Journal of Theoretical and Applied Information Technology
15th June 2018. Vol.96. No 11

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

INTERACTING THROUGH DISCLOSING: PEER INTERACTION PATTERNS BASED ON SELF-DISCLOSURE LEVELS VIA FACEBOOK

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ABSTRACT

Peer interaction in an online environment has close connections with self-disclosure. Hence, this study was conducted to explore peer interaction patterns and self-disclosure levels via a social networking tool, specifically, Facebook. Twenty-two postgraduate students who enrolled for the Authoring System course participated in the study. Data were gathered from the online discussion transcripts in Facebook. The online discussion transcripts were coded and analysed based on (a) coding scheme for identifying patterns of peer interaction, and (b) a self-disclosure rating scale for categorizing the levels of self-disclosure. Findings showed that the students had mostly used response and position types of peer interaction. Meanwhile, most of the students were self-disclosing through Information-Level 1 followed by Feeling-Level 1, and Thought-Level 1. Furthermore, peer interaction patterns were found to have a strong significant and positive correlation with self-disclosure levels. In conclusion, this study revealed that high self-disclosure by students affects positively peer interaction in Facebook discussions. The implications of these results are considered, and possible future studies are suggested.

Keywords: *Peer Interaction, Self-disclosure, Online Discussion, Online Learning Environment, Facebook*

1. INTRODUