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Online Synchronous Discussion in Face-to-Face Classroom Based on WeChat

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Abstract: In recent years, the online synchronous classroom has developed rapidly in higher education, which has attracted the attention of many educational scholars. This study collected online synchronous discussion records during two months based on WeChat of an undergraduate students group and a graduate students group. The undergraduate group contains 355 messages and the graduate group contains 521 messages. All messages were coded by two trained coders. Content analysis and lag sequential analysis were conducted to explore the behavioral patterns. The analyses also revealed that the characteristics and differences of the interaction behavior discussed by different learners. Undergraduate students and graduate students are good at proving the rationality of the view. They have a lot of the behavior of emotional communication in the classroom. Graduate students are more adept at asking questions and thinking deeply than undergraduate students. And graduate students are better at crossing three dimensions of behavior than undergraduate students. Instructional suggestions were proposed to facilitate further online synchronous classroom interaction.

Keywords: WeChat, blended learning, learning behavioral pattern, online discussion activity, instant messaging tools

1. Introduction

With the rapid development of Internet, the online education has become another development field of helping education (Amador & Amador, 2014). The popularity of instant messenger leads to the emergence of a new instruction model. Online synchronous learning has become increasingly popular because of its conveniently and many studies have proven the benefits of online synchronous teaching and learning (Chen, Ko, Kinshuk, & Lin, 2005). The emergence of MOOC (Massive Open Online Course) makes it possible to learn anytime and anywhere. The popularity and application of smart phones affect learners' learning habits. The emergence of mobile learning allows learners to acquire educational information, educational resources, and educational services by using wireless mobile technology (Briz-Ponce, Pereira, Carvalho, Juanes-Méndez, & García-Peñalvo, 2017). This is a profound impact on traditional classroom teaching and it also promotes the reform of classroom teaching. Blended learning combines the advantages of traditional methods of teaching and learning and online learning (W. Chen & Looi, 2007a). In this process, the learner's classroom behavior pattern will also change, which from passive acceptance the knowledge taught by teachers into a more active and initiative to think and create.

2. Literature Review

Discussion has played a vital role in teaching and learning. Studies have found out that classroom discussion was significantly related to learning performance (Apple-bee, Langer, Nystrand, & Gamoran, 2003). A number of studies have shown that students behave differently between face-to-face and online discussion, for example, students who are less active in face-to-face discussion were more active online and some students argued that they were less stressful in an online learning environment than the traditional classroom (Kelm, 1992; Kern, 1995). With the increasing popularity of online

learning, a growing body of literature has explored the characteristics of online discussion. Online discussion can be categorized to online asynchronous discussion and online synchronous discussion. Literatures about online asynchronous discussion. The self-regulated, self-paced quality was one of the most attractive features of online discussion (Tiene, 2000). And the written record was good for review and reflection.

Hsieh & Tsai (2012) explored the role of moderators in online synchronous discussion. The results showed that the moderator helped the students to enhance their collaboration pattern and to increase the online participation rate. The strategies of helping students focus on the main topic and giving students feedback were also crucial for online synchronous discussion.

Previous study compared the in-class and off-class online discussion and found out that in-class postings were less interactive than off-class ones. The main reason of this finding was the lack of interaction perceived by the learners (Chen & Looi, 2007b). Some researchers argued that online discussion has disadvantages like technical barriers and a lack of visual cues. Educators use lots of tools to facilitate face-to-face and online discussion. Some of them are specific tools, such as Instant Response Systems. Some of them are not. Social medias, such as Facebook, twitter, etc., are used as efficient tools. However, current research primarily focuses on traditional classroom and online asynchronous discussion. Previous research has seldom discussed online synchronous discussion in traditional face-to-face classroom settings. WeChat as a kind of instant messaging tool, the study online synchronization discussion mode of undergraduate students and graduate students in the WeChat is very meaningful and needed.

Accordingly, the present study conducts an online synchronous discussion in face-to-face classroom. The research questions of this study are as follows.

Q1: what's the difference of typical online synchronous discussion activities between undergraduate students and graduate students?

