

The Relationship between Modes of Interaction, Degree of Intimacy and Discussion Efficiency

Hongxi Chen¹, Binwen Yan², Jiayi Sun³, Yuekai Tang⁴, Shuang Xu⁵

¹RDF International School, Shenzhen, Guangdong, 518116, China

²Foshan NO.1 High School, Foshan, Guangdong, 528000, China

³School of Education and Social Science, University of California, Irvine, CA 92697, United States

⁴University of Connecticut, Storrs, Connecticut 06268, United States

⁵Jiangnan University, Wuxi, Jiangsu, 214122, China

Abstract

With the boom of online learning, conflicting findings on this topic have been yielded. This work seeks to answer the core research question: During synchronous online discussion on Tencent Meeting, how do different modes of discussion (turn-taking and free discussion) and the degree of intimacy (friends and strangers) affect undergraduate students' discussion efficiency? Eventually, the data of 32 participants are valid, with four groups for one mode. To evaluate their efficiency of online discussion, this study combines a more subjective content analysis with the exported results from the tests. As revealed by the final results, although they are not supported by all hypotheses, there are notable interaction effects presented. Sum of words in turn-taking discussions between strangers are much more than that occur in free discussions whereas two different modes (free discussion and turn taking) do not matter for most of the variables for strangers. Moreover, among the 5 elements of content analysis, participation across groups appears slightly statistically significant, indicating that that friends discussing in a free discussing condition produce more swap of turns. Familiarity of the topic, as a confounding variable, has a significant impact on participants score. Combined, the results of this study have educational implications, serving as a reference for teachers designing teaching strategies. Lastly, some limitations of this study are discussed and future research directions are suggested.

Keywords

Online learning; Synchronous online discussion; Turn-taking; Free discussion; Intimacy.

1. Introduction

The concept of online learning is not new, and as a mutual teaching and learning method, online learning platforms have gained rapid growth over the past few decades. Meanwhile, more and more schools and institutions offer this learning method with great flexibility, facilitating a large number of learners who are busy at their careers or families to engage in advanced, professional studies. Currently, coronavirus has upended the formal in-class learning into online learning. Because of the shut-down, many schools offered online courses, either synchronous or recorded, for students to study, via Zoom, Tencent Meeting or many other online platforms or systems. Correspondingly, with the ongoing pandemic, the efficiency of online learning has come to the foreground.

The specific issue on which the researcher had focused upon is that the different teachers and educational institutions are presently struggling to overcome the limitations of online

discussion modes. Identifying the most effective discussion mode would be able to improve academic performance of the students [1]. Thus, finding the most effective modes of discussion to promote frequency of interactions and maximize the responses given by students is the problem on which the researcher had focused upon for conduct of the study.

The aim of this study is to undertake an analysis of the two modes of discussion, namely, free discussion and turn-taking discussion which are generally being used in group discussion in online environment while focusing on their relative effectiveness, and how degree of intimacy affect the online discussion efficiency.

2. Literature Review

Interactivity plays a significant role in learning, especially in online learning [2]. Studies have shown that, through interactivity, students construct knowledge, develop learning satisfaction, and improve academic performance [2, 3]. Meanwhile, students may understand and obtain knowledge efficiently when they are engaging in discussions and high frequency of interaction through discussion could maintain students' motivation [3]. There are various types of strategies or modes that offer opportunities to professors and students to interact with each other under the online learning environment. However, different modes have different insufficiency, including: (a) participants prefer to follow others' ideas without thinking their own ideas in discussion forums; (b) the lack of responses during a free discussion in a real-time online course; (c) online discussion takes much of the course time online [4]. In order to maximize the frequency of the interaction and to offer opportunities for students to show their arguments, it is important to find the best mode of interaction during the online courses.

