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Peer Interaction Patterns in a Collaborative Learning Environment Using Google Docs

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This study aims to investigate the frequency of three types of peer interaction occurs in a collaborative learning environment utilizing Google Docs. A total of 25 second-year students from the Bachelor's degree in Education who enrolled in Digital Audio and Video course participated in this study for one month. Students were provided with reflection task activity consisting of reflective prompts which they have to address, guided with structured reference materials provided by the instructor that consists of Udemy and Youtube videos, pdf files, e-books, and websites. Students in a group of five were required to collaboratively learn in Google Docs document. Students answered the reflective prompts and wrote summaries and reflective writings for the reflection task. Students were also encouraged to post comments so that they will interact actively, communicating and sharing new knowledge. Hence, students developed reflective thinking from experience and understanding through information sharing and interaction between them. This study employed a content analysis approach to better understand students' types of peer interaction in Google Docs based on three types of peer interaction namely collaborative, cognitive and meta-cognitive adapted from Kaendler, Wiedmann, Leuders, Rummel, and Spada 's (2016) model. The findings revealed that the collaborative was identified as the dominant type of peer interaction offered by the students followed by cognitive and meta-cognitive types. The results of this study suggest that students tended to share their ideas and respond to their friends' ideas apart from encouraging their friends to contribute and treat them with respect. This study demonstrates empirically the importance of the collaborative type of peer interaction that will trigger more students' engagement with cognitive and meta-cognitive peer interactions.

Keywords: peer interaction; Google Docs; collaborative learning environment; reflection; reflective writing

I. INTRODUCTION

The Malaysian Ministry of Education has identified 21st-century skills that are appropriate to produce skilled learners to think and learn collaboratively. Collaborative learning has become a methodology in the education system while encouraging active involvement of students in the learning process. Cloud-based technology such as Google Docs now provides the opportunity to implement active learning approaches by providing collaborative learning environments and encouraging students to interact with each other (Lin, Chang, Hou, & Wu, 2015). While teaching and learning activities are conducted collaboratively, interactions will take place as well as helping students build more meaningful knowledge compared to individual learning (Maor, 2003; Razak, 2013). Collaborative learning is defined as an activity involving more than one person to achieve the same goals. Collaborative learning is an effective learning element in the classroom and is increasingly recognized at institutions of higher learning (Jarvela, Jarvenoja, Malmberg, Isohatala, & Sobocinski, 2016). The success of collaborative learning depends on the quality of student interaction (Dillenbourg and Tchounikine, 2007). Collaborative learning usually involves a group of students who work together to discuss and exchange views to achieve the same agreement or goal (Kim *et al.*, 2014). The findings of Razak (2013) reported that online collaborative learning strategies have encouraged students to interact and express

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their opinions in understanding the content they learned. The results of the study found that students responded regularly to interact with the current learning class as students easily understand learning in the form of words as well as visuals through collaborative built-in understanding.

Research on collaborative learning stresses the importance of promoting students' interactions (Stahl, Koschmann, & Suthers, 2006; Liu & Shi, 2016). Social interaction promotes cognitive processes such as reflection, reasoning and critical thinking, including affective domain that influence learning (Yang, Tsai, Kim, Cho, & Laffey, 2006). Xing, Kim, and Goggins (2015) employed a Partial Least Squares (PLS) analysis method to modelling students' performance in asynchronous collaborative learning environment with three predictive factors (i.e. social ability, collective efficacy and social interaction) operationalized through a survey instrument. It was found that social interaction had the strongest impact on student learning thus suggests the importance of peer-to-peer interactions in-group dialogues that resulted with higher learning performance. However, their research was based on self-reported participation which may not address the students' actual peer interaction performance.

On the other hand, Dukuzumuremyi and Siklander's (2018) research reported that not all types of interactions are able to promote successful collaboration and meaningful learning. Therefore, actual evaluation that content analyse students' interaction is needed and should be investigated. What types of peer interaction patterns normally happen in online platform?

II. OBJECTIVE

Researchers have shown increasing attention to web-based and cloud-based collaborative learning with the affordances of Web 2.0 tools such as wikis, blogs, social networking sites including Google Docs that enable students to work together on the virtual space to contribute to an evolving text. To date, studies of web-based and cloud-based collaborative learning have focused on: (a) processes of writing; (b) quality of joint texts; (c) learners' perceptions of online collaboration; and (d) interaction patterns (Cho, 2017).

Google Docs found within Google Drive is now becoming a popular online venue that encourage the implementation of instructor-led and student-driven collaborative learning. Google Docs provide a venue for online interaction via its annotative comments which has the potential to be a valuable pedagogical tool.

Peer interaction in a collaborative learning through Google Docs is becoming increasingly important in today's blended learning classroom (Kaendler, Wiedmann, Leuders, Rummel, & Spada, 2016). Unfortunately, educators' task in monitoring and evaluating of student interactions is challenging and a demanding task. However, in order to plan student interaction, monitor, facilitate, support and design cloud-based collaborative learning activity effectively, it is crucial to understand what types of student interactions normally engaged by students during collaborative learning. This certainly elicits a concern on the use of Google Docs to function effectively in enriching the quality of peer interaction in online collaborative learning. As fewer studies investigated peer interaction patterns especially in Google Docs, thus this study examined the nature of peer interaction types in a collaborative learning environment using Google Docs.

