needed since all were making an effort to finish their tasks together and meet the deadline. When viewed from this perspective, we discovered that, in many situations, social talk served as a yardstick by which the difficulties that were occurring in task talk and negotiation could be gauged. Therefore we see task talk, social talk, and soft power as tripartite symbiosis.

Conclusions

Many important aspects of online discussion, as it relates to learning, remain understudied (Dennen 2008). Social talk in this paper is indeed one of those aspects. Learning may take place through actions that we cannot see, but also through visible actions that we ignore. Social talk is normally composed of the type of message whose meaning is predetermined, messages therefore eliminated from analysis at an initial stage. Using a confluence of methods and taking a highly contextualized approach to analyzing the role played by social talk, we discovered that social talk is surprisingly beneficial to learning.

The results of this study provide evidence of the positive aspect of social talk in online discussion. Firstly, a certain number of messages that were selected by learners as Important Postings have the attributes of social talk. Secondly, the interweavings of different categories of postings are examined statistically and significant correlations are found between social talk and on-task talk as well as social talk and the emergence of Important Postings.

Thirdly, light is shed on how, exactly, social talk contributes to group learning. Soft power embedded in soft talk functions as one kind of subtle instrument for both the proactive and "in and out" members during team collaboration. For "in and out" participants, social talk is a ladder to more comfortable participation; for proactive members, social talk is a powerful way to influence teammates. Negotiation can be present within social talk. Whenever a team encountered collaborative problems, social talk emerged immediately. Social conversation is not an off-task activity. On-task and off-task talks not only co-occur, but also interweave to accomplish effective discussion and negotiation.

This study contradicts commonly held beliefs and assumptions concerning the conventional meaning of social talk. Rather than anecdotally inferring that social interaction is valued, or off-task behaviors are necessary to establish a virtual social presence (i.e., Tutty and Klein 2008), this study debunks misconceptions and redefines the meaning of social talk. Social talk, in our study, is considered to be purposive, strategic, goal-oriented postings, rather than casual, off-topic conversation, irrelevant to the learning process. If we are to understand better how effective learning occurs, we cannot exclude these social conversations and discard them as irrelevant to effective learning.

As with any other research, certain limitations of our findings must be noted. These results occurred very probably because Lain was a naturalistic virtual setting in which engagement was always an issue. Rather than using a point-for-post method to assess

learners' performance, participants in this study were able to withdraw, intermit, wander, or engage at their own pace. There was also no factor present of a specific mandate to produce a minimum number of on-topic messages. Participants worked in a large community consisting of 82 groups over a period of six weeks. Managing peer relationships and organizing participation were as important as the activities of domain-related discussion. The findings therefore need to be viewed with caution as they would not be representative of other types of online collaborative learning environments. Moreover, in analyzing statistically the interwoven relationships among postings of different categories, we purposely selected threads which contained large numbers of postings. Future studies with short threads would be useful to verify our findings.

Yet to be resolved is the accuracy of the categorization of single messages. Sorting postings is problematic in terms of identifying appropriate content. In most cases, one posting either contains messages with multiple attributes or needs indexical elements to make further judgment. This involves therefore a time-intensive process of negotiation between raters. However, the conduct of content sorting does not exist in isolation and the results of this study were supported by the use of multiple mixed methods.

The results of this study have implications for identifying the indicator of group learning difficulties. 'Where does learning take place' has been one of the most promising concerns in the learning sciences community. Relatively little attention has been paid to the indicators of group learning difficulties in online forums, with emphasis being placed typically upon more direct measurements. For example, Hewitt (2005) investigated how threads die; Guzdial and Turns (2000) considered whether a group can maintain a sustained and focused discussion; Zhu and her colleagues (Zhu et al. 2005) explored the attrition of learners in group learning; Chen and Jiang (2004) compared two groups with similar quantities of interchanges but producing different group products. None of them probes the phenomena of group interaction that may subtly reflect group learning difficulties. Of further interest in the present study is the fact that social talk can be considered to be a yardstick reflecting the state of collaboration and the barriers that arise during collaboration. Examining social talk may be a very effective way to assess and evaluate an online collaborative learning process.

By the same token, factors related to online passive participation should be further explored. As previously mentioned, the difficulties the passive participants encountered may also be invisible. Passive participants, like some lurkers, could produce productive learning (Beaudoin 2002). They learn something important not only because they engage in reading postings made by others, but because they observe how to develop the competence required to work together in a community and to foster group cohesion (Lee et al. 2005). For these lurkers, social talk functions as an accelerator of cohesion: knowing when to cheer up fellow members, when to accompany, and when to talk (or not talk) properly. Do "in and out" members in this study have the same sources for learning as lurkers in an online environment? Additional research is needed to explore how they can become competent in online learning. As more studies explore peripheral learners in online group learning, it is hoped that our ability to identify the indicators of group learning difficulties will improve.

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Fei-Ching Chen is a Professor in Graduate Institute of Learning and Instruction at National Central University in Taiwan. She is interested in computer supported collaborative learning and pays attention to peripheral learners in groups.

Thomas C. Wang earned his Ph.D. in Sociology from University of Minnesota. He is a researcher enjoying across boundaries.