2.1. Modes of Online Discussion: Turn-Taking and Free Discussion

Much research has already been conducted on one particular mode of interaction measuring the efficiency of discussion but none of them compare various modes of interaction. Participants stayed on task for most of the turns and clarified their ideas efficiently [5]. Meanwhile, the turn-taking strategy would offer opportunities to the entire class and allow silent students to speak their own thoughts out [6]. In this case, the turn-taking strategy allows space for individual students to express ideas, which promotes the efficiency of speech in the online classroom [5,6]. On the other hand, the mode of free discussion has the maximum of opinion cumulative change, which means that participants interact frequently under the mode of free discussion [7]. In the meantime, free discussion can be considered as a strategy for developing students' skills in critical thinking and promoting knowledge construction [2]. Our approach is to investigate which mode serves as the best strategy for interaction during distance learning by comparing free discussion and turn-taking.

2.2. Degree of Intimacy: Friends and Strangers

There are various strategies for allocating students in groups, such as random assignment, self-selection, and deliberate allocation, and degree of intimacy is a critical mediator of the efficiency of the group [8]. Thus, the degree of intimacy plays a significant role in online collaborative work and discussion because friends usually engage in a more extensive talk which would extend to more expressed ideas and elaborate more thoughts [8]. However, strangers are more helpful and active in the online collaborative discussion because strangers may offer new thoughts and ideas and prefer to express the opposite arguments directly [9]. In this case, our study seeks to investigate how the degree of intimacy affects the students' efficiency in online collaborative discussion.

2.3. Discussion Efficiency

Previous research stated that there are various methods to measure the efficiency of discussion under the online environment, e.g. interruption, validity, scope, quantity, participation [5,10]. Specifically, interruption could be considered when the first speaker's utterance is incomplete, the second speaker's utterance appeared together [10]. Meanwhile, another study stated that validity should be an element of a good discussion, which means that students' arguments should be well-supported in a highly efficient collaborative discussion [11]. An efficient discussion should contain various ideas and opinions from different accepts instead of narrowly focused, and, in this case, scope should be an element for measuring the degree of comprehension in an online discussion [12]. What's more, a goal of online collaborative discussion is to have every student to engage in and to participate in the discussion, so participation plays an important role in measuring the efficiency of discussion [13]. Another research stated that measuring the quantity of words is relatively simple to evaluate the interaction of online discussion by collecting the number of speaking words in arguments and responds [14].

In summary, according to the above literature, our research study examines whether the modes of online discussion specifying turn-taking and free discussion and the degree of intimacy specifying friends and strangers would promote undergraduate students' collaborative online discussion efficiency. Thus, this research study was guided by the following research question: In synchronous online discussion using Tencent Meeting, how do modes of discussion (turn-taking, free discussion) and the degree of intimacy (friends, strangers) affect undergraduate students' discussion efficiency (Validity, Scope, Quantity, Interruption, Participation)?

According to the research by Gay (2012) and Karas (2016), turn-taking strategy could maximize students' efficiency in the online collaborative discussion. Yet, free discussion strategy could improve students' discussion efficiency by promoting the interaction in the online group discussion [7]. In this study, we also interested in how the degree of intimacy as an element affect the students' efficiency in the online collaborative discussion. The above literature helped us to construct three hypotheses for this study:

H1: Free discussion among friends under an online condition, in contrast to turn-taking discussion, presents higher discussion efficiency.

H2: Turn-taking discussion among strangers under an online condition, in contrast to free discussion, presents higher discussion efficiency.

H3: In both modes of discussion, discussion among friends, with higher familiarity, presents higher efficiency than that among strangers.

3. Methods

3.1. Context and Participants

Participants were 32 (mean age 19-22) undergraduate students (16 males, 16 females). Of these, 16 participants (8 males, 8 females) are friends and 16 participants (8 males, 8 females) are strangers. All these participants have their own smartphones and have their own account of Tencent Meeting. Also, they are familiar with how to use Tencent Meeting to discuss with each other. All of them are native Chinese with Chinese as their first language and none of them have developmental delay or speech and hearing impairment. The participants in friends' group were equally assigned into four groups based on gender resulting in each group with 2 males and 2 females, and the participants in strangers' group were assigned into four groups in the same way as the friends' group did. Therefore, a 2*2 quasi-experiment was designed. This study was conducted into a synchronous online lecture offered via Tencent meeting for approximately 15 mins long, and the lecture was related to the topic of criminal psychology.