Q2: what's the difference of online synchronous discussion patterns between undergraduate students and graduate students?

3. Research Methods

3.1 Participants

Two blended learning courses were selected in the same school year. Students took part in these two courses were asked to carry out a series of learning tasks including online synchronous discussion on an instant messenger app called WeChat. WeChat is the most popular instant messenger app in China. The two courses were fundamental psychology courses and they were taught by a same instructor. The instructor carried out a similar instructional approach combining traditional lecturing and online discussion in both courses. All participants were learning these courses for the first time. The undergraduate group included 48 freshmen from Education major and the course is "Introduction to Psychology". The graduate group included 67 first year students from Education major and the course is "Developmental Psychology". Participants were asked to join the WeChat group at the beginning of each course. They can communicate with instructor and other students via text, voice, and pictures messages during the face-to-face lecturing sessions. All participants are familiar with the function of WeChat.

3.2 Procedure

This study lasted for two months. WeChat was used as an assist teaching tool. Students were allowed to post anything in the discussion group. The instructor would not force the students to participate in the discussion and the discussion would not affect the final grade. At the end of the research session, the discussion log was exported for subsequent analysis.

3.3 Coding Scheme

Researchers found that there were three different behaviors in online course, including cognitive presence, social presence, and teaching presence (Anderson, Rourke, Garrison, & Archer, 2001). Cognitive presence can be divided into five categories: sharing, demonstration, negotiation, produce, and reflection (Liu, Zhu, Chen, & Huang, 2005). Some researchers believed that social presence includes positive emotions, negative emotions, seeking help, asking questions, and explanation or providing help (Zhu, Liu, & Huang, 2007). Anderson et al (2001) also claimed that teaching presence can be divided into design and organization, facilitative discussion, and direct instruction. Therefore, the coding scheme used in the present study was adopted from the above-mentioned studies which included cognitive, social, and teaching dimensions (as shown in Table 1).

Table 1: Coding scheme for analyzing undergraduate and graduate behavior.

Dimension	Category	Explanation
Cognitive Presence	Share(S)	Supply or introduce relative fact, resource, information or knowledge.
	Demonstrate(D)	Judge, comment, demonstrate, explain and summarize the conclusion, viewpoint, fact information.
	Negotiate(N)	Check, affirm, doubt the viewpoint; agree or disagree and modify the viewpoint.
	Produce(P)	Synthesize the views or statements, make refinement and summary, and thus sum up the conclusions or products.
	Reflect(R)	Reflect the learning process, methods and achievement.
Social Presence	Positive emotion(PE)	Express ore describe personal positive emotion.
	Negative emotion(NE)	Express ore describe personal negative emotion.
	Seek help or ask a question (HE)	Ask others for help or help others, state something irrelevant with academic tasks.
	Explain or provide the help(EE)	Answer other people's help, state their own status or explain things related to the task submission.
Teaching Presence	Organizing teaching(O)	Design activities, determine the time to complete the task and the media, establishing ritual constraints.
	Facilitate discussion(F)	Inspire and guide a talk by asking questions, act as organizer and guide the participation.
	Lead thinking(L)	Teachers provide intellectual and scholarly leadership and share their subject matter knowledge with students.
Others	Others(OS)	Any behaviors not mentioned above.

Two trained coders coded the discussion log. If one message was divided into two or more messages. They would be coded as one single message. In addition, the discussion log contained different types of messages, including text, voice, pictures, web links, and videos. The coder took them into account and coded them too. The inter-coder Kappa coefficient of undergraduate group was 0.872 and the inter-coder Kappa coefficient of graduate group was 0.907. Finally, total number of 355 messages from undergraduate group and 521 messages from graduate group were coded.

4. Results

4.1 Content Analysis

Content analysis has been used by many researchers to study learners' behavior patterns (Hou, Sung, & Chang, 2009; Cheng & Hou, 2015). The content analysis includes both qualitative content analysis and quantitative content analysis. Quantitative content analysis has been used in several studies to explore the online discussion process (Jeong, 2003). Researchers believed that coding scheme was the most important part of content analysis (Garrison, Anderson, & Archer, 1999).

