

Discovering Cognitive Patterns of Online Discussions on Facebook and Messenger

I-Chun Julie Chen

With the increased choice of tools for cross-cultural communication, little is known regarding students' online discussion process, particularly their cognitive patterns in asynchronous and synchronous contexts. Therefore, the current study aimed to explore the effects of integrating literature circles, specifically students' cognitive patterns and perceptions via Facebook Group and Facebook Messenger. Participating English-as-a-foreign-language (EFL) students were trained in literature circle roles to enhance their reading skills for online communication. Topics for online communication were initially extended from in-class discussions to topics of individual interest. Qualitative and quantitative data were gathered and analyzed, including FB postings, student projects, reflections, interviews, and researcher's field observations. A Practical Inquiry Model was used as the primary coding scheme to examine cognitive patterns across two modes of communication. Findings indicated that more off-topic discussion behaviors, followed by exploration, were observed on Messenger than on Facebook Group. More behavior sequences were also found on Messenger. Overall, participating students considered instructional scaffolding, increased cultural knowledge, language awareness, multi-modal communication strategies, and border crossing as strengths for the online communication experience. However, lack of timely response, scheduling conflict, and project-related difficulties were mentioned as weaknesses and challenges.

Keywords: lag sequential analysis, online discussion, cognitive patterns

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Introduction

One's linguistic and socio-cultural knowledge, skills and attitudes about one's own and other cultures are deepened, enriched, reshaped, and refined through numerous cross-cultural dialogues (Angelova & Zhao, 2016; Byram & Wagner, 2017; Ciftci & Savas, 2018; Lee & Song, 2019; Liaw & Ware, 2018; O'Dowd, 2016; Priego & Liaw, 2017). In order to engage students' minds in effective, meaningful, and collaborative cross-cultural communication, EFL teachers have strived to integrate sound pedagogies through computer-mediated communication (CMC) (Chen & Yang, 2016; Liaw & Ware, 2018; Lin et al., 2017; Weng, 2020; Wu et al., 2013). Due to user-friendliness, familiarity and accessibility, one common integration of CMC into EFL curriculum is through social media sites such as Facebook (Lin et al., 2016). Studies of integrating social network sites have advocated for the affordance for English learning in relation to relatedness to online peers, autonomy, social acceptance, online learning community, motivation, and language competence (Akbari et al., 2015; Chugh & Ruhi, 2018).

Online communication tools, whether synchronous or asynchronous, have different affordances (Hou et al., 2015; Sun et al., 2018). Compared with asynchronous online discussion forums, most students prefer the social gratification they receive from Facebook (Akbari et al., 2015; Chen, 2020; Cheung et al., 2011). In addition to social interaction, when used as a Learning Management System (LMS), some students are also content with FB's pedagogical and technological affordances, such as sharing learning resources, organizing course discussion groups, or fostering teacher-student relationships (Jin, 2015; Junco, 2012; Wang et al., 2011; Wu et al., 2015). However, scaffolding approaches in engaging students' minds in cross-cultural discussion have received little attention, especially in non-fiction reading, often considered the most difficult and challenging in comparison with fiction or narrative reading. For this purpose, non-fiction literature circles are chosen to be the scaffolding framework for cross-cultural discussion. Consequently, cognitive patterns and student perceptions are investigated to evaluate the overall effectiveness and learning outcomes of the non-fiction cross-cultural literature circles.

Literature Review

Theoretical Framework

Social constructivist learning theory focuses on the social context of learning (Vygotsky, 1978). Vygotsky's social-cultural theory puts an emphasis on the "Zone of Proximal Development" in which learners acquire new concepts through interacting and receiving feedback from other learners such as peers or teachers. It is through this constant interaction that new knowledge or understanding is constructed gradually. Consistent with social constructivism theory, social presence is also an interdependent core element with cognitive, and teaching presence in the Community of Inquiry Model (Garrison et al., 2000). Social presence is viewed as the mediating factor between teaching and cognitive presence variables. Meaningful learning can be achieved when group cohesion, trusting relationships and common learning goals are constructed. In addition, cognitive presence consists of "definition of a problem; exploration for relevant information; making sense of and integrating ideas; and, finally, testing plausible solution" (Garrison et al., 2009). This reflects the inquiry process the students use for asking questions, constructing knowledge, negotiating, analyzing, synthesizing, and testing newly gained knowledge. Finally, a teaching presence is vital in establishing foundations for beneficial learning outcomes. Its responsibilities include providing learning content, designing learning tasks, monitoring, and assessing learning outcomes in a timely fashion (Garrison et al., 2000). Both social-cultural theory, and Community of Inquiry model set the theoretical frameworks for fostering online learning community for the current study.

Social Media for Academic Purpose

As compared to traditional online discussion forums offered through school-based learning management system, social media such as Facebook (FB) is generally considered to be more personalized, interactive, comprehensive, accessible, user-friendly, and facilitative to social interactions and possibly collaborative online learning groups targeted for the specific interests of the user (Lin et al., 2016; Wang et al., 2011; Weng, 2020). Studies show that FB is considered a social tool for undergraduate students to acculturate into college student identity and important for informal learning rather than for academic or educational purposes (Madge et al., 2009; Yu et al., 2010). Moreover, studies with college students reveal that certain FB communicative activities (e.g. commenting on content or co-curricular activities)

were related positively to learner engagement in educationally relevant activities while non-communicate activities (e.g. playing games, checking up on friends) are negatively associated with engagement (Junco, 2012; Shih, 2011). In Jin's (2015) study of the benefits of the cultural interactions between 32 Korean EFL college students and 20 English native speakers in the U.S over 15 weeks, she concluded that FB Groups were an effective and facilitative means for cross-cultural communication. Similar to the benefits of asynchronous discussion, functions on FB allow users to choose the mode of communication whether it has taken place in real-time or not. Therefore, providing empirical evidence for learner cognitive processes or patterns will be vital for future online instructional design on FB and Messenger. However, research areas regarding EFL learners' cognitive learning processes on asynchronous FB Groups and synchronous instant messaging Messenger for optimal English learning outcomes are underexplored.

Non-fiction Literature Circle (LC)

Literature circles, coined by Daniels (1994), are small discussion groups in which readers choose to read the same text such as a story, poem, or article. Each group member is assigned a specific role or task and should come prepared for regular discussion meetings. Group members rotate various group roles that serve as a guide to analyzing reading sections from various perspectives and facilitating discussion in each session. Commonly used LC roles are discussion director, illustrator, summarizer, connector, and literacy luminary (Daniels, 2002a). At the end of the chosen reading, group members create final projects for the class (Awada et al., 2020). Group members are then reformed with other group members and hence, new circles are constructed and a new cycle begins. It should be noted that the roles are considered as temporary facilitation guides at the beginning to engage learners in peer-supported discussions and eventually guide learners to then take ownership of LC based on the nature of group dynamics (Daniels, 2002b). The integration of literature circles in the L1 classroom has become a popular practice and has gained much success, contributing to increased reading interest and engagement (McElvain, 2010; Whittingham, 2013), enhanced reading comprehension of the text (Ferguson & Kern, 2012), reflective thinking (Beeghly, 2005), and the fostering of cooperative learning environments (Helgeson, 2017). Literature circles could also serve as a transformative instructional strategy for marginalized Syrian EFL refugee learners in Lebanon, in creating a "third space" (Awada et al., 2020, p. 2) for collaborative discussions for

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Lebanese learners to examine human rights critically from a personal, social, and international point of view.