Criminal psychology was chosen as the lecture topic because most undergraduate students were not familiar criminal psychology. In order to control the level of background knowledge in criminal psychology, a pre-test to test the level of participants' knowledge is constructed. Meanwhile, there are two confounding variables: the participants' ability of study and the participants' personality, whether outgoing or introverted. In order to figure out the level of study ability for each participant, there is a pre-survey to ask them to rate their study ability through one to five. Number one means the lowest study ability and number five means the highest study ability, then using the same way to figure out whether the participants are outgoing or introverted through number one to number five. Number one means the most introverted and number five means the most outgoing.

3.2. Experimental Procedure

This study was conducted in four steps: pre-survey, pre-test, online meetings and post-test. Before the experiment, researchers announced the study goal and procedure to participants privately on WeChat, and distributed pretest survey including consent form and demographic test which contained gender, age, mother tongue, personality and learning ability. However, the study goal was covered as the efficiency of students to learn by watching a video online within a group. After they completed, they were assigned into eight groups numbered M1-F to M2-S'. Under each condition, there was a control group. For groups of friends, we intentionally assigned them into four groups under two conditions (free discussion and turn-taking). Meanwhile, we randomly assigned other 16 strangers into four groups under the other two conditions (free discussion and turn-taking). Then, researchers asked them for available time within a week for the half-hour online study privately, told them their group name and their own experimental number.

During online meetings, a host, one of the researchers, provided instructions and rules of the discussion, for about 2 minutes. 15-minute video then began. Next, 4 participants within a group were asked to express their ideas of three discussions cues we provided, based on the knowledge of the video, for about 15 minutes (5min/cue). For each group, a host will lead with discussion cues. For the turn-taking group, researchers will serve as mediators between turns, giving instructions to the next speaker. Participants, on the other hand, will have to click the raise-hand button before they speak, and give cues of closure afterwards. For free discussion, hosts hardly intervene participants. All participants were required to speak in Chinese. They were not allowed to open their cameras. The online meeting design is shown in Figure 1.



Figure 1. Online meeting design

When the meeting was finished, researchers sent them the post-test including self-report (focus on the topic, clarity, validity, scope, consensus and intensity) and 6 questions (4 open questions and two multiple choice) through WeChat privately. After 4 of them had completed, researchers debriefed to them the true purpose of the study. The experimental process is shown in Figure 2.