The frequencies of messages from two groups (as shown in Table 2 and Figure 1) were coded according to coding scheme (see Table 1).

Table 2: Frequencies of undergraduate and graduate behavior.

		Undergraduate Group		Graduate Group	
	Category	f	%	f	%
Cognitive presence	S	55	15.5%	25	4.8%
	D	36	10.1%	20	3.8%
	N	50	14.1%	27	5.2%
	P	15	4.2%	11	2.1%
	R	7	2.0%	2	0.4%
	total	163	45.9%	85	16.3%
Social presence	PE	72	20.3%	153	29.4%
	NE	30	8.5%	44	8.4%
	HE	25	7.0%	97	18.6%
	EE	35	9.9%	93	17.9%
	total	162	45.6%	387	74.3%
Teaching presence	O	3	0.8%	16	3.1%
	F	4	1.1%	4	0.8%
	L	1	0.3%	3	0.6%
	total	8	2.3%	23	4.4%
Other	OS	22	6.2%	26	5.0%
Total	S	355	100.0%	521	100.0%

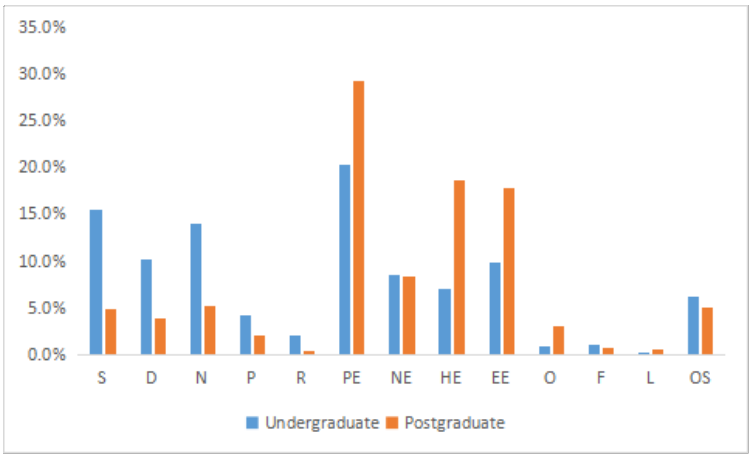

Figure 1. Distribution of content analysis of undergraduate and graduate behavior.

As shown in Table 1, PE (positive emotions) accounted for the largest proportion in undergraduate group and graduate group. For undergraduate students, cognitive presence and social presence accounted for almost equal proportion. The percentage were 45.9% and 45.6% respectively. The proportion of S (share) in cognitive presence was 15.5%, followed by N (negotiation) accounted for 14.1%. PE (positive emotions) in the social presence accounted for a large proportion of 20.3%. The teaching presence was less frequent and 2.3% less. Other discussions also accounted for a certain proportion of 6.2%.

For graduate students, social share accounted for 74.3%, cognitive presence accounted for only 16.3%. N (negotiation) in cognitive presence accounted for a higher proportion of 5.2%, followed by S (shared) accounted for 4.8%. The proportion of PE (positive emotions) in the Social presence accounted for a larger 29.4%, HE (Help or Questions) and EE (Explain or Offer the Help) appeared a higher frequency, the proportion accounted for 18.6% and 17.9%. Teaching presence and the other accounted for less, 4.4% and 5.0% respectively.

The distribution showed that interactions occurred in online synchronous discussion in face-to-face classroom were mostly composed of knowledge sharing, negotiation, expressing positive

feelings, asking questions and asking for help, and explaining or providing help. Most of the interaction between teachers and students occurred in both cognitive and social dimensions. It can be known that the participant's attention was high and the participant could effectively receive the teacher's information and give a timely response in online synchronous discussion in face-to-face classroom. In addition, the emotional communication between teachers and students was more frequent. There was emotional exchange among participants before entering formal teaching and after the teaching activities, which will help create a relaxed and friendly teaching and learning atmosphere. However, the frequency of P (produce) and R (reflection) was less in interactive behavior. This shows that the interaction among participants was more simple knowledge sharing and negotiation, less of the knowledge of the summary and reflection.

