

# A Study of Group Interaction Patterns and Emoticon Use in a Synchronous Discussion Activity

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## Abstract

This study explores the group interaction patterns and emoticon use in a synchronous discussion activity within an international distance course. It adopts the qualitative research approach and analyzes data collected from messages posted onto the online discussion boards of four learning groups during their online discussion activity. The transcript analysis tool (TAT) was used to analyze interaction features on a sentence-level. With TAT, transcripts were coded within five main categories by three raters. The findings suggested that differences in focus on the factual elements (statements) distinguished group involvements with online network, and each group showed the same preference in providing support to teammates. Besides, emoticon use was proved to be a good method to strengthen interpersonal interaction and to enhance social presence during the interaction process. Students viewed synchronous online discussion as an impressive and helpful learning activity which benefited their positive attitudes to international distance learning. This study concludes that with sound online learning activity design, synchronous CMC is beneficial to improve interaction and to increase students' willingness to participate in class activities.

**Keywords:** computer-mediated communication, emoticon use, interaction patterns, international distance course, synchronous discussion

# 1. Introduction

Communication patterns among instructors and learners have changed along with the transforming adoption of the advancing technologies. Foci of new ways of communication moved from knowledge delivery to collective knowledge construction with social negotiation processes. Computer supported collaborative learning (CSCL) is encouraged in education settings that has various types, such as computer-mediated communication (CMC), computer-mediated discussion (CMD), computer conferencing (CC), and networked learning (NL). Although concepts of these applications are somehow different, however, they share the common basic principle that learners would use computers as a medium to exchange messages with each other (Wever, Schellens, Valcke, & Keer, 2006).

Social constructivism theory suggests that learners can acquire the most effective learning through process of peer discussion in exchanging opinions, experiences and perceptions. Along with the widely adoption of internet technology, computer-mediated communication became more and more important in higher education. The main role of networked computers has shifted from providing structured learning materials to facilitate communication among learners (Mason & Bacsich, 1998; Pena-Shaff & Nicholls, 2004). With the great computing, storage and analysis capability of computers, instructors and researchers can easily track learners' development. They can also understand how students collaborate with each other to create and sustain purposive interactions, what management methods are adopted by task groups, and how individual learner connects with others in online learning environment by analyzing online discussion contents (Hara, Bonk, & Angeli, 1998; Walther, 1996). One approach to analyze group interaction is by studying the sequential nature of messages and responses exchanged between learners to determine how particular factors that affect the processes, help or inhibit groups from achieving the desired outcomes. As a result, a process-oriented approach to studying computer-mediated communication enables researchers to develop computational models to explain and predict patterns in group interaction based on specific features of the message and the conditions surrounding the exchange of messages (Jeong, 2005).

Moreover, while most recent instant messaging tools and services provide useful emoticons, some researchers (i.e., Derks, Bos, & Grumbkow, 2008) contended that by using emoticons, users

could express emotions and strengthen messages as well as express humor immediately even in a computer-mediated communication environment at distant. Emoticons can provide support to written communication, in the same way that visuals or body language can enhance verbal communication. Facial expressions are crucial in conveying emotions during face-to-face communication, and emoticons are a means to express feelings and intent regarding a particular sentence or statement sent via electronic form. By integrating emoticons into text-based communication is an alternative way for facial cues found in face-to-face contexts (Rezabek & Cochenour, 1998). Therefore, teachers and researchers also can further understand the emotion expressed in their interaction.

Although there have been great amount of researches on asynchronous online communication to explore its advantages, disadvantages, and possibilities in education, however, very little was found to investigate the applications of synchronous online discussion as a learning activity. As Jonassen, Peck, and Wilson (1999) argued, synchronous online discussion can assist learners to develop skills in socialization, reading, writing, negotiation, and communication, it gives learners a chance to rethink and absorb what they actually learned. Therefore, it is helpful for instructors to consider adopting synchronous computer-mediated communication to facilitate students' collaborative learning and knowledge construction as well as to encourage interaction among learners in distance courses. Besides, it is as well important for researchers to explore students' patterns of interaction and emoticon use in synchronous communication that would further help advance teaching and learning with computer-mediated communication.

## 2. Literature Review

Computer-mediated communication systems are network-based computer systems which use electronic forms, such as newsgroup, e-mail, computer conferencing system, virtual classroom, internet relay chat, etc., to allow users to share ideas, opinions, comments, and attitudes to specific issues or topics. Researchers considered the common advantages of CMC include increasing cohesiveness, productivity, team performance, construction of knowledge, and critical thinking skills of team members (Buraphadeja & Dawson, 2008; Ehsan, Mirza, & Ahmad, 2008; Saritas, 2008).

Many CMC systems use texts as a fundamental communication and dialogue medium since the permanence and explicitness of text can strength writing skills and encourage deliberate articulation

of ideas (Pena-Shaff & Nicholls, 2004; Veerman, Andriessen, & Kanselaar, 2000). And there are two types of text-based CMC: asynchronous and synchronous. Asynchronous CMC seems to be used more frequent in many computer-supported learning environments (Hrastinski & Keller, 2007). However, other researchers see real-time interaction between learners as an advantageous feature of synchronous CMC, and use synchronous CMC as the primary communication mode in distributed learning environments (Cameron, Barrows, & Crook, 1999; Orvis, Wisher, Bonk, & Olson, 2002; Stromso, Grottumt, & Lycke; 2007). In a problem-based learning context, Lo (2009) compared the use of asynchronous (i.e., Blog and wiki) and synchronous (i.e., MSN) CMC tools and found students tended to discuss more in real time. Carr, Cox, Eden, and Hanslo (2004) compared the degree of participation between synchronous discussion and face-to-face meeting, and found that text chats could enhance students' participation. Moreover, Simon (2006) also pointed out there is no difference in task performance among instant-messaging system, videoconferencing and face-to-face communication, which was consistent with the findings of Suh (1999). In regard to communication process, Kerr and Murthy (2004), and Stromso et al. (2007) further considered participants in synchronous CMC feel freer to propose ideas without any interruption from peers, and it may support the brainstorming process than it in face-to-face communication.

Either in asynchronous or synchronous communication environment, it is important to understand the interaction and communication process in groups. Researches have proved collaboration can improve learning effectiveness. By way of deliberately express ideas and opinions, learners can help each other to understand and clarify learning content more deeply, further, co-construct and form productive problems. Therefore, peer interaction plays an important role in collaborative learning (Chan, 2001). However, just placing students in groups and assigning them tasks could never ensure the group members will successfully display effective collaborative learning behaviors. Soller (2001) found that some peer groups interact naturally, and the others may appear a balance relationship among participation, leadership, understanding, and encouragement. Schrire (2006) proposed that in computer conferencing environment, interaction means the messages respond to each other, and differs from participation means the number or average length of messages post. With computer conferencing, it allows learners to reflect more thoughts, form cognitive process, as well as express emotions along with the discussions.

How would learners interact in group discussions? Fahy (2003) found learners used a great deal of different interpersonal strategies to support each other, such as asking open questions, talking about opinions with each other, inviting others to discuss, and using emoticons to express feelings. Hara et al. (1998) also found that the discussion contents usually contained emotional

expressions, self-introductions, jokes, and greetings which provided social presence messages. However, as Rourke, Anderson, Garrison, and Archer (1999) argued, although interpersonal support behaviors can increase in-depth and meaningful learning in online interaction, but overmuch supportive behavior may also endanger learning outcomes.

In education, text in CMC possesses dialog and regulation functions as the important role of spoken language in face-to-face classroom interaction (Wells, 1996). Text communication not only can foster complicated and in-depth thinking, knowledge construction and learning, but also record all information of what learners exchanged with each other to reflect their learning process. Besides, transcripts of all group members wrote in conferencing can be used to explore the process and judge the results of group collaboration and individual contribution (Macdonald, 2003). Therefore, in order to understand students' learning status, it is possible to analyze their negotiation process and information articulated during online discussion (Veerman et al., 2000).

In the past, many researchers usually adopted self-developed tools to analyze transcripts based on different research purposes. Jeong (2003) used discussion analysis tool to investigate the patterns of interaction and its influence on critical thinking. Fahy (2003) used transcript analysis tool (TAT) to examine communication styles and network preferences. And Hara et al. (1998) used Henri's (1992) analytic structure to investigate the patterns of interaction and meta-cognitive skills. Since every study used different analysis tools, it is difficult to repetitively examine the reliability and validity of the developed tools. There are generally three concerns about using this kind of analysis techniques including discriminant capability, reliability, and unit of analysis. Fahy (2001) used TAT as an analysis tool and found that with the increase of experiences and appropriate practices, the inter-rater reliability would increase. It has become a frequent adopted tool that the current research would also use in analysis of students' interaction patterns (Curran, Kirby, Persons, & Lockyer, 2003; Gibbs, 2009; Ngah & Choo, 2005; Schellen & Valcke, 2006).

While this study intends to explore how students interact in a synchronous computer conferencing learning activity, the purposes of this study are: (1) to examine interaction patterns of student group communication; (2) to examine supportive behavior preferences of student group communication; (3) to examine the role of emoticons in of student group communication; (4) to determine the helpfulness of synchronous discussion in facilitating online group learning activity.

## 3. Methods

### 3.1 Study Contexts

This study is conducted within an online learning activity in an international distance course between two universities of Taiwan and Japan in fall semester of 2005. Video conferencing system is used for weekly synchronous lecture, which accompanied with a learning management system (LMS) with asynchronous learning supports including supplemental materials and interactive forums. Participants were twenty-four students enrolled in this course that included 6 males and 18 females of both undergraduate (91.67%) and graduate (8.33%) students.

The online learning activity was designed to have students discuss in groups synchronously on the forum assigned. Students were required to log on to the course website at the appointed time from anywhere at their convenience. They were divided into four groups by the instructor in advance and each group has five to seven students internationally and interscholastically. Activity tutorial with guideline were provided online so that students can read it before starting the assignment or refer to it whenever they need to during the activity. The theme for group discussion was “What learning would be like in the next decade?” and students were encouraged to discuss it autonomously base on their experiences, imaginations, or refer to any resources. However, they need to complete the discussion within the time limit (1.5 hours) and then post their conclusions onto the course LMS.

### 3.2 Computer-Mediated Communication System

Although there are different CMC systems in supporting online discussion, such as BBS, NetMeeting, Cosy, Eudora Pro, and Sentence Openers, it should be a match between the system and task to attain better learning performance (Munzer & Borg, 2008). As Veerman et al. (2000) suggested, instructors should establish a user-friendly and easy to understand CMC system to provide a place for learners to discuss smoothly. Based on task-technology fit (TTF) theory, team performance is optimized when CMC toolset provided to team members matches the requirement of the task (Zigurs & Buckland, 1998). This study adopted the phpbb-based online discussion board which included four group boards and one technical support board (see Figure 1). This system was selected because it has the server and database format, is quick and easy to install, and can be

integrated into course learning management system (Lin, Yueh, & Minoh, 2006). Besides, students can share ideas and comments in the open environment, instructors can monitor and provide assistance at anytime. Moreover, the interface of this system is organized and user-friendly that all students can easily understand and quickly start to use it.

The screenshot shows the phpBB forum interface for 'EL 2005'. At the top, there is a navigation bar with links for 'FAQ', 'Search', 'Memberlist', 'Usergroups', 'Register', 'Profile', and 'Log in to check your private messages'. Below this, a table lists forum topics. The table has columns for 'Forum', 'Topics', 'Posts', and 'Last Post'. The data in the table is as follows:

Forum	Topics	Posts	Last Post
System Problem Problems of using this bbs system	5	7	Wed Nov 09, 2005 12:22 pm jason
Group 1 Kate, Winnie, Davina, Tim, Melody, Yui	25	108	Wed Nov 09, 2005 11:44 pm 551610124
Group 2 Elaine, Jessica, Shiba, Sharston, Kim, Jie, Yi-Ting	11	92	Fri Nov 18, 2005 11:45 pm 2169006
Group 3 S5D, Cindy, Teresa, Littlebow, Jan-Yu Yu, Shaheed, Kama	17	96	Wed Nov 23, 2005 11:53 am 82541847
Group 4 RoboWang, Jason, Dattoz, Shrij, Baba, Jih-Yi Lin	12	41	Wed Nov 09, 2005 1:04 pm 60000

Below the table, there is a 'Who is Online' section. It states: 'Our users have posted a total of 394 articles who have 28 registered users'. It also lists the most recent registered user as 'Baba\_Bin\_3' and the most users ever online as 27 on Wed Nov 09, 2005 11:53 am. A note at the bottom says 'This data is based on users active over the past five minutes'.

Figure 1 Phpbbs-based online discussion boards

### 3.3 Analysis Technique

This study adopted transcript analysis tool (TAT; Fahy, 2001) as the analysis technique to analyze the interaction patterns of and online supportive behavior of student groups. The TAT was based on a model originally developed by Zhu's (1996) discussion content categorization and Vygotsky's theory of proximal development (Curran et al., 2003). In Vygotsky's theory, zone of proximal development is the difference between what a learner can do without help and what he or she can do with help. An important concept in Vygotsky's theory is that social interaction is the basis for cognitive growth. The communication that transpires in a social setting with more knowledgeable or proficient people, such as teachers and peers, assists learners in building an understanding of the concept. Therefore, learning is most effective when it is facilitated through dialogues between learners and mentors or peers, who challenge, support and scaffold them.

As shown in Table 1, transcripts are classified into five categories including questioning, statements, reflections, scaffolding, and references and authorities. In addition, this study adopted Fahy's (2003) aspect and viewed type1B, 2B and 4 as online support behaviors to understand what supportive strategies were most used by the students. Type1B interaction helps the group establish and shape consensus to an adequate answer; type2B interaction promotes dialogue to express opinions, questions and responses to others; type4 includes greetings, thanks, encouragements and other social conversations.

Table 1 TAT analysis structure

Primary Category	Secondary Category	Description
Type1 – Questioning	Type1A – vertical	a correct answer exists
	Type1B – horizontal	may not be one right answer
Type2 – Statements	Type2A – direct	do not invite response or dialogue
	Type2B – answers or comments	direct answers to questions, or comments referring to specific preceding statements
Type3 – Reflections		express thoughts, judgments, opinions or information which are personal
Type4 - Scaffolding		to initiate, continue or acknowledge interpersonal interaction
Type5 – References, authorities	Type5A – references, quotations	reference to, and quotations of other sources
	Type5B – citations or attributions	citations or attributions of quotations

(Sources: Fahy, 2001; 2003; modified by researchers of this study).

The discussion postings from each of the four groups were downloaded from the CMC system for discourse analysis. Coding was accomplished on a sentence-by-sentence basis by three raters who had educational technology background. After coding the transcripts of one group by each individual rater, the quality of the coding was assessed by determining Cronbach alpha. A value of 0.8 was put forward as an acceptable criterion for inter-rater reliability. The inter-rater agreements among three raters varied from 0.83 to 0.95, and the inter-rater reliability was 0.957 which attained a rather reliable level.

## 4. Results

### 4.1 Interaction Patterns and Emoticons Use

To address questions of this study, the complete 289 postings, 761 sentences, 10,415 words of the conferencing transcript from the online discussion activity was coded and analyzed using the TAT technique to examine communication of the four groups. The results show that group 1 produced most of the postings (36.27%), followed by group 2 (28.65%), group 3 (21.16%), and



group 4 (13.92%). As seen in Table 2, type 2A (statements, 37%) and type 4 (scaffolding, 28%) predominated the communication, followed by type 3 (reflections, 11%), and altogether, these three types accounted for over three-quarters (76%) of the sentences in the transcript. Those behaviors (statements, scaffolding, and reflections) were also the averagely most used interaction behavior types across the four groups. On the other hand, type 5B (citations) was the least used type, only got 5 (0.66%) posts from all groups.

Table 2 Frequency of primary group interaction behavior types by TAT analysis structure

	Group 1	Group 2	Group 3	Group 4	Total (%)
Type 1A	12	16	13	2	43 (5.65)
Type 1B	16	13	3	3	35 (4.60)
Type 2A	89	73	86	36	284 (37.31)
Type 2B	12	13	3	8	36 (4.74)
Type 3	36	20	16	18	90 (11.83)
Type 4	66	80	34	37	217 (28.51)
Type 5A	45	3	2	1	51 (6.70)
Type 5B	0	0	4	1	5 (0.66)
Total (%)	276 (36.27)	218 (28.65)	161 (21.16)	106 (13.92)	761 (100)

Table 3 shows the result of transforming type 1B, 2B and 4 into the category of supportive interaction behaviors. For all the four groups, the ratio of supportive sentences to total sentences is 37.84%. Among them, group 2 and group 4 had nearly one-half of supportive sentences, at 48% and 45% respectively.