III. METHODOLOGY

A. Context of Study

This qualitative content analysis study took place in the undergraduate Digital Audio and Video course during Semester II 2016/2017 academic year that involve a total of 25 second-year students from the Bachelor of Education, majoring in Teachers of English to Speakers of Other Languages (TESOL) program with a minor in multimedia, from the Faculty of Education in one of the Malaysian Higher Education Institutions (HEIs). Students were divided into five groups and one facilitator was appointed to regulate their learning.

B. Procedures, Data Collection and Data Analysis

The collaborative learning activity requires participants to answer five scaffolded guiding questions about Digital Audio and Video production important concepts (e.g. different types of camera shots, camera movement and camera angles, the rule of third, 180-degree rule, A-roll versus B-roll footage), by writing summary and reflection. In order to answer the questions, participants were required to conduct a self-directed learning approach guided with structured

resources provided by the instructor in the Schoology Learning Management System (LMS) platform that consists of Udemy and YouTube videos, pdf files, e-books, and websites. Upon understanding the content from the structured resources provided, participants translated their understanding in the collaborative writing using Google Docs.

In a group of five, participants then write summaries and reflective writings and communicate with their friends throughout the learning process. In the process of working together in Google Docs, multiple users can easily edit, chat, comment on, and view a single document at the same time. The chat and comment features in Google Docs allow participants to interact while writing and they can also leave feedback while reviewing the documents later. Peer interaction occurs when participants discuss, respond and share their knowledge in Google Docs' comment feature as shown in Figure 1.

Figure 1. Excerpts are taken from Google Docs's comment section

The text chats and comments collected from Google Docs were copied and pasted into spreadsheets for data analysis purposes. Data were analysed with Kaendler *et al.*'s (2016) peer interaction model. This model suggests that the effectiveness of collaborative learning depends on the quality of peer interaction that can be evaluated based on three dimensions, namely collaborative (K), cognitive (C), and meta-cognitive (MC) types. First, visible indicators of collaborative (K) type interaction is indicated when the group members: share their ideas (K1), respond to each other's ideas (K2), encourage each other to contribute (K3), and treat each other with respect (K4). Second, cognitive (C) type interaction is indicated when the group members: ask each other questions if they do not understand (C1), give reasons for their statements (C2), think out loud (C3), and connect content that is already familiar to new content that is to be learned (C4). Finally, meta-cognitive (MC) type interaction is indicated when the group members: point out mistakes to each other (MC1), express lack of understanding and/or what they have already understood (MC2), and search for ways to make progress on the problem at hand (MC3).

The data in this study were analysed using content analysis method with 'unit of meaning' as the unit of analysis. The inter-rater reliability test was carried out in this study because the human ability to study and analyse the meaning of phrases and sentences is limited. Inter-rater reliability is an important measure of control within data coding. Thus, data in this study were coded by the researcher and an assistant who was trained in the application of the Kaendler *et al.*'s (2016) peer interaction model. The inter-rater agreement was 83%, while disagreements were resolved via discussion. Some examples of the statements from students' peer interaction that represented the three dimensions, namely collaborative (K), cognitive (C), and meta-cognitive (MC) types can be seen in Appendix A.

IV. RESULTS AND DISCUSSION

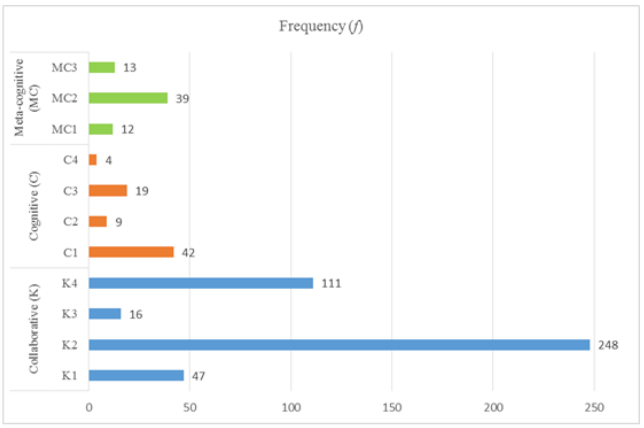
As shown in Table 1 and Figure 2, a total of 560 peer interactions contributed by the participants. Results obtained show that overall, the dominant type of peer interaction offered was collaborative (K) interaction (f = 422). This study also reveals that students tended to respond to their friends' comments (K2) and show respect through praises or jokes (K4), apart from sharing their experiences, feelings, personal views, including encouraging each other in the learning and writing process. On the other hand, with f = 74 for cognitive (C) contributions, the results show that participants were not regularly asking questions when they do not understand the content or asking questions to confirm their understanding (C1). Participants offered their opinions, but the opinions

given were not clearly defined and were not accompanied by appropriate examples to be easily understood by other participants (C2). Moreover, participants were also found less voicing and asserting what comes to their mind (C3) and there was minimal evidence that showed participants actively using their prior knowledge from previous lessons and/or their general knowledge (C4). Additionally, a notable pattern is that meta-cognitive (MC) type of interaction (f = 64) were contributed the least by the participants. It was observed that there were fewer statements about a lack of understanding and/or about what is already understood (MC2) and as a matter of fact, mistakes which were made by participants were not addressed by the other group members (MC1).