Similarly, positive learning outcomes observed with Chinese-speaking university students have included enhancing reading comprehension (Hsu, 2004), promoting critical thinking (Liao, 2009), increasing learning engagement (Chen & Ho, 2018), and facilitating monitoring strategies (Chou, 2021). Chou's most recent quasi-experimental study with EFL university students in Taiwan provided empirical evidence that LC not only fosters linguistic and cultural knowledge but also facilitates metacognitive reading strategies and even retention of long-term memory. With the rapid innovation of technology, online literature circles with university students have also received positive English learning outcomes with Chinese-speaking university students (Chiang, 2007; Shih, 2011; Su et al., 2019). In Chiang's (2007) pioneer study of virtual literature circles with EFL university students who are non-English majors on BlackBoard, students improved in reading comprehension and general English proficiency after their one-year LC involvement. Researchers suggest the need for teachers to model, coach and train students in transitioning from face-to-face to computer-mediated discussion groups as well as integrating topics from literature circles into existing course requirements, such as quizzes, or oral reports (Chen, 2020; Liao, 2009).

Most online LC studies conducted with university EFL students in Taiwan have taken place in face-to-face discussion mode in language classrooms and have been less focused on reading informational or expository texts (Hsu, 2004; Su et al., 2019). Daniels (2002a) and Wilfong (2009) argue for the possibility of using expository texts in literature circles even though traditional literature circles usually focus on reading narrative fiction. The following ingredients were proposed to bring non-fiction text literature circle alive: (1) content that is important or engaging; (2) people we can care about; (3) a narrative structure or chronological line; (4) places we can visualize; (5) danger, conflicts, risks, or choices; (6) value, moral, ethical, or political dimensions; (7) some ideas that reasonable people can debate, dispute, or disagree about (Daniels, 2002a, p. 11). With the advantage of its interactive, user-friendly, and easy accessibility features, FB is considered an appropriate English language learning tool and platform for conducting literature circles with EFL university students. Therefore, the current research posits the appropriateness of integrating EFL online non-fiction literature circles on FB Groups in a cross-cultural communication context, specifically with EFL learners in Taiwan.

The research is significant in the following perspectives: (1) it's a longitudinal study (Akirama & Cunningham, 2019); (2) peer-lead discussion facilitates cognitive learning by idea sharing, interaction, information searching, and even reflective thinking; (3) it explores cross-cultural discussion behaviors for educational purpose via FB Groups and Facebook Messenger; (4) it investigates the feasibility of learner-led online communities where participants take ownership of their learning.

To further bridge the gap of exploring EFL students' cognitive patterns in online cross-cultural discussions, the current study employed Community of Inquiry Model (Garrison, et al., 2000) to explore the cognitive presence or process of students' cross-cultural communication across different means of communication, mainly Messenger and FB. The study aimed to unveil the distribution of cognitive processes as EFL students engaged in online discussion with university students in the United States. Moreover, data was further analyzed with lag sequential analysis (LSA) to compare cognitive patterns between FB Groups and Messenger. Therefore, four research questions were proposed:

- (1) What cognitive processes are observed most frequently from online discussion on Messenger and Facebook Groups?
- (2) What cognitive patterns are observed on Messenger and Facebook Groups?
- (3) What do students perceive as strengths of this online cross-cultural communication experience?
- (4) What are the challenges and weaknesses of this online cross-cultural communication experience?

Methodology

Participants and Setting

Participants in the cross-cultural online discussion included students from a university in Taiwan and from another university in the United States. The Taiwanese group consisted of eight students enrolled in a required Freshman English class at a university in Taipei. Participating Taiwanese students' average level of English proficiency ranged from intermediate- (B1, CEFR-Common European Framework of Reference for Languages) to high-intermediate (B2). The students were from different

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majors, including Journalism, Business Administration, International Trade, Finance, and English Language and Literature.

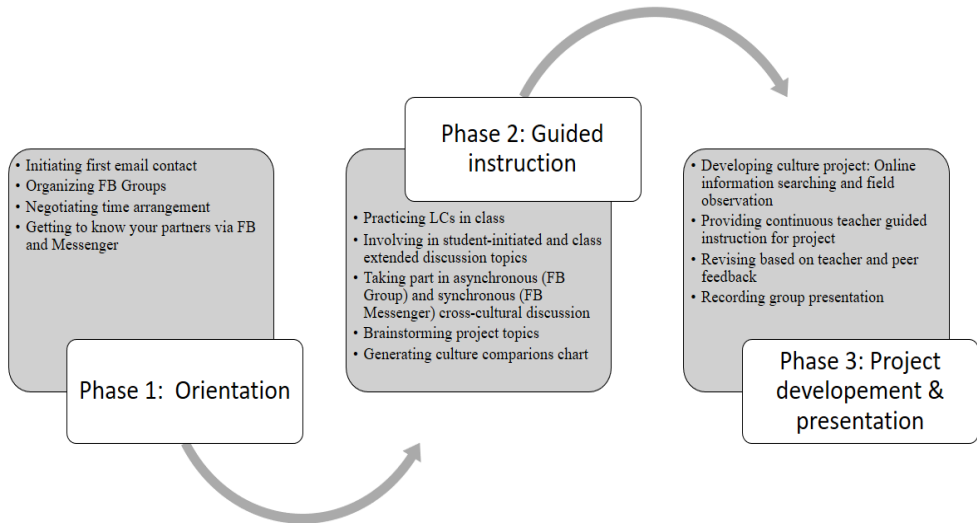
The U.S. group members recruited were from an intercultural communication class at a university in the eastern United States. Most of the students were education majors studying in areas such as Early Childhood Education, Elementary Education, Mathematics, History, Psychology, Social Work, and English and Communication. U.S. students were required to interact with people of different cultures and submit a 500-word essay at the end of the cross-cultural communication project.

Facebook Groups and Facebook Messenger were used because of the worldwide popularity, familiarity, accessibility, and privacy for participants in this project. Based on the students' choice of partners, each FB Group consisted of 2 EFL students and 2 U.S. students. Each group had access to two platforms on FB, namely Facebook Group and Messenger, an instant messaging app on Facebook. It should be noted that closed Facebook Groups were formed so the content was viewable for group members only to ease the English language anxiety of EFL students when posting their ideas via text, image, or photo. Similar to other instant messaging apps, instant Messenger features text chat, video chat, audio chat, file sharing, and chat script download functions. To sum, students were instructed to use Facebook Messenger primarily for synchronous communication and Facebook Group for asynchronous communication.