Table 3 Analysis of transforming types of group supportive interaction behaviors

	Group 1	Group 2	Group 3	Group 4	Total
Supportive sentences	94	106	40	48	288
Total sentences	276	218	161	106	761
Support behavior ratio (supportive / total sentences) x 100%	34.05%	48.62%	24.84%	45.28%	37.84%

Since emoticons may serve as a nonverbal emotion expression in computer-mediated communication, Table 4 shows the results of emoticons all students in the four groups used in each sentence. The phpbb-based online discussion boards provided forty-two emoticons. The 15

emoticons used by students in this study were very happy, smile, sad, surprised, shocked, confused, cool, laughing, razz, embarrassed, crying, rolling eyes, wink, exclamation, and question. Averagely, very happy (27.69%) and smile (23.85%) were the most popular emoticons. And for all groups, the ratio of emoticons use to total sentences is 15.51%. Among them, group 2 had the highest of emoticons used sentences (22.94%), followed by group 1 (13.41%) and group 4 (13.21%). To further explore what emoticons students used with TAT types, the results showed that most emoticons students used were in type 4 (scaffolding) for all groups, from 78.57% to 51.35%.

Table 4 Analysis of students' use of emoticons in group interaction

	Group 1	Group 2	Group 3	Group 4	Total
Emoticons use sentences	37	50	17	14	118
Total sentences	276	218	161	106	761
Emoticons use behavior ratio (emoticons use / total sentences) x 100%	13.41%	22.94%	10.56%	13.21%	15.51%
<b>Emoticons</b>					
very happy	7	19	6	4	36 (27.69%)
smile	6	21	2	2	31 (23.85%)
sad	0	0	1	3	4 (3.08%)
surprised	3	1	1	0	5 (3.85%)
shocked	3	0	0	0	3 (2.31%)
confused	1	2	1	2	6 (4.62%)
cool	1	0	0	1	2 (1.54%)
laughing	3	3	1	0	7 (5.38%)
razz	2	3	1	1	7 (5.38%)
embarrassed	3	2	1	1	7 (5.38%)
crying	3	0	1	0	4 (3.98%)
rolling eyes	3	1	1	1	6 (4.62%)
wink	4	1	1	0	6 (4.62%)
exclamation	2	0	0	0	2 (1.54%)
question	3	1	0	0	4 (3.98%)
total	44	54	17	15	130 (100%)

## 4.2 Students' Reflections on the Synchronous Discussion Activity

Based on the end-of-course questionnaire responses, students reflected on this activity as one of the most impressive learning activity and thought that this activity was very helpful to their learning experience. Some students reflected as follows:

*"It was a cool instructional design, I never attended this kind of activity and it impressed me."*  
(student A)

*"Chatting and discussing with classmates at home was a new experience."* (student B)

*"This was my first time to participate in this kind of course, and I think it was very interesting"*  
(student C)

Besides, some other students' reflections also demonstrated that this learning activity expanded their understanding of e-learning or digital life, as shown in the following comments:

*"It was the first time for me to have the opportunity to interact with Japanese peers, and it made me really feel the advantage of internet."* (student D)

*"I got up, turned on my computer, and started the class in my own room. I truly experienced the digital life. It was interesting."* (student F)

Some students further elaborated that this well designed activity could *"overcome the critics to e-learning that it was unable to evaluate students learning"* (student G). Specifically, since this is an international distance learning course, students are satisfied and appreciated the opportunity to interact with foreign students.

## 5. Discussions and Conclusions

The results of this study were consistent with Fahy and Ally's study (2005) that among all groups most communication patterns were found to be type 2A and type 4. And they were varied in proportion across groups, type 2A from 53% (group 3) to 32% (group 1); type 4 from 37% (group 2) to 21% (group 3). Although both types had great variations, as type 2A (direct statements) got biggest span across groups (21%), it suggests differences in focus on the factual elements of the discussion and that may distinguish groups more than their involvement with the online network (type 4 scaffolding). Furthermore, results of the study also corresponded to previous study (Stromso et al., 2007) that when students discussed in the synchronous learning environment, they produced relatively more initiatives (type 2A, 37%) but less responses (type 2B, 5%).