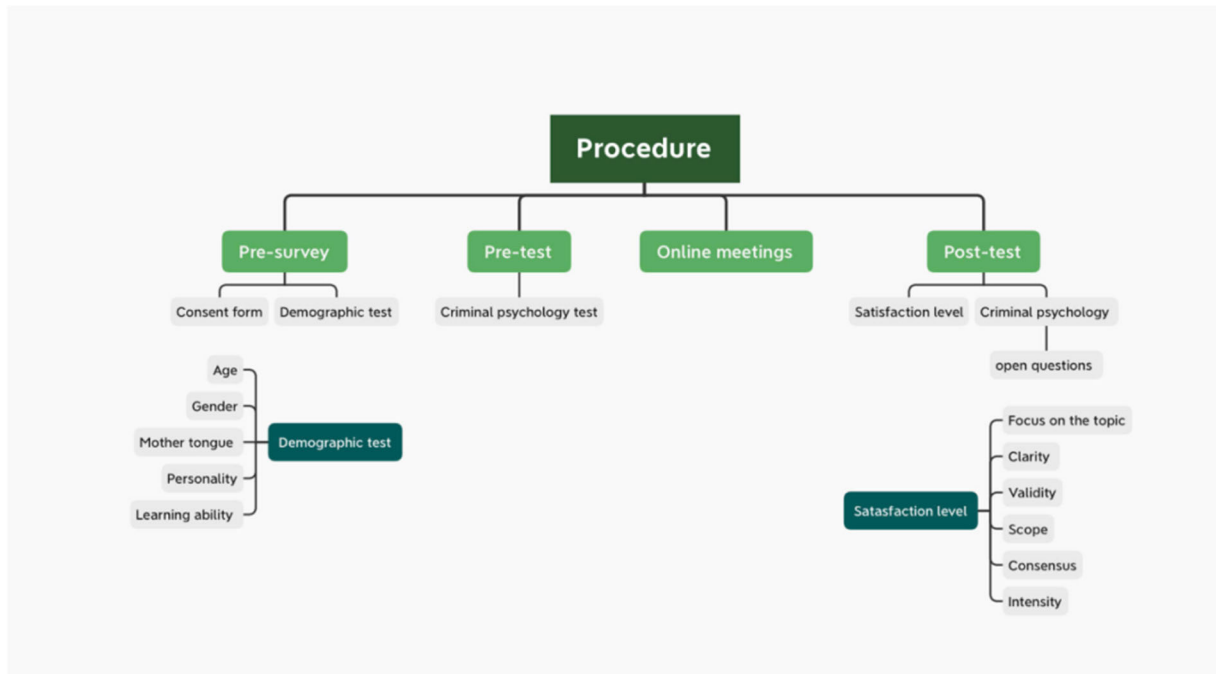


Figure 2. Experimental Procedure

3.3. Data Coding and Analysis

There are 2 data sets of content analysis, one is for calculation of overall efficiency score, the other is the raw data of content analysis. To evaluate the former, a grading system was set on each element (validity, scope, quantity, interruption, and participation). 25, 30, 4000, 20 and 50 are the maximum score corresponding to validity, scope, quantity, interruption, and participation respectively (e.g. in the results, the validity of M1-S group is 14 out of 25). Score of each element is then translated into percentile and were given an equal weight. We then calculated the weighted mean and outputted an average score.

Content analysis for each group was analyzed by two researchers based on an agreed-upon criteria, and 4 researchers participated in the whole process of analysis. Validity, number of arguments, include logical induction and deduction, citation of facts and examples. Scope, number of theses, represents speeches indicating that the speaker is making a point. Quantity, number of characters, does not include modal particles e.g. "eh" "ah", linking words in Chinese e.g. "this" "that", and only the initial contents are counted in repeating contents e.g. "I think, I think". Interruptions include simple interruptions, overlaps, butting-in interruptions, silent interruption [7], and simultaneous attempts of speech initiation. Participation, number of turns taking in the whole discussion, only consists of turns that include information.

Full credit of the quiz on criminal psychology is 24, and that of the satisfaction questionnaire is 40. They were both translated into percentile. The quiz, the satisfaction questionnaire, and the content analysis were respectively distributed the weight of 30%, 30%, and 40%. Their weighted means were calculated, and the output represented the overall efficiency score.

4. Results

This work conducted a statistical analysis of 8 groups across two discussion modes and two degrees of intimacy. The work applied ANOVA to analyze efficiency difference between different modes (with "4 strangers in free discussion group" coded as M1-S, "4 friends in free discussion group" coded as M1-F, "4 strangers in turn-taking discussion group" coded as M2-S and "4 friends in turn-taking group" coded as M2-F) (See Table 1.). It is important to note that the final score which is composed of answers about criminal psychology quiz (30%), satisfaction level (30%), and content analysis (40%) presents the efficiency of discussion.

Contrary to our expectations, there were no significant differences in efficiency, evaluated by our methods, across all 4 groups (See Table 1). Although the mean score of M2-F is slightly higher than other groups, it is not high enough to be significantly different.

Table 1. ANOVA analysis on efficiency difference between different modes

		n	Mean	SD	SE	F	P-value
Final Score	M1-S	8	55.50015	4.830588	1.707871	0.79	0.51
	M1-F	8	51.80237	10.33423	3.653702		
	M2-S	8	53.4975	5.234734	1.850758		
	M2-F	8	57.22157	8.285251	2.929279		
	Sum	32	54.5054	7.441743	1.315527		

4.1. Friends vs Strangers

4.1.1 Quantitative results

As shown in Table 2, the efficiency difference within friends and strangers were not significant($p=0.996$).

4.1.2 Descriptive results

Table 2 represents descriptive information of the friends and strangers' group. Although the difference between the means of two groups were descriptively insignificant, the standard deviation varied significantly.