The teacher researcher served multifaceted roles during the project, including organizing guided instruction for in-class literature circles, monitoring cross-cultural discussion, and providing instructional guidance and feedback for cultural projects. Students were encouraged to use Messenger and Facebook Group with their U.S. peers at the beginning after their initial e-mail contact. During the second or guided instruction phase, students were trained to practice various roles in literature circles such as discussion director, illustrator, and connector. Students were encouraged to apply those skills learned from those roles into the online cross-cultural discussions. In order to better prepare students for online communication, initial discussion topics were in conjunction with in-class non-fiction readings such as East meets West, eating well, or career decisions. Toward the end of phase two, students used cultural comparison charts (i.e. illustrator in LC) to settle on topics of their own interest and related aspects for the final project worth 10% of the course grade. The final or project development and presentation phase aimed to complete projects through teacher guided instruction and online peer feedback. EFL students from each group met with the teacher after class at least three times, once a week, for individualized project

counseling such as information searching strategies, field observation, data collection, analysis, and presentation. Students were expected to revise their projects based on teacher and online peer feedback before sharing their recorded representation on FB in class. The teaching instruction and major tasks are summarized in Figure 1.

Figure 1
Instruction and online tasks



Coding Scheme

Practical Inquiry Model (Garrison, et al., 2000) was used to delineate cognitive processes on Facebook and Messenger because of its relevance to the current study and validity. The current study adapted the cognitive presence as the coding scheme to analyze online discussion, or cognitive process patterns. The cognitive presence consists of 4 stages as shown in Table 1. An additional category (E) was added to the current category to address messages that were irrelevant or off-topic to online discussion topics. After consulting with an experienced English language researcher, 86.36% interrater reliability was achieved. Disagreements in coding were discussed and resolved before further analysis was conducted. The final coding scheme along with student excerpts is presented in Table 1. In order to detect statistical significance in student's discussion behavior continuity of cognitive process patterns, Generalized Sequential Querier (GSEQ) 5.1 software was used to calculate LSA (Bakeman &

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Gottman, 1997). In the recent decade, LSA has gained ever more attention as an effective tool to identify sequential behaviors from various educational settings online (Hou, Chang, & Sung, 2011; Hou, Wang, Lin, & Chang, 2015; Hsu, 2018; Hsu, Chang, & Liu, 2018).

Table 1

Practical Inquiry Model (Garrison, et al., 2000)

Phases	Descriptor & Indicators	Example
Triggering	Evocative: Recognizing the problem; Sense of puzzlement	“What is it like for teens who are in relationships there? Are parents strict?”
Exploration	Exploration: Divergence within the online community; Information exchange; brainstorming	“More and more Chinese choose the western wedding. For example, hold ceremony in church, dressed in white gown. Usually they will hold western ceremony and Chinese traditional dinners.”
Integration	Tentative: Convergence among group members, connecting ideas, synthesis, creating solutions	“I’ve had multiple friends of different sexual orientations but it would never make me look at them differently. My family on the other hand is not very welcoming of same sex couples which I find upsetting. I believe they deserve to be treated equally”
Resolution	Committed: Various application to real world; testing solutions; defending solutions	“High paying job is not stable as it includes high risk that requires immediate attention and be alert. High paying job may take less time than the standard criteria of average worked hours but you are trapped by the time you are in....I am comfortable at the current state of my life but comfortability does not get me anywhere in my life when it comes to break out of my shell and take risk. I am not able to advance myself to the next level and are not applied to my highest potential. It is time the time has stop and repeat itself automatic...”

Data Collection and Analysis

A total of 1,359 messages were gathered in two semesters from Facebook Groups and Messenger. EFL students were asked to share their messages from Messenger with the researcher as soon as they finished their discussion with their U.S. group partners. In addition to online messages, all EFL students were interviewed at the end of each semester to verify unclear messages, and to explore student perceptions.

Results

Research Question One: Content Analysis

Based on the findings in Table 2, the most frequently observed cognitive process on Messenger was off-topic discussion (E, 65.1%), followed by exploration (B, 16.9%) and triggering (A, 14.2%). In terms of Facebook Groups, close to half of the messages clustered on exploration (B, 45.84%). The second highest was off-topic discussion (E, 23.94%). Both the integration and resolution stages accounted for a smaller portion of cognitive process on Messenger (C, 3.8%; D, 0%; 3.8% combined) than on Facebook Groups (C, 17.03%; D, 0.41%; 17.44% combined).

Table 2

Cognitive code distribution across Facebook and Messenger

	FB		Messenger	
A: Triggering	63	12.78%	123	14.2%
B: Exploration	226	45.84%	146	16.9%
C: Integration	84	17.03%	33	3.8%
D: Resolution	2	0.41%	0	0.0%
E: Off-topic	118	23.94%	564	65.1%
Total	493	100%	866	100%

Research Question Two: LSA Findings

To explore the cognitive patterns, the participants' discussion logs were first coded based on Practical Inquiry Model as indicated in Table 1. Then, the lag sequential analysis was performed on GSEQ 5.1 software. In other words, the coded discussion logs were analyzed by computing the total number of occurrences for possible sequential combinations of cognitive patterns. The stage in each row shows the initial behavior and the column indicates the discussion sequence it follows. If the

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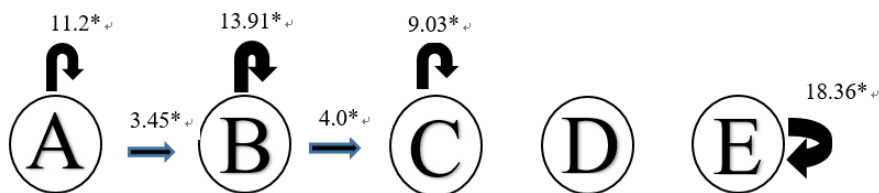
z score is larger than + 1.96, it means the behavior sequence has reached a significant level at $p < .05$ (Bakeman & Gottman, 1997). Based on Table 3, six significant sequences were observed among 25 possible sequential patterns. Figure 1 illustrates the corresponding diagram of these 6 sequential patterns. Therefore, Figure 2 illustrates the following 6 significant behavior sequences into diagram: from A (triggering)→ A (triggering); A (triggering)→ B (exploration); B (exploration)→ B (exploration); B (exploration) → C (integration); C (integration)→ C (integration); E (off-topic)→ E (off-topic) was found on Messenger. In other words, students would be able to maintain discussion and move discussions to other levels (from triggering to integration) on Messenger.

Table 3
Cognitive pattern on Messenger: Z-score

Z	A	B	C	D	E
A: Triggering	11.02*	3.45*	-0.35	0.00	-10.64
B: Exploration	-1.23	13.91*	4.00*	0.00	-11.63
C: Integration	-0.86	0.68	9.03*	0.00	-3.54
D: Resolution	0.00	0.00	0.00	0.00	0.00
E: Off-topic	-6.76	-13.73	-6.51	0.00	18.36*

* $p < .05$

Figure 2
Behavior sequence diagram on Messenger



In a similar manner, the cognitive sequences of discussion logs on Facebook Group were computed. Table 4 shows the results derived from LSA. Similarly, A (triggering)→ A (triggering); B (exploration)→ B (exploration); C (integration)→ C (integration); E (off-topic)→ E (off-topic) behavior sequences were also observed on

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Facebook Groups. In other words, 5 significant sequences were revealed in LSA. The corresponding diagram illustrates these 5 sequential patterns in Figure 3. Although a significant difference in behavior in the transition from resolution (D) to resolution (D) was reached, only 2 messages were coded in this stage, as indicated in Table 2. A larger number in this stage would be required for it to be interpreted meaningfully. In summary, fewer behavior sequences were observed for Facebook Groups, as illustrated in Figure 3. Based on the diagram, students were able to maintain consistent discussions at each level (from triggering to off-topic) on Facebook Group.