To determine the students' online support behavior preferences and whether group members used supportive strategies to lessen interpersonal distance and increase interaction, findings of the study showed that over one-third (37.84%) sentences demonstrated as supportive interaction behaviors. The most common supportive activities focused on interpersonal recognition, extended dialogues, and demonstration of a sense of thanks, which indicates the importance of interpersonal communication in online group interactions. Results also found that some groups (group 2 and group 4) were more attentive to and involved in maintaining social network. Although the supportive behaviors were not used equally by each group, however, all groups showed the same preference (type 4) in how to demonstrate support.

Moreover, finding of the study showed that students' type 2 communication behaviors (statements, 42%) was much more than type 3 (reflections, 12%) that also concord results from former studies (i.e., Fahy, 2001; Fahy & Ally, 2005). Most contents in type 2 statements included topic-centered discussion, such as confirmation, problem construction, and explanation. In collaborative learning process, successful group learners usually provided more type 2 statements and viewed CMC systems as another learning supportive tool, and then performed well. Besides, while asynchronous discussion provides learners more time to reflect, in synchronous discussion environment, learners may respond and comment to each other more but reflect less due to the time limitation and the immediate demands of responding.

In the present study, most students used "very happy" and "smile" emoticons to express their welcome and thanks, provide encouragements and agreements, strengthen messages, sustain discussion process, and to build friendly online discussion circumstances. The results showed emoticons were mainly used to improve interpersonal interaction, increase their social presence (Short, 1976) and improve communication efficiency (Ehsan et al., 2008; Stromso et al., 2007). And this finding is also consistent with what Derks et al. (2008) contended that emoticons are usually used to express emotion, to strengthen a message, and to express humor. Besides, since Taiwanese and Japanese students in this study never met face to face as they were geographically dispersed and did not understand the text communication patterns in the two countries, it may make them feel more comfortable to use positive emoticons for establishing and sustaining interpersonal relationships (Thompson & Foulger, 1996; Walther & D'Addario, 2001).

Although Straus and McGrath (1994), Suh (1999) and Walther (1996) considered the computer-mediated form has negative effects on communication, such as it may take longer time for users to reach agreement or be less productive than it does in face-to-face communication, students in this study still could complete the tasks within time limit. Some groups (group 1 and 2) even

performed in an effective way which referenced to Simon (2006) who compared students' discussion within instant messaging and face-to-face conversations on a temporal basis.

In conclusion, results of this study suggest that given a friendly, ease to use tool such as phpbb-based forum, students can perform well in synchronous group discussion tasks. It proved that students were able to engage in collaborative online learning activities and make sense of the discussion topic through reading articles and working within the assistance from group members. Under synchronous, timed online discussion context, they came up with more subject oriented statements for discussion, along with lots of scaffolding on supportive interpersonal interaction, and used positive emoticons to show their supports to one another. Fewer reflections were found due to the limitation of time and format of online activity. Moreover, it showed that synchronous online discussion activity could enhance students' willingness to participate in class activities and altered student perception toward international distance learning and synchronous e-learning.

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# 小組線上同步討論活動中互動模式與 表情符號使用之研究

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## 摘 要

本論文旨在探討國際遠距學習情境中，學生小組在線上同步討論活動之互動模式與表情符號使用行為。本研究採用質化研究取向，分析資料取自於參與同步線上討論活動之四個學習小組張貼於 php-based 討論看板的所有文本。文本分析方面，本研究採用以句子為基礎(sentence-based)、包含五種文本類別之 TAT 工具檢驗學生的互動行為，由三位評分員分別據此分類標準進行分析，並經分析取得高評分者間信度水準。研究結果顯示，小組對線上網絡參與程度之差異主要表現於事實性的成分（陳述）的行為類型，且每一個小組對提供支持的行為都表現同樣的偏好程度。此外，學生對表情符號的使用行為也證明表情符號確實可加強在互動歷程中的人際互動與社會存在。學生認為同步線上討論活動是非常有幫助的學習活動，並且增強他們對國際遠距學習與數位學習之肯定程度。本研究提出同步電腦中介溝通活動可有效提升互動，藉由好的線上學習活動設計，更可增加學生願意參與學習活動的意願。

關鍵詞：電腦中介溝通、表情符號使用、互動型態、國際遠距課程、線上同步討論