Table 2. ANOVA analysis on efficiency difference between two groups with different degrees of intimacy

		n	Mean	SD	t	P-value
Final Score	Friends	16	54.51197	9.47123	0.005	0.996
	Strangers	16	54.49883	4.97461		

4.2. Free Discussion vs Turn-taking Discussion

4.2.1 Quantitative results

As shown in Table 3(with "free discussion" coded as 1 and "turn-taking discussion" coded as 2), the efficiency difference within two discussion modes among friends was not significant($p=0.267$).

As shown in Table 4(with "free discussion" coded as 1 and "turn-taking discussion" coded as 2), the efficiency difference within two discussion modes among strangers was also not significant($p=0.44$).

4.2.2 Descriptive results

Based on descriptive information in Table 3, the mean of mode 1 was 51.80 and the mean of mode 2 is 57.22, slightly higher. On the other hand, the descriptive results in Table 4 indicate that there only a slight descriptive difference within two modes among strangers, while the

mean of mode 1 was 55.50, and the mean of mode 2 was 53.49. At the same time, the SD of the two modes were almost the same.

Table 3. ANOVA analysis on efficiency difference between two discussion modes with friends

	Mode	n	Mean	SD	t	P-value
Final Score	1	8	51.80237	10.3342	-1.157	0.267
	2	8	57.22157	8.28525		

Table 4. ANOVA analysis on efficiency difference between two discussion modes with strangers

	Modes	n	Mean	SD	t	P-value
Final Score	1	8	55.50015	4.830588	0.795	0.44
	2	8	53.4975	5.234734		

4.3. Content Analysis

Although we combined the results of three sets of data (quiz about criminal psychology (30%), satisfaction level (30%), and content analysis (40%)) to evaluate the overall efficiency of discussions, we have the strongest interest in the data from the content analysis. The results from the quiz may be highly affected by individual abilities and do not fully rely on the impact of the group discussions; results from the satisfaction questionnaire can well indicate the perception of participants toward the discussion, it does not, nonetheless, serve as an objective evaluation of different aspects of the discussion indicating its efficiency, because the ratings from participants can be highly subjective and the criteria vary across participants. Therefore, we believe that content analysis, despite the subjectivity of researchers, can be a strong indicator of discussion efficiency since we adopted an agreed-upon standard while evaluating, assigned two researchers for evaluation of each group, and the data is detailed and quantified. It thus can provide us deeper insight into the elements that can facilitate discussion efficiency, and the variation across groups and participants concerning the respective elements (Validity, Scope, Quantity, Interruption, Participation).

Overall, we found among the 5 elements that only the difference of Participation across groups appears slightly statistically significant, indicating that that friends discussing in a free discussing condition produce more swap of turns, which represents the high engagement of participants (See Table 5). However, data of Validity shows a relatively smaller P-value, and the mean number of arguments of group M2-F is more than twice that of group M1-F. Total characters of M2-S is also more than twice the data of M1-S.

Despite the large P-value, Interruptions appear much more frequent in group M1-F. It is reckoned that free discussion does not limit speakers to speak in turns, and therefore provides more opportunity for participants to speak before the end of another participant's speech. Free discussion among strangers, however, only produced two interruptions, both of which were simultaneous attempts of initiating a turn and were eliminated when one speaker insisted that the other speak first. It is also notable that strangers under the free discussing condition spontaneously developed cues of ending a turn, e.g. "Over", "The speech is finished", leading to the low possibility of interruptions and quasi-Turn-taking discussion.

Table 5. Content analysis on 5 elements

Groups	n	Sum	Mean	Square Deviation	F	P-value	F crit
Validity							
M1-S	2	28	14	32	3.85	0.11	6.59
M1-F	2	17	8.5	12.5			
M2-S	2	28	14	2			
M2-F	2	42	21	8			
Scope							
M1-S	2	43	21.5	60.5	1.84	0.27	6.59
M1-F	2	28	14	32			
M2-S	2	44	22	32			
M2-F	2	56	28	18			
Quantity							
M1-S	2	3411	1705.5	1240312.5	0.81	0.54	6.59
M1-F	2	4037	2018.5	262812.5			
M2-S	2	7284	3642	3936818			
M2-F	2	4851	2425.5	1647112.5			
Interruption							
M1-S	2	2	1	2	2.64	0.18	6.59
M1-F	2	45	22.5	364.5			
M2-S	2	0	0	0			
M2-F	2	1	0.5	0.5			
Participation							
M1-S	2	28	14	2	4.47	0.09	6.59
M1-F	2	161	80.5	2112.5			
M2-S	2	25	12.5	0.5			
M2-F	2	18	9	2			