Table 4
Cognitive pattern on Facebook Group: Z-score

Z	A	B	C	D	E
A: Triggering	2.40*	0.57	0.05	-0.54	-2.53
B: Exploration	0.03	7.87*	-3.10	0.12	-6.51
C: Integration	-0.98	-4.21	7.78*	-0.64	-1.11
D: Resolution	-0.54	0.12	-0.65	11.06*	-0.79
E: Off-topic	-0.97	-5.95	-3.17	-0.79	10.67*

* $p < .05$

Figure 3
Behavior sequence diagram on Facebook Group



Research Question Three: Student Perceptions as Strengths

The following themes were generated from interviews and reflections from both EFL and U.S. participants as indicated in Table 5 and Table 6. Inductive coding was

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applied to identify emerging themes. A total of 535 nodes were identified as strengths and 113 as weaknesses in Nvivo 12. Pseudonyms were used in the following sections for confidentiality.

Table 5
Student perceptions: Strengths

Themes	Categories
Instructional scaffolding and project design*(242)	LC roles: Questioner & Connector Background knowledge Organizing information via guided instruction Skill-integrated project
Language awareness (81)	Language usage Online information searching
Increased cultural knowledge (80)	Culture differences Culture similarities Reconstruction of culture stereotypes
Multi-modal communication strategies (74)	Asynchronous and synchronous mode Multimodal interaction
Border crossing (58)	Overcoming anxiety Self-confidence

*Number of comments made by participants

Instructional scaffolding. In terms of LC role rotation, EFL students engaged more in the roles of discussion director (questioner), and connector than summarizer and illustrator online. (field observation) This may be due to the frequent practice of those 2 roles in FB discussions as one student raises questions and others answer or reply with answers based on personal experiences. Providing students with topics and discussion questions extended from in-class reading passages did prepare students with relevant background knowledge and vocabulary deemed to be beneficial in triggering discussion questions and identifying subtopics. Tyler mentioned that the extended topic discussion helped him not get stuck in a “blank slate” stage and helped build some foundations in related vocabulary knowledge via previous in-class textbook discussions. (Taiwan, interview) Nevertheless, authentic cross-cultural online communication encourages critical thinking. Mark reflected upon his schooling experience and commented, “when we talk about ‘Does school really prepare us for

work?', I wonder about the applicability of the knowledge we acquire in the university. Can I really apply what I learn in school for my future career?" (Taiwan, reflection) However, students also valued the learning that came from being an illustrator. Yani mentioned she used mind mapping practiced in class because it helped her "visualize main points" in the text. (Taiwan, interview) When developing attributes for the compare-and-contrast graphic organizers provided by the researcher, students indicated the use of graphic organizers to be an effective tool for information organization and presentation in the final project.

Projects were considered a valuable experience for EFL students from topic selection, field observation to information presentation as indicated. When selecting topics for project presentations online, EFL students were aware of their audience and appropriately chose topics that met the level of understanding for students in both countries. In other words, students realized that the topic for presentation should be neither too simple nor too complicated but worthwhile and appealing. (field observation) In terms of the effort put into writing practice, Yani specifically described that she would take time drafting on paper, rechecking her grammar, and rereading before typing it up online. "It generally takes me 1.5 to 2 hours from drafting to publishing online. Although it is very time consuming, it is worth the effort." (Taiwan, interview) Tyler, on the other hand, benefited from transcribing interview data and considered it a "definitely profound language learning experience he'll never forget". (Taiwan, interview) With guided instruction, not only could EFL students practice reading and writing skills, they were also able to collect and analyze real first-hand data from the field such as conducting interviews with parents about wedding customs and online surveys (Taiwan, interview). "I learn editing skills from YouTube." (Taiwan, interview) Some students took time to learn additional computer skills such as organizing online surveys, and researching skills such as synthesizing to improve their online final project presentation.

Language awareness. In general, students believe this cross-cultural learning community provided an authentic, and purposeful language learning context. Most EFL students strived their best in seeking opportunities to practice their reading, speaking, listening, writing, and even translation skills. Some students would read extensively to gain multiple perspectives on an issue or topic. For example, Ethan mentioned the practice of skimming when browsing through various online resources. (Taiwan, interview) Mark said that he became aware of the language usage in "various contexts". (Taiwan, reflection) When searching online for information, Elizabeth

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shared the importance of searching and reading from “various resources” when developing a final project. (Taiwan, reflection)

In addition to English language learning outcomes, some U.S. group members tried to learn common Chinese phrases from their group members and found it to be an amusing, yet meaningful personal connecting moment.

“(we) laughed over my bad pronunciation of Chinese words and we laughed about her trying to explain what she meant...this experience showed me that even another student from another country has the same sense of humor as I do...because we were able to connect over such a simple thing.” (U.S., reflection)

When U.S. students attempted to pronounce words in Chinese, the use of humor, and nonverbal communication brought people closer and developed friendship. Alice summed up her cross-cultural communication in the following excerpt.

“This experience has been very eye-opening for me... It's been so informative and fun... I hope that we can keep in touch after this project and continue to learn about each other's lives and cultures and create a long-term friendship.” (U.S., reflection)

Increased cultural knowledge. All EFL students strongly agreed that they had expanded their “different” cultural learning horizons through cross-cultural communication as indicated in Figure 5. Not only were students involved in discovering the differences and similarities across cultures in various areas such as holidays, educational systems, etiquette, customs and traditions, they were also able to engage in controversial expository text discussions such as “should teenagers work part-time?” or the debate on genetically modified food. One U.S. student realized that it is uncommon for students to work part-time in Taiwan. Nancy reflected that

“This was a surprising discussion for me, because me and all my friends had jobs in high school, but there it is very uncommon for teens to work because it is very important for them to focus on their education and their parents take care of them financially until they finish school.” (U.S., reflection)

On the topic of appropriate age for dating, Kimberly was surprised to learn that none of her group members in Taiwan had ever dated at this point because “their parents were very strict about dating rules” and focus on achieving academic excellence (U.S., reflection). Another EFL student described his admiration of the

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freedom of choosing one's own major in the university. He expressed his disappointment and indicated the inequality in Taiwanese schooling. "Preparing for the university entrance exam focuses too much on competing with others" in scores rather than putting one's field of interests as the priority as it is in the U.S. (Taiwan, reflection). When comparing cultural differences, students were able to relate to his or her own cultures, made comparisons across cultures, and even grew to appreciate and reflect upon various aspects of his own culture which most people take for granted. His U.S. partner commented:

"He [his EFL partner] was forced to study [in the major] he wasn't interested in. Why should he want to continue his education if he hates what he's learning and sees no future? It made me appreciate America's educational system more." (U.S., reflection)

The following excerpt was from a U.S. student who was very impressed by how complex marriage and engagement ceremonies were in Taiwan, as she learned from the final project of her EFL partners.