The proportion of teaching presence involved teachers and teaching assistants was less. O (organizing teaching), F (facilitate discussion), L (lead thinking) accounted for a small proportion. The exchange and feedback between teachers and students was important classroom activities in online synchronous discussion in face-to-face classroom.

The chi-square test was performed on the distribution of the interaction between undergraduate group and graduate group ($P = 0.000 < 0.05$). It indicated that the interaction behavior of the two groups was significantly different from each other. More interactive behavior took place in positive emotions in the two groups. During the two months' period, the graduate students sent more messages than the undergraduate students. From the social interaction point of view, however, it can be found that undergraduate students were more willing to share ideas and consult with others, graduate students were more willing to express emotions, questions and explanations. The questions raised by undergraduates are more likely to be answered by teachers, and the questions raised by the graduate students are answered by classmates, and the dependency of the graduate students on the teachers was relatively small. P (produce) and R (reflection) are rare for undergraduate students and graduate students. Most of the ideas are summarized by the teacher, the reflection was done by the students, which shows that the students in the discussion are more accustomed to express their views through the demonstration and negotiation, not good at summing up the views of the conclusions.

4.2 Behavioral Sequence Analysis (LSA)

The lag sequential analysis (Bakeman & Gottman, 1997) is a way to explain the sequential behavioral patterns based on discussion log. The main function of lag sequential analysis is to observe the sequence of behavior that continuously occurs at different stages of online discussion. That is, to observe the next situation and the total number of behavior after the end of a particular discussion stage. Lag sequential analysis (Bakeman & Gottman, 1997; Hou, 2010) enables us to conduct a more structured and visualized analysis of behavioral patterns. The data is analyzed by time sequence. The significant behavioral sequences compile an overall pattern of behavior in discussion (Hou, Sung, & Chang, 2009).

The study used the lag sequential analysis to analyze the behavior patterns of the participants. First, the coded data table was converted into the behavior sequence frequency table. Second, the behavior sequence frequency table was converted to the adjustment residual Z-score table. The column represents the previous behavior and the row represents the latter behavior. This Z-score is revised according to a certain formula, so it is called the adjustment residual Z-score. It is generally believed that the Z-score greater than 1.96 is to achieve statistical significance ($p < 0.05$). Through the lag sequential analysis, it can be found there were 18 significant behavioral sequences in the undergraduate group and 23 significant behavioral sequences in the graduate group.

Table 3 presents Z-scores of online synchronous discussion behavior of the undergraduate group. The significant behavioral sequences were as follows: S→S (4.23), S→D (4.08), N→D (2.48), N→N (4.35), N→P (3.70), P→N (4.46), R→N (2.20), R→R (2.36), PE→PE (5.13), PE→O (2.00), NE→NE (9.91), HE→EE (5.23), HE→L (3.63), EE→EE (3.90), O→HE (6.31), F→F (4.54), L→EE (3.02), OS→OS (6.96).

Table 4 presents Z-scores of online synchronous discussion behavior of graduate group. The significant behavioral sequences were as follows: S→D (10.70), S→N (2.50), D→N (9.21), D→P (2.50), N→S (5.42), N→D (5.10), N→N (4.10), P→S (5.07), P→P (3.74), P→R (4.72), R→NE (2.11), PE→PE (5.77), PE→F (2.02), NE→NE (4.12), HE→EE (6.07), HE→O (1.97), EE→HE (2.54), O→O (2.22), O→L (3.04), L→S (2.38), OS→R (2.93), OS→L (2.26), OS→OS (6.96).

Table 3: Z scores of online synchronous discussion behavior of undergraduate group.

	S	D	N	P	R	PE	NE	HE	EE	O	F	L	OS
S	**4.23**	**4.08**	0.10	0.49	0.96	-2.94	-1.40	-1.65	-1.69	-0.75	0.53	-0.43	-2.08
D	1.75	-0.92	0.03	1.34	0.39	0.88	-1.90	0.37	-1.47	1.37	-0.67	-0.33	-0.87
N	0.10	**2.48**	**4.35**	**3.70**	0.01	-2.30	-2.32	-1.51	-2.02	-0.71	-0.82	-0.41	-1.33
P	-0.24	0.41	**4.46**	-0.83	1.33	-1.32	-1.20	-0.06	-1.31	-0.37	-0.42	-0.21	-1.02
R	-0.09	0.36	**2.20**	-0.56	**2.36**	-0.39	-0.81	-0.74	-0.89	-0.25	-0.29	-0.14	-0.69
PE	-1.16	-1.45	-2.34	-1.34	-1.35	**5.13**	-0.52	0.47	-0.94	**2.00**	0.23	-0.51	0.83
NE	-0.88	-0.66	-2.32	-1.20	-0.81	-0.48	**9.91**	-1.58	0.02	-0.53	-0.61	-0.30	-1.47
HE	-1.65	-1.06	-1.51	-1.09	-0.74	-1.04	-0.09	1.00	**5.23**	-0.48	-0.55	**3.63**	1.24
EE	-1.69	-2.10	-0.99	-0.43	0.39	1.33	0.02	-0.33	**3.90**	-0.58	1.02	-0.33	-0.13
O	-0.75	-0.59	-0.71	-0.37	-0.25	-0.87	-0.53	**6.31**	-0.58	-0.16	-0.19	-0.09	-0.45
F	0.53	-0.68	-0.82	-0.42	-0.29	0.25	-0.61	1.41	-0.67	-0.19	**4.54**	-0.11	-0.52
L	-0.43	-0.34	-0.41	-0.21	-0.14	-0.50	-0.30	-0.28	**3.02**	-0.09	-0.11	-0.05	-0.26
OS	-1.47	-1.63	-1.33	-1.02	-0.69	-0.23	-0.68	2.10	-0.13	-0.45	-0.52	-0.26	**6.96**

Table 4: Z scores of online synchronous discussion behavior of graduate group.

	S	D	N	P	R	PE	NE	HE	EE	O	F	L	OS
S	1.80	**10.70**	**2.50**	0.67	-0.32	-1.06	-1.56	-2.45	-1.86	-0.91	-0.45	-0.39	-1.18
D	1.17	0.27	**9.21**	**2.50**	-0.28	-1.94	-1.39	-1.01	-1.53	-0.81	-0.40	-0.35	-1.05
N	**5.42**	**5.10**	**4.10**	1.96	-0.33	-3.01	-0.91	-2.05	-1.97	0.19	-0.47	-0.41	-0.32
P	**5.07**	-0.67	1.96	**3.74**	**4.72**	-1.50	-1.02	-1.61	-1.56	-0.60	-0.30	-0.26	0.63
R	-0.31	-0.28	-0.33	-0.21	-0.09	0.64	**2.11**	-0.68	-0.66	-0.25	-0.12	-0.11	-0.33
PE	-1.85	-2.93	-2.56	-0.81	-0.91	**5.77**	-0.99	-0.34	-2.06	-0.94	**2.02**	0.16	1.06
NE	-0.77	-1.39	-1.62	-1.02	-0.43	-0.33	**4.12**	0.32	0.46	-1.24	1.19	-0.53	-0.87
HE	-0.79	-1.60	-1.54	-1.61	-0.68	-3.35	-0.08	0.55	**6.07**	**1.97**	-0.96	-0.83	-0.44
EE	-2.34	-2.13	-2.49	0.03	-0.66	0.41	0.88	**2.54**	1.01	0.75	-0.94	-0.81	-1.39
O	-0.89	0.51	-0.95	-0.60	-0.25	0.72	-0.32	0.66	-1.23	**2.22**	-0.36	**3.04**	-0.93
F	-0.44	-0.40	1.79	-0.30	-0.12	-1.30	-0.61	1.62	-0.94	-0.36	-0.18	-0.15	1.84
L	**2.38**	-0.35	-0.41	-0.26	-0.11	0.15	-0.53	0.65	-0.81	-0.31	-0.15	-0.13	-0.40
OS	-1.15	-1.05	-1.22	-0.77	**2.93**	0.15	-0.14	0.08	-0.87	-0.93	-0.46	**2.26**	**4.34**

According to the Z-scores, transition diagrams of online synchronous discussion of both groups were shown in Figure 2 (undergraduate group) and Figure 3 (graduate group).

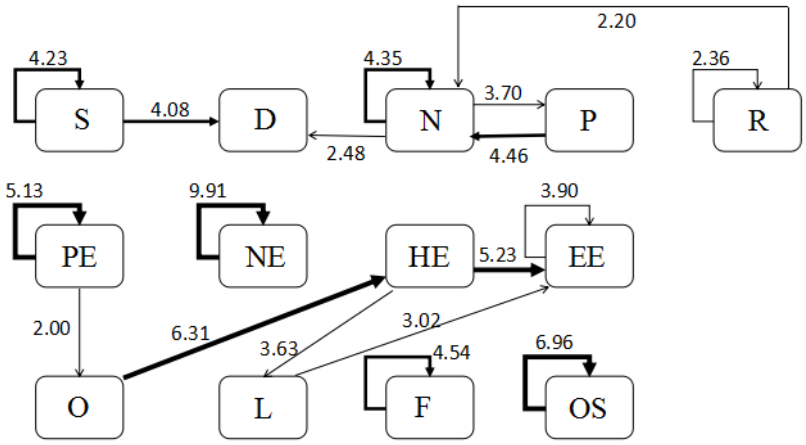

Figure 2. Transition diagram of online synchronous discussion of the undergraduate group.

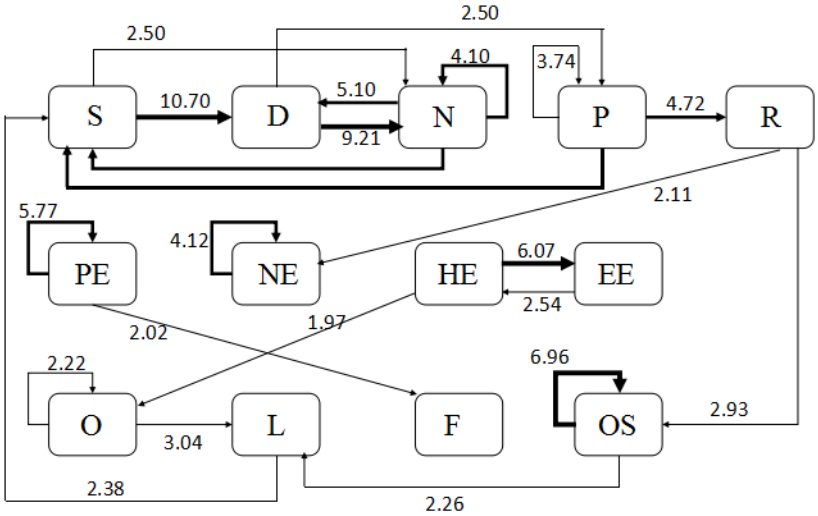

Figure 3. Transition diagram of online synchronous discussion of the graduate group.

The values in the figure represent the Z values of each sequence, the thickness of the arrow indicates a significant degree, and the behavior is shifted in the direction of the arrow. These sequences showed the overall interaction behavior patterns of the two groups in online synchronous discussion.

4.2.1 The Sequential Patterns of undergraduate group

By analyzing the overall interaction of undergraduate students, it can be observed that the behavioral sequences of the six sequences were significantly higher, including NE→NE (9.91), OS→OS (6.96), PE→PE (5.13), F→F (4.54), S→S (4.23), N→N (4.35). However, the significance of P (produce) was still small. This showed that six kinds of behavior patterns including share, negotiation, positive emotion, negative emotion, lead thinking and others were the ongoing classroom undergraduate's activities in online synchronous discussion in face-to-face classroom.

The first was the pattern of behavior that occurs between reflection, negotiation, produce, demonstration of cognitive presence dimensions. It was R→N→P and R→N→D. N (negotiate) was usually followed after R (reflect). N (negotiate) would lead to different behavior patterns, including P (produce) and D (demonstrate). This suggested that once there is little frequency of reflection, it would cause the learner's attention. Then the learners to negotiate and discuss. At this time there may be two cases. One was the teacher or the learner to sum up the conclusion, the other was the learners continue to clarify their points. This behavior pattern promoted the behavior of cognitive dimensions.

The second was the pattern of behavior that occurs between teaching presence and social presence. It was O→HE→EE and HE→L→EE. The occurrence of a teacher's teaching organization (O) would cause the learner to ask for help or ask questions (HE), then someone would explain or provide help (EE). When a learner raised a question, teachers or assistants usually lead the students to think (L), and then someone would propose a solution. This suggested that there was cross between teaching presence and social presence. After the teacher consciously organized the teaching, the students would put forward questions, and feedback on the questions was also very timely. Then after students ask questions, teachers would appear to lead thinking behavior to encourage students to think deeply and create a solution. The emergence of this positive behavior model facilitated the cross of teaching presence and social presence.

The third was the pattern of behavior that occurs between sharing and demonstration. It was S →D. Students liked to share their views in the classroom. And then they would prove the rationality of their own point of view or other students to further analyze this view.

4.2.2 The Sequential Patterns of Graduate Group

By analyzing the overall interaction of graduate students, it can be observed that the behavioral sequences of the six sequences were significantly higher, including OS→OS (6.96), PE→PE (5.77), NE →NE (4.12), N→N (4.10), P→P (3.74), O→O (2.22). This showed that six kinds of behavior patterns including negotiation, produce, positive emotion, negative emotion, organizing teaching and others are the ongoing classroom graduate's activities in online synchronous discussion in face-to-face classroom. Participants have a high attention and stamina in classroom activities.

In this interactive behavior pattern, four independent and significant behavior pattern sequences were found.

The first was the behavior pattern of the cycle that occurs between sharing, demonstration, negotiation of cognitive presence dimensions. It was S→D→N→S. D (demonstration) is usually followed after S (share). Demonstration (D) would lead to the emergence of N (negotiation). After the discussion of the learners, the learners would usually put forward their new ideas (S). This suggested that learners will demonstrate after expressing their views. Then other learners would discuss, which led to the creation and discussion of new ideas. The behavioral pattern of this cycle would make the discussion behavior more sustainable and promote the discussion of cognitive dimensions.

The second was the behavior pattern that occurs between sharing, produce and reflection of cognitive presence dimensions. It was P→S,P→R. After the learners synthesize the views and form the conclusions, there are usually other students share new insights or learners to reflect on interactions. The patterns of behavior that occur at the cognitive dimension and social dimension are P→R→NE. This showed that learners may have negative emotions after concluding and reflecting. This is because after the learners reflect on the events, words and deeds, questions, experiences in the interaction, they will find their own problems and shortcomings, so they may show negative emotions such as anxiety, dissatisfaction and inferiority.

The third was the pattern of behavior that occurs between sharing, produce and reflection of social presence dimensions. This indicated that other students provide helping after one raise the question. After solving the problem, there would be more people to raise new questions. Learners do depth thinking about the problem.

The fourth was the pattern of behavior that occurs between teaching presence and cognition presence. It was O→L→S. After the organization of teaching, teachers usually take action to continue to promote the discussion of learners, then learners will put forward their views. This showed that teachers would consciously organize teaching and encourage students to discuss to enable students to share their views.

4.2.3 The Difference of Sequential Patterns between Undergraduate and Graduate Group

The behavioral patterns in cognitive dimensions of undergraduates are relatively independent. When they were in occurrence of cognitive behavior, the undergraduate students won't appear the behavior of the other dimensions. However, when they were in occurrence of cognitive interactive behavior, graduates' behavior was to facilitate discussion of teaching presence dimensions and negative emotion

of social presence dimensions. This showed that the graduate students are more adept at making the behavior of the three dimensions cross occurs than undergraduate students.

At the social presence dimension, both undergraduate students and graduate students have a pattern of behavior was asking questions and then solving problems. The difference was that undergraduates' behavior patterns are usually teachers first organize teaching, and then students ask questions, and finally others to solve the problem. However, graduate students usually continue to ask new questions after solving the problem. This is because the graduate students are more adept at asking questions and thinking deeply.

At the teaching presence dimension, the same between undergraduate students and graduate students was the emergence of the behavior of teaching dimensions, which lead to the occurrence of social dimension. The difference was that teachers have more guide thinking behavior in the undergraduate group. Teachers have more organization teaching behaviors in the graduate group. This is because the graduates would spontaneously carry out depth thinking, undergraduates lack of consciousness, so the teacher's guidance is necessary.

Other discussions that are unrelated to the teaching content was common classroom activity that occur in undergraduate and graduate classes. The difference was that the other discussions in the undergraduate classroom are relatively independent and do not lead to other behaviors, but other discussions in the graduate's class will lead to the teacher's promotion of discussion and student reflection. This indicated that undergraduates' unrelated discussions were less affected by other behaviors or affect other behaviors, but the teacher would guide the graduate students to return to the classroom or to self-reflection through the organization of teaching after the unrelated behavior of the graduate students.

5. Conclusion

This study was about online synchronous discussion in face-to-face classroom based on WeChat, and encoded the discussion messages of undergraduate students and graduate students. Then participants' interactive behavior patterns were found by content analysis and lag sequential analysis. And studied the characteristics and differences of the interactive behavior patterns between undergraduate students and graduate students. Positive emotional communication was the most important activities in effective discussing both undergraduate students and graduate students.

It can be found by quantitative content analysis and lag sequential analysis as follows. In the undergraduate classroom, the frequency of positive emotional communication, knowledge sharing, negotiation was higher and was significantly higher classroom behaviors. In contrast to these three behaviors, negative emotional communication, lead thinking and other discussion of these three kinds of behavior occurs in the lower frequency but were significantly higher classroom behaviors. In the graduate's class, the frequency of positive emotions, ask questions and solve the problem was higher, but negotiation, produce, positive emotions, negative emotion, teacher organizing teaching and other discussions were significant classroom behavior in the graduate's class. In the face-to-face online synchronization class-room, undergraduate students and graduate students have a high level of attention and endurance. Except the discussion of cognitive dimensions, learners also appear the behaviors of expressing and exchanging emotions and discussing unrelated issues. Good emotional expression and communication provide a relaxed and friendly learning atmosphere for the formal teaching activities, which was conducive to the interaction of participants. The construction of high-quality deep knowledge can be realized in the learner's creation, reflection and solving problem, but the frequency of occurrence was less. Therefore, it is necessary for teachers to use teaching strategies to promote these behaviors.

In order to improve the quality of learners' online synchronization discussions, this study will provide some advice on teachers how to intervene in online synchronization discussions for undergraduate students and graduate students based on findings. There are four suggestions as follows.

First, for undergraduate students, teachers can encourage students to integrate their views and draw conclusions. They are more inclined to carry out the surface analysis so that they cannot think profoundly. Teachers can encourage students to integrate the various views that appear when students discuss to a certain degree. And then come to a conclusion or solution to make the whole discussion more complete. For graduate students, teachers can encourage students to reflect on their own point of

view. They prefer to express their own views, so teachers can guide students to reflect and summary on the point of view.

Second, teachers can encourage students to continue to ask questions after they have solved the problem, guide them to generate more knowledge building activities, and make positive responses and feedback to them.

Third, teachers can take more instructional strategy of teaching dimensions, such as organization of teaching, promoting discussion, guiding thinking and so on, to guide learners to share their views, argumentation, consultation and draw conclusions.

Finally, in formal learning activities, learners inevitably have some discussion that has nothing to do with the content of the teaching. At this point, the teacher can make appropriate reminders to avoid the whole discussion from deviating from the subject, thus improving the efficiency of learning and teaching.

This study combines the online discussion with the traditional classroom for blended learning and analyzes the behavior patterns of different learners. The research is very limited, so the researchers can do further research with various methods in different contexts.

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