5. Discussion

Employing our model of discussion efficiency evaluation, although our results show insignificant overall variation across groups, and thus do not support all our hypotheses, sum of words in turn-taking discussions between strangers are much more than that occur in free discussions, which shows one of the most notable interaction effects; whereas M1 vs M2 doesn't matter for most of the variables for strangers. It is possible that our model is not the best for evaluating discussion efficiency, or that other limitations of the experiment. For example, short time limit may have led to the insignificant variation. However, our findings in content analysis may provide insights in the how modes of interaction and familiarity of students respectively influence the content and the efficiency of online discussion.

It is believed that even when the quantity of a discussion is large (containing more characters), validity and scope should also be taken into consideration for useful and meaning information contained in the discussion. Therefore, the combined results of Validity, Scope, and Quantity indicate that even though a turn-taking strategy may facilitate more engagement in the discussion among strangers, it does increase the emergence of more information.

One of our important finding is that for students who are strangers, the discussion is apt to turn into a turn-taking one even though it is started as a free discussion. It is possibly because strangers may be more respectful and discreet in conversation. Since free discussion may lead to interruptions (and as shown in our data, it does), which are view as disrespect, strangers would refrain from adopting such conversational strategy in a discussion to avoid that situation. On the other hand, friend groups in free discussion mode display much more swap of turns and interruption than strangers did. We speculate that friends, with higher familiarity with one another, may interact more frequently and have less concern that interruption represents disrespect.

6. Limitations and Future Research Directions

While this study has obtained some important findings, there are some limitations as well. First, since this study was conducted using a quasi-experiment, the group setting and participants

could not be controlled completely. Some participants had a much higher score of background knowledge of criminal psychology in the pretest survey. If all the participants would have approximately the same score, we could better decipher the effects of online discussion on their learning. Second, although we have two groups for each condition, the number of participants was still not large enough to generalize the result. There were still some individual variations under two groups with the same condition. We speculate that larger variation may appear if the experiment is conducted with a larger sample. The duration time for the discussion is also too short to discover significant variation across groups. Third, participants were required to turn off their cameras because of Chinese's conservative tradition, but we consider it better to require participants to open their cameras in Tencent meeting, thus providing future research to compare the effect of offline (in-person) meeting under different modes of interactions and degree of intimacy among undergraduates. Fourth, the profile photos of participants were different in the meeting. It would probably influence the mood of participants. For example, a smiley face on the image might allow participants to feel more comfortable while some other images might give participants other emotions, which could influence the discussion efficiency to some extent. Fifth, questions about criminal psychology in pretest survey were different from those in the posttest, though they both came from the video we provided for participants. Last but not least, because of the different available time of researchers, meetings were held with different hosts. Therefore, a host could be assigned to the group in which his/her friends have the meeting together. Because of the familiarity, some informal chats were unavoidable, which might have an impact on discussion efficiency.

The present study focuses on how different modes of interaction and different degrees of intimacy affect the discussion efficiency under undergraduate students. It remains unclear that what effect the two modes may have on people of other different ages and in other learning areas such as political or environmental studies. This might be an opportunity for further research.

7. Conclusion

Despite the limitations, the content analysis did provide some elementary results worth looking into. This study can serve as a pilot study, probing a topic that researchers can investigate closer into in the future. This study can also serve as a reference for teachers designing teaching strategies. Our content analysis on participation may indicate that if a teacher looks forward to an intense free discussion, he or she should try to facilitate familiarity among students. The large number of turns swapped among friends under free discussion conditions suggests that if a teacher is seeking for high engagement of students, he or she should adopt a free discussion strategy, and the impact is significant when the student are acquaintances. However, our data shows that if the teacher intends to adopt a turn-taking strategy for online discussions, it should not be concerned whether the students are familiar with each other.