"Over there, engagement is not a surprise at all, and the whole family gets involved in a large ceremony. Whereas here, engagement is normally a surprise and the family isn't normally involved, unless a significant other is asking the parents of their partner for permission to take their hand in marriage" (U.S., Reflection)

This cultural awareness of one's own identity was also shown in EFL students when they tried to collect first-hand data from the field which was a required element to be included in the final project presentation. For instance, Miller mentioned that "it was my first time talking to my parents about their wedding ceremony and engagement. I realized that those ceremonies are far more complicated than the western wedding traditions we search online." (Taiwan, interview)

Stereotypes were being challenged as part of the cross-cultural communication outcomes. "When I looked at the last name, location of his school. I assume my e-pal was born and raised in Asia. Later, I realized that he was born in South Africa." Abby was made aware of her stereotyping when she learned that Tyler was a South African-born Taiwanese student. On the other hand, Mary was shocked when she learned that her Taiwanese group member preferred to work at a high paying job than spend time with family and friends. "His decision surprised me because with a collectivist culture,

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I assumed time with others would be of high value. I wonder if our difference in opinion was based on cultural differences, gender differences, or another variable” (U.S., reflection) Students’ prior knowledge on collectivism and individualism was reshaped and reconstructed by considering other variables.

Multi-model communication strategies. In addition to one’s cultural border crossing, students also make adjustment and efforts in multi-model communication to achieve utmost cross-cultural comprehension. Renee referred to this adjustment as crossing communication boundaries. “I need to consider the communication boundaries and make adjustments to my language as well and take into consideration what English they know and what I could do to make it easier when communicating.” (U.S., reflection)

To enhance comprehension, students in both countries integrated pictures, videos, links, graphs, or statistics to illustrate or support their points. David’s understanding of Taiwan’s beautiful scenery was greatly enhanced when his group member, Nicholas sent him pictures. “I was able to appreciate the natural beauty of Taiwan. Far from being a tiny island, the country boasts mountains and serene rivers traveled by Taiwanese aesthetic boats.” (U.S., reflection). A picture is worth a thousand words. Nicholas also used news clips to pique his group member’s curiosity while explaining people’s belief in reincarnation and taboos during the ghost month in Taiwan. In addition to using verbal description, an EFL student Miller, also used pictures to explain what a Taiwanese wedding cake is like.

When I try to explain ‘Taiwanese wedding cake’, I realize that their concept of a typical American wedding cake may be different from our Taiwanese traditional bridal cake. So, I sent her a picture of our bridal cake. Wedding pastry? Similar to moon cake (Taiwan, interview).

Border Crossing. For some students, it takes faith and courage to cross that invisible boundary one may have set when initiating cross-cultural communication. People get used to being in their comfort zone. Stepping out of the comfort zone may mean encountering uncertainty, confusion, negotiation, dispute, frustration or a sense of achievement. A U.S. student described her journey of stepping out of her comfort zone as personal growth.

“Pushing yourself out of your comfort zone is a scary yet such a rewarding experience. I feel as though this made a stronger person out of me.” (U.S., reflection)

Miller described his increased confidence and competence at the end of the cross-cultural communication in the following statements.

“I have always doubted my English ability and wonder if they would understand what I say. However, after talking to foreigners several times online...My confidence grows. In the future, I will have more confidence when talking to foreigners.” (Taiwan, interview)

Research Question Four: Student Perceptions as Challenges and Difficulties

Table 6

Student perceptions: Weaknesses

Themes	Categories
Lack of timely responses *(69)	Lack of frequent responses No timely responses Accountability
Language anxiety (22)	English writing anxiety Real-time chat: listening and speaking difficulties
Scheduling conflict (19)	Different time zone Time management skill
Project-related difficulties (3)	Information searching Translation Peer negotiation for project presentation

*Number of comments made by participants

Lack of timely response. One major challenge encountered by students was the lack of timely responses or messages read but not responded to. Students said they were not upset with each other once explanations for untimely responses were given. Also, few students said they felt frustrated or even upset when messages were read but received with no responses or explanations from their group members. “My partner responded to me at the very beginning but then, she disappeared. No responses. I do not know why. Then, she showed up again at the end of the semester?” (Taiwan, reflection).

On the other hand, Ethan, an EFL student, delayed his response to his U.S. partner’s lengthy messages because he needed more time to think them through. In addition, since this was just a short-term cross-cultural communication assignment,

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he was reluctant about building a trust relationship with U.S. partners. It should be noted that Ethan has been actively involving in an international community forum for over four years and developed solid friendship with its members by discussing certain popular TV series. Whereas he was enthusiastic when analyzing plots of TV series on the forum and supporting members on the forum, he was reluctant to spare extra time for a short-term discussion group. (Taiwan, interview)

Language learning anxiety. After the initial email contact, students were able to choose their means of communication. Most EFL students reported using other modes of communication such as video-mediated communication. The text-based communication became the main tool for most cross-cultural discussions due to the EFL students' language proficiency, internet connection speed and scheduling conflicts. (Taiwan, interview) EFL students appreciated the oral practice with native English speakers and realized that responding to U.S. students on the spot may raise their level of language anxiety to an extreme. "I had to rely on my partner translating what my U.S. partner was saying on Messenger in Chinese because I was too nervous and unable to concentrate." (Taiwan, field observation) EFL students also recognized that writing an English composition was one thing, responding or chatting to native English speakers on Facebook or Messenger another. Elizabeth was surprised to find out how much casual speech discourse differs from the formal speech she acquired in school while chatting with her U.S. partner. The prevalent use of abbreviation was one example that was cited. (field observation)

Scheduling conflict. When designing student-centered cross-cultural communication, students bore the responsibility of time and task arrangement. Initially students attempted to experience synchronous discussion, but due to internet connection speed and accents EFL students were not used to, most students switched to asynchronous discussion to ease the burden of finding a suitable time from both sides. "Due to time difference and scheduling conflict, we then changed to text-based asynchronous communication on Facebook Groups." (Taiwan, interview) Even with asynchronous discussion, differences in academic calendars may have also caused problems for coherent discussion or inadequate time for giving feedback for the final project. The researcher did notify students of this difference in academic calendars that may impact momentum in cross-cultural communication in advance but a few students still delayed their responses and presenting the revised version of final projects.

“When U.S. partner showed interests in conducting discussion on Christmas, the two EFL students replied to postpone the discussion because of the mid-term exam week. But by the time, students finished their mid-term exam, they do not have much time to prepare for their project presentation.” (field observation)

Project-related difficulties. Most EFL students indicated that selecting a topic, negotiating with partners, and revising content based on teacher feedback is a challenge for freshman students who had never done face-to-face interviewing and online surveys, not to mention analyzing or presenting information online. Finding a common topic of interests in group was an ordeal for some EFL students who differed greatly in their interests. In addition, EFL students found certain cultural concept difficult to convey or translate such as Chinese poems, Confucian sayings, or cultural traditions. EFL students commented on the difficulties of locating relevant culture-specific readings online. “I had difficult time trying to translate Confucius saying regarding respect of the elderly and Double Ninth Festival.” (Taiwan, interview) In addition, in terms of selecting relevant information online, EFL students tended to rely on one source, rather than synthesizing from multiple sources initially. “I will just use one that best suited my need for content, often the very first one from google results” (Taiwan, interview). After searching for relevant information, synthesizing information, evaluating the appropriateness and completeness in presentation was the next struggle. Miller explained it this way in the following excerpt. “My partner thinks that our project should be more comprehensive to avoid misunderstanding of our wedding customs. We had long discussion on traditional red wedding dress or modern day western white wedding dress in Taiwan” (Taiwan, interview). In this case, EFL students became aware of the audience and sought ways to present traditional and modern wedding customs which had been revolutionized and influenced by western culture to some degrees. Before students submitted the final project online, they received feedback on the initial drafts of the project from the researcher as well as peer feedback. As mentioned in the researcher’s journal, “some of the projects required major revisions...Students failed to make revisions according to the researcher’s feedback. I was quite disappointed when finding out that all that time I took to search for pertinent information and comment for my students’ projects was not valued.” (field observation) A few students claimed that on top of the projects assigned by their majors at the end of the semester, they simply were overwhelmed by the intensive and burdensome revisions involved in preparing the final projects in this general education English course.

Discussion

The current research investigated the cognitive presence and behavior sequential patterns of undergraduate students' cross-cultural discussion via Messenger and FB Groups in Taiwan and the U.S. Major findings with pedagogical implications are discussed in the following sections.

Off-topic and exploration discussion behaviors ranked top 2 for FB and Messenger

Off-topic discussion or social interaction, often overlooked in traditional classrooms, is pivotal in building an online community of inquiry (Garrison et al., 2000; Hou, et al., 2015). Although social interaction does not guarantee or equate to effective cognitive outcomes, it serves as a foundation for fostering group cohesion, open communication, and affective expression (Garrison et al., 2000). Consistent with previous studies (Hou et al., 2015; Hsu, 2018), in a risk-free online learning environment, language learners are more willing to interact in discussions and voice their opinions freely to achieve common educational goals. Without a doubt, most students may already be familiar with this social interaction in their first language to build relationships of trust with others. Therefore, when doing mostly synchronous communication via Messenger, students allocated more time to getting to know their overseas partners and showed interests in their life and concerns.

Even though more off-topic discussions were observed on Messenger than on FB Groups, students were able to flexibly move among cognitive stages. Within the limited synchronous timeframe, students had clear learning goals to be accomplished (Wu, et al., 2015). However, students seemed to easily go off on a tangent in their discussions and hence, less time could be devoted to in-depth discussion of topics of their own interests. When integrating Messenger for out-of-class discussion, the instructor could use reminders or guidelines to help students monitor the quality of their discussion (Ferguson & Kern, 2012).

In contrast, when engaging in asynchronous FB Group discussion, students had more time to respond, think, reflect, or search for additional information. Although more extended and focused cross-cultural discussions were observed, most of the messages still centered on the stage of exploration. Therefore, a certain amount of intervention and guidance was needed to assist the flow of discussion moving among cognitive stages such as from exploration (B) to integration (C) or from integration (C) to resolution (D). In other words, guided instruction or facilitation should be

provided to lead and move discussions to a further cognitive level for future instructional design in cross-cultural discussions.

Researchers suggest incorporating comprehension strategy instruction in student-led discussion such as Inference Maker, Importance Synthesizer (Ferguson & Kern, 2012) to keep focused on the tasks. In order to make inferences, readers need to make predictions, and connections from various parts of the text to provoke reading for deeper meaning, rather than sharing of facts. Importance Synthesizer, also another critical thinking and comprehension strategy for all readers across the board, helps learners to summarize, evaluate and negotiate important ideas or concepts embedded in the reading text. Incorporating visualization tools to map out the direction of group discussion is another useful team planning strategy for constructing meaningful and profound online learning experiences. Other aspects of learner factors such as self- and social- regulation behaviors, gender, group functionality, types of tasks, and different individual learning styles could also be taken into consideration in evaluating online learning (Freiermuth & Huang, 2015; Lin et al., 2013; Priego & Liaw, 2017).

Instructional scaffolding in every step of a way

Differences in academic calendars, scheduling conflicts and lack of timely responses caused concerns about being able to complete the final project on time. Conflicts of this sort are common sources of tension in cross-cultural communication studies (Priego & Liaw, 2017; Schreiber & Jansz, 2019). Although the researcher did not intervene in students' online discussion flow, she observed and gave feedback to EFL students regularly. Teacher presence should not, nevertheless, be underestimated (Garrison et al., 2009; Lin, et al., 2016; Widodo, 2015; Xu et al., 2020). Students favored teacher feedback over peer feedback for the final project because of relevance and specificity. The pivotal instructional scaffolding was needed every step of the way. In addition, learner training should not just be provided at the beginning of the online learning context but throughout the learning experience (Stockwell & Hubbard, 2013). Student training in information searching is another key for successful background understanding of a topic. Although teacher-selected websites were provided for EFL students to look up relevant topics, most EFL students still preferred to use the Google search engine, which they were most familiar with. By accessing certain websites, students also needed training in information searching strategies, especially for English websites. It would be more effective if those instructions could be recorded online for students' references and practices on their own.

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The end-of-semester project was considered beneficial for EFL students to practice language skills and reflect upon their cross-cultural learning progress. In the preparation stage, most EFL students mentioned trying to find the most suitable article to be included in the presentation to be a challenging task. During the process of finding the most appropriate texts, EFL students practiced skimming and scanning reading strategies. Moreover, comparing, synthesizing, evaluating, and communicating information also took place throughout. However, guided instruction needs to be provided every step of the way. For example, use of graphic organizers for comparing and synthesizing information from various sources is considered beneficial and lucid for information presentation. Due to the time constraint, some EFL students were overwhelmed with synthesizing information while waiting for feedback from overseas partners. Tensions and contradictions were observed. Therefore, when conducting cross-cultural projects, it is crucial to lay out specific task responsibilities, due dates, and guidelines for students in both institutions prior to the collaboration (Freiermuth & Huang, 2015; Priego & Liaw, 2017).

Meaningful student-centered online community

The initial discussion topics which were extended from in-class discussion were well received by EFL students because it lessened their learner anxiety and helped build a foundation for their lexical and background knowledge of the topics. Under the framework of literature circles, students were exposed, trained, and supported to read texts from different perspectives to make reading meaningful throughout the semester as well as with the online learning community (Chen, 2020; Chen & Ho, 2018; Chiang, 2007; Liao, 2009). Reading became even more meaningful and reflective when communicating and sharing critical, yet relevant to life issues with students of another culture (Awada et al., 2020). When communicating and presenting information, EFL students became more aware of their audience, seeking various approaches to achieve communication goals, and furthermore, reflecting on personal bias and increasing awareness of different language usage in academic as well as informal discourse (Schreiber & Jansz, 2019). In terms of lack of timely responses from learners, allocating some in-class time for cross-cultural discussion or offering joint discussion groups could be possible alternative solutions for expanding divergent viewpoints (Lee & Song, 2020). As for reducing language anxiety, multimodal communication strategies such as images, recorded audio or videos could be stressed and shared in class. In order to refine the multimedia presentation of the projects, EFL students were motivated to acquire new presentation skills on their own. By sharing

final projects, EFL students learned from their peers and were more aware of the areas for project improvement the following semester. Nevertheless, it should be noted that an increased teacher workload was observed (Schreiber & Jansz, 2019). Therefore, creating a climate of group rapport and cohesion, accountability and engagement are vital to positive group dynamics, eventually leading to fruitful learning outcomes.

Conclusion

The current study had the following limitations. First, due to the small number of participants, findings cannot be generalized to other EFL student populations. In addition, it should be noted that chat logs from Messenger were submitted by students on a voluntary basis. It is possible that some chat log data were not submitted to the researcher due to privacy or workload; hence, the final data may not represent the full landscape of online discussion behaviors. Second, since only cognitive aspect was analyzed in discussion logs, future research could include social and teaching presence into the spectrum of online learning effectiveness. Third, the study only investigated learners' cognitive patterns via Facebook Group and Messenger. Other means of communication are also worthy for exploration of how learners interact in different modes of online learning community. Finally, the role of teacher presence cannot be underestimated. When integrating cross-cultural online community into existing curriculum, teachers need to allocate time to setting guidelines, designing the online tasks, and coordinating between institutions, a vital prerequisite for successful cross-cultural communication.

Findings from this research study have several pedagogical implications for student-centered cross-cultural communication. First, creating meaningful student-centered online cross-cultural community is feasible with guided in-class literature circle role practices to independent small-group discussions on FB and Messenger. Second, utilizing modes for communication as well as multi-modal communication strategies facilitates optimal communication, engagement, and learning outcomes. Although off-topic social interactions would often be observed and considered irrelevant in synchronous or real-time communication mode, interactions of this sort could also facilitate team building and rapport among group members. On the other hand, asynchronous Facebook Groups are useful for continuous, more lengthened, and reflective exchanges. Future research studies could continue to explore critical cross-cultural learning moments via FB Group and instant Messaging apps in relation to multi-modality modes of communication strategies, language proficiency, task

design, or group composition. Last but not least, the need for continuous guided instruction throughout the process cannot be overemphasized. With rapidly evolving technology, digital e-moderator or e-tutor could be designed to assess learners in a timely manner in terms of quality and quantity of online cross-cultural interactions and provide step-by-step guided instruction for smoother digital project development and sharing in global online community.

Acknowledgements

The research project was supported by the Ministry of Science and Technology in Taiwan (MOST 106-2410-H-034-030). The author would also like to thank Professor David Stoloff and students taking part in this project.

References

- Akbari, E., Pilot, A., & Simons, P. R. (2015). Autonomy, competence, and relatedness in foreign language learning through Facebook. *Computers in Human Behavior*, 48, 126-134.
- Akirama, Y., & Cunningham, J. D. (2019). Synthesizing the practice of SCMC-based telecollaboration: A scoping review. *CALICO Journal*, 35(1), 49-76.
- Angelova, M., & Zhao, Y. (2016). Using an online collaborative project between American and Chinese students to develop ESL teaching skills, cross-cultural awareness and language skills. *Computer Assisted Language Learning*, 29(1), 167-185. <https://doi.org/10.1080/09588221.2014.907320>
- Awada, G., Ghaith, G. & Diab, N. M. (2020). Using third space and literature circles (TSLC) as transformative pedagogy for marginalized EFL learners. *Innovation in Language Learning and Teaching*, 1-9. <https://doi.org/10.1080/17501229.2020.1819288>.
- Bakeman, R., & Gottman, J. M. (1997). *Observing interaction: An introduction to sequential analysis*. Cambridge University Press.
- Beeghly, D. G. (2005). It's about time: Using electronic literature discussion groups with adult learners. *Journal of Adolescent & Adult Literacy*, 49(1), 12-21.

專論

- Byram, M., & Wagner, M. (2017). Making a difference: Language teaching for intercultural and international dialogue. *Foreign Language Annuals*, 51, 140-151.
- Chen, I. C. (2020). Integrating literature circles to facilitate reading comprehension on Facebook Groups: Questioning and learning perceptions. *Taiwan Journal of TESOL*, 17(2), 119-146.
- Chen, J. J. & Yang, S. C. (2016). Promoting cross-cultural understanding and language use in research-oriented internet-mediated intercultural exchange. *Computer Assisted Language Learning*, 29(2), 262-288.
- Chen, W., & Ho, M. (2018). An alternative to reading instruction: Implementing literature circles in a college-level EFL classroom. *The Elementary Education Journal*, 65(2), 53-81.
- Cheung, C. M. K., Chiu, P.-Y., & Lee, M. K. O. (2011). Online social networks: Why do students use Facebook? *Computers in Human Behavior*, 27(4), 1337-1343.
- Chiang, M. H. (2007). A novel idea: English as foreign language reading via virtual literature circles. *English Teaching & Learning*, 31(4), 1-37.
- Chou, M. H. (2021). Using literature circles to teach graded readers in English: an investigation into reading performance and strategy use. *Innovation in Language Learning and Teaching*. <https://doi.org/10.1080/17501229.2021.1885412>
- Chugh, R. & Ruhi, U. (2018). Social media in higher education: A literature review of Facebook. *Education and Information Technologies*, 23, 605-616.
- Ciftci, E. Y., & Savas, P. (2018). The role of telecollaboration in language and intercultural learning: A synthesis of studies published between 2010 and 2015. *ReCALL*, 30(3), 278-298.
- Daniels, H. (1994). *Literature circles: Voice and choice in the student-centered classroom*. Stenhouse Publishers.
- Daniels, H. (2002a). Expository text in literature circles. *Voices from the Middle*, 9(4), 7-14.
- Daniels, H. (2002b). *Literature circles: Voice and choice in book clubs & reading groups*. Stenhouse Publishers.

Discovering Cognitive Patterns of Online Discussions on Facebook and Messenger

- Ferguson, L., & Kern, D. (2012). Re-visioning literature circles: Incorporating comprehension strategy instruction in student-led discussions. *New England reading association journal*, 23-30.
- Freiermuth, M. & Huang, H.-C. (2015). Do Opposites Attract? Willingness to Communicate in the Target Language for Academically, Culturally, and Linguistically Different Language Learners. *International Journal of Computer-Assisted Language Learning and Teaching*, 5(2), 40-57.
- Garrison, D. R., Anderson, T., & Archer, W. (2000). Critical inquiry in a text-based environment: Computer conferencing in higher education. *Internet and Higher Education*, 2(3), 87-105.
- Garrison, D. R., Martha, C., & Fung, T. S. (2009). Exploring causal relationships among teaching, cognitive, and social presence: Student perceptions of the community of inquiry framework. *Internet and Higher Education*, 23(2), 123-136.
- Helgeson, J. (2017). Differentiating through literature circles. *Kappa Delta Phi Record*, 53, 41-44.
- Hou, H. T., Chang, K. E., & Sung, Y. T. (2011). Exploring Knowledge Sharing Discussion Behavioral Patterns in e-Learning Communities: A Comparison of Peer-Assessment and Problem-Solving Strategy. *International Journal on Continuous Engineering Education and Life-Long Learning*, 21(1), 25-41.
- Hou, H.-T., Wang, S.-M., Lin, P.-C., & Chang, K.-C. (2015). Exploring the learner's knowledge construction and cognitive patterns of different asynchronous platforms: Comparison of an online discussion forum and Facebook. *Innovations in Education and Teaching International*, 52(6), 610-620.
- Hsu, J. (2004). Reading without teachers: Literature circles in an EFL classroom. *Proceedings of 2004 Cross-strait Conference on English Education* (pp. 401-421). Huwei Institute of Technology.
- Hsu, T. C. (2018). Behavioral sequential analysis of using an instant response application to enhance peer interactions in a flipped classroom. *Interactive Learning Environments*, 26(1), 91-105.