It is predicted that the high frequency of the peer-to-peer collaborative type of interaction has helped participants received a lot of new content through discussion as well as triggering the cognitive type of interactions that encourage the generation of new questions in the minds of participants because of curiosity as well as gaining certainty of the newly accepted content. However, with less cognitive interactions, they were not able to think and interact critically and creatively to provide feedback to their peers. In fact, due to the lack of understanding of the content received, the findings show that majority of the participants were often less linking existing content with newly learned content and less helping group members to get additional content from other sources. Hence, participants were more likely to receive the content they learned without questioning the validity of the content.

Table 1. The frequency of peer interactions contributed by the participants

Types of Peer Interaction	Code	Frequency (f)	Total
Collaborative (K)	K1	47	422
	K2	248	
	K3	16	
	K4	111	
Cognitive (C)	C1	42	74
	C2	9	
	C3	19	
	C4	4	
Meta-cognitive (MC)	MC1	12	64
	MC2	39	
	MC3	13	



*Note:

Collaborative type (K): group members share their ideas (K1), respond to each other's ideas (K2), encourage each other to contribute (K3), and treat each other with respect (K4).

Cognitive type (C): group members ask each other questions if they do not understand (C1), give reasons for their statements (C2), think out loud (C3), and connect content that is already familiar to new content that is to be learned (C4).

Meta-cognitive type (MC): group members point out mistakes to each other (MC1), express lack of understanding and/or what they have already understood (MC2), and search for ways to make progress on the problem at hand (MC3)

Figure 2. Comparison of three types of peer interaction

V. CONCLUSION

The patterns that emerged imply that students were more likely to interact collaboratively. The frequency of students interacting collaboratively has proven to encourage students to interact cognitively and meta-cognitively, although these two types of peer interaction may take time to develop. The findings suggest that Google Docs cloud-based technology could be integrated into collaborative learning to support students' collaborative writing and fostering peer interaction, while the design of the instruction influences the extent of students' effective peer interaction and successful knowledge construction. This study provides initial insights into how future cloud-based collaborative writing activities could be designed and proposed new ways that will encourage and guide students to regularly interact cognitively and meta-cognitively. Students should be trained and provided with a

guide on different types of peer interaction with appropriate examples for reference so that beneficial and effective student interactions could take place. For future research direction, Kaendler *et al.* (2016) recommend that peer interaction in the collaborative learning environment has the potential to be effective in improving student's reflective thinking skills. Hence, this insight raises the question of whether peer interaction has a relationship or correlation with students' reflective thinking in a cloud-based collaborative environment? Therefore, there is a need to study a correlation between students' types of peer interaction with their reflective thinking skill levels in a cloud-based collaborative environment such as Google Docs.

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Appendix A: Types of Peer Interaction Coding Scheme Sheet with Examples from This Research

Types of Peer Interaction			Examples of the statements from students' peer interaction
Code		Indicator	
Collaborative activity	K1	The group members share their ideas.	Your notes would be perfect if there are pictures with it for the camera shots
	K2	The group members respond to each other's ideas.	True, that why I'm kind a shock to learn about it and it is beyond my imagination. Seem like I take the production of video lightly.
	K3	The group members encourage each other to contribute.	When there is a will, there is a way. Great job Eli! I'm sure you will make use of it in your future works.
	K4	The group members treat each other with respect.	Wow..colourful and nice picture. Love it!! I like your notes which is short and precise.
Cognitive activity	C1	The group members ask each other questions if they do not understand.	Are we going to use the same method this time?
	C2	The group members give reasons for their statements.	However, I think that this can somehow still be accepted as a dolly zoom because at some point of the zooming process, it does not effect the ratio anymore, while the environment are still moving.
	C3	The group members think out loud.	It is important not to violate this rule as it will irritate the audience and their concentration will just fly away.
	C4	The group members connect content that is already familiar to new content that is to be learnt.	Hi. You can refer this: http://www.mediacollege.com/video/shots/ Our project will require more hand hold shots and a little shaky cams here and there with the scenes n and scenery changing accordingly...thats why it would be better to have another camera to capture the same scenes but at a different angle... it would help us when we go into editing the video.
Metacognitive activity	MC1	The group members point out mistakes to each other.	No, the director carves out the story and then brings it to the producer to get sponsored to make the movie.
	MC2	The group members express lack of understanding and/or what they have already understood.	Based on the examples of pictures you gave, I can conclude that camera shots are the same for all countries.
	MC3	The group members search for ways to make progress on the problem at hand.	I do enjoy watching as its funny, but I'll watch this for other purposes as well such as to learn on their mistakes maybe.