As the COVID-19 has spread over time, online classes, usually including online discussions, have become an integral part of student life. It has been suggested that this communication method promotes knowledge construction by allowing participants to interact with one another in a more reflective manner by enabling students to obtain a more equal level of participation. This type of synchronous discussion in an online course encourages integrity of information in each turn. However, it may encounter the problem of lower engagement. As shown in the content analysis, free discussion among friends, due to frequent swaps of turns, shows less integrity of information. On the other hand, although free discussion among friends shows high engagement level, it causes the information to be fragmented and thus may lead to problems of comprehension. Large number of interruptions in this mode may instead diminish discussion efficiency rather than facilitating it. Therefore, we suggest that while one is speaking, friends

need to be respectful and to control themselves if they want to express ideas. In this way, it is possible for this mode to play to its strength and become more efficient.

References

- [1] Bervell, B., Umar, I. N., & Kamilin, M. H. (2020). Towards a model for online learning satisfaction (MOLS): Re-considering non-linear relationships among personal innovativeness and modes of online interaction. *Open Learning: The Journal of Open, Distance and e-Learning*, 35(3), 236-259
- [2] An, H., Shin, S., & Lim, K. (2009). The effects of different instructor facilitation approaches on students' interactions during asynchronous online discussions. *Computers & Education*, 53(3), 749-760. doi: 10.1016/j.compedu.2009.04.015
- [3] Hartley, J., & Cameron*, A. (1967). Some observations on the efficiency of lecturing. *Educational Review*, 20(1), 30-37. doi: 10.1080/0013191670200103
- [4] Nandi, D., Hamilton, M., & Harland, J. (2012). Evaluating the quality of interaction in asynchronous discussion forums in fully online courses. *Distance education*, 33(1), 5-30. doi: 10.1080/01587919.2012.667957
- [5] Gay, T. (1990). A Short Study of Turn Taking in Mixed Sex, Small Group Discussion. *International Journal of Adolescence and Youth*, 2(2), 125-142. doi: 10.1080/02673843.1990.9747669
- [6] Karas, M. (2016). Turn-taking and silent learning during open class discussions. *ELT Journal*, 71(1), 13-23. doi:10.1093/elt/ccw051
- [7] Su, J., Liu, B., Li, Q., & Ma, H.. (2013). Opinion dynamic evolution: a comparison of group experts rounds' discussions with free ones. *Journal of National University of Defense Technology*, 35(2), 52-56. doi: 1001-2486(2013)02-0052-05
- [8] Sainsbury, E., & Walker, R. (2012, September). Motivation, learning and group work—the effect of friendship on collaboration. In *Proceedings of The Australian Conference on Science and Mathematics Education (formerly UniServe Science Conference)*.
- [9] Whittaker, S. (1996, November). Talking to strangers: An evaluation of the factors affecting electronic collaboration. In *Proceedings of the 1996 ACM conference on Computer supported cooperative work* (pp. 409-418).
- [10] Ferguson, N. (1977). Simultaneous speech, interruptions and dominance. *British Journal of social and clinical Psychology*, 16(4), 295-302. doi: <https://doi.org/10.1111/j.2044-8260.1977.tb00235.x>
- [11] Smith, R. L., Flamez, B., Vela, J. C., Schomaker, S. A., Fernandez, M. A., & Armstrong, S. N. (2015). An exploratory investigation of levels of learning and learning efficiency between online and face-to-face instruction. *Counseling Outcome Research and Evaluation*, 6(1), 47-57. doi: 10.1177/2150137815572148
- [12] Eubank, L., Lee, K. S., Seder, D. B., Strout, T., Darrow, M., MacDonald, C., ... & Kern, K. B. (2018). Approaches to community consultation in exception from informed consent: analysis of scope, efficiency, and cost at two centers. *Resuscitation*, 130, 81-87. doi: 10.1016/j.resuscitation.2018.06.031
- [13] Davies, J., & Graff, M. (2005). Performance in e-learning: online participation and student grades. *British Journal of Educational Technology*, 36(4), 657-663. doi: 10.1111/j.1467-8535.2005.00542.x
- [14] Nisbet, D. (2004). Measuring the quantity and quality of online discussion group interaction. *Journal of eLiteracy*, 1(2), 122-139.