- Hsu, T.-C., Chang, S.-C., & Liu, N.-C. (2018). Peer assessment of webpage design: Behavioral sequential analysis based on eye tracking evidence. *Educational Technology & Society, 21*(2), 305-321.
- Jin, S. (2015). Using Facebook to promote Korean EFL learners' intercultural competence. *Language Learning & Technology, 19*(3), 38-51.
- Junco, R. (2012). The relationship between frequency of Facebook use, participation in Facebook activities, and student engagement. *Computers & Education, 58*, 162-171.
- Lee, J., & Song, J. (2019). Developing intercultural competence through study abroad, telecollaboration, and on-campus language study. *Language Learning & Technology, 23*(3), 178-198.
- Lee, J., & Song, J. (2020). The impact of group composition and task design on foreign language learners' interactions in mobile-based intercultural exchanges. *ReCALL, 32*(1), 63-84.
- Liao, M. (2009). Cultivating critical thinking through literature circles in EFL context. *Spectrum: Studies in Language, Literature, Translation, and Interpretation, 589-116*.
- Liaw, M. -L. & Ware, P. (2018). Multimodality and social presence in an intercultural exchange setting. In Richard Kern and Christine Develotte (Eds.), *Screens and scenes: Multimodal communication in online intercultural encounters* (1st ed., pp. 256-278). Routledge.
- Lin, P.-C, Hou, H.-C., Wang, S.-M. & Chang, K.-E. (2013). Analyzing knowledge dimensions and cognitive process of a project-based online discussion instructional activity using Facebook in an adult and continuing education course. *Computers & Education, 60*, 110-121.
- Lin, V., Kang, Y.-C., Liu, G.-Z., & Lin, W. (2016). Participants' experiences and interactions on Facebook Group in an EFL course in Taiwan. *Asia-Pacific Education Researcher, 25*(1), 99-109.
- Lin, W.-C., Shie, J.-S., & Holmes, P. (2017). Enhancing intercultural communicative competence through online foreign language exchange: Taiwanese students' experiences. *Asian Journal of Applied Linguistic, 4*(1), 73-88.

Discovering Cognitive Patterns of Online Discussions on Facebook and Messenger

- Madge, C., Meek, J., Wellens, J., & Hooley, T. (2009). Facebook, social integration and informal learning at university: It is more for socializing and talking to friends about work than for actually doing work. *Learning, Media and Technology*, 34(2), 141-155.
- McElvain, C. M. (2010). Transactional literature circles and the reading comprehension of English learners in the mainstream classroom. *Journal of Research in Reading*, 33(2), 178-205.
- O'Dowd, R. (2016). Emerging trends and new directions in telecollaborative learning. *CALICO Journal*, 33(3), 291-310.
- Priego, S. & Liaw, M.-L. (2017). Understanding different levels of group functionality: Activity systems analysis of an intercultural telecollaborative multilingual digital storytelling project. Special issue 2017, *Computer Assisted Language Learning*, 1-22.
- Schreiber, B. R., & Jansz, M. (2019). Reducing distance through online international collaboration. *ELT Journal*, 74, 63-72.
- Shih, R. (2011). Can Web 2.0 technology assist college students in learning English writing? Integrating Facebook and peer assessment with blended learning. *Australian Journal of Educational Technology*, 27(5), 829-845.
- Stockwell, G., & Hubbard, P. (2013). *Some emerging principles for mobile-assisted language learning*. The International Research Foundation for English Language Education.
- Su, Y., Li, Y., Liang, J. -C., & Tsai, C, -C. (2019). Moving literature circles into wiki-based environment: The role of online self-regulation in EFL learners' attitude toward collaborative learning. *Computer Assisted Language Learning*, 32(5-6), 556-586. <https://doi.org/10.1080/09588221.2018.1527363>
- Sun, Z., Lin, C., Wu, M., Zhou, J., & Luo, L. (2018). A tale of two communication tools: Discussion-forum and mobile instant-messaging apps in collaborative learning. *British Journal of Educational Technology*, 49(2), 248-261.
- Vygotsky, L. (1978). *Mind in society: The development of higher psychological process*. Harvard University Press.

- Wang, Q., Woo, H. L., Quek, C. L., Yang, Y., & Liu, M. (2011). Using the Facebook group as a learning management system: An exploratory study. *British Journal of Educational Technology*, 43 (2), 428-438.
- Weng, I. (2020). Employing the ABC's online transnational long-distance program to improve Taiwanese students' intercultural communication abilities. *Journal of Teaching Practice and Pedagogical Innovation*, 3(2), 137-176.
- Whittingham, J. (2013). Literature circles: A perfect match for online instruction. *TechTrends*, 57(4), 53-58.
- Widodo, H. P. (2015). Engaging Students in Literature Circles: Vocational English Reading Programs. *The Asia Pacific Education Researcher*, 25(2), 347-359.
- Wilfong, L. G. (2009). Textmasters: Bringing literature circles to textbook reading across the curriculum. *Journal of Adolescent & Adult Literacy*, 53(2), 164-171.
- Wu, S. Y., Chen, S. Y., & Hou, H. T. (2015). A study of users' reactions to a mixed online discussion model: A lag sequential analysis approach. *International Journal of Human-Computer Interaction*, 31(3), 180-192. <https://doi.org/10.1080/10047318.2014.986637>
- Wu, W. V., Marek, M., & Chen, N. S. (2013). Assessing cultural awareness and linguistic competency of EFL learners in a CMC-based active learning context. *System*, 41, 515-528.
- Xu, B., Chen, N., & Chen, G. (2020). Effects of teacher role on student engagement in WeChat-based online discussion learning. *Computers & Education*, 157, 1-11.
- Yu, A. Y., Tian, S. W., Vogel, D., Kwok, R. C. (2010). Can learning be virtually boosted? An investigation of online social networking impacts. *Computers & Education*, 55, 1494-1503.

網路溝通認知歷程模式初探： 以Facebook和Messenger為例

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語言學習者利用網路工具進行跨文化交流已成為趨勢。但是，鮮少有針對英語為外語大學生在課外進行自主同步與非同步跨文化討論情境中，探討與比較其認知歷程模式異同之處。國際化思潮下，大學生能否獨立進行課堂外的自主跨國互動有效溝通亦成為未來國際競爭力重要關鍵能力。因此，本研究目的在分析台灣大一英文通識課程學生在課外和美國大學生進行同步與非同步跨文化認知行為模式和學生觀點。學生網路討論內容、文化專題、學習反思、訪談與教師觀察記錄皆收集為分析資料。根據實用探究模式與滯後序列分析的研究結果顯示，參與學生在使用即時討論中有較多離題討論行為，而非即時訊息中則有較多屬探究型討論。滯後序列分析結果發現，在即時討論中有較多序列呈現有顯著行為轉換，學生意見則多肯定參與跨文化交流活動中所帶來正向英文學習成果。

關鍵字：滯後序列分析、網路討論、認知歷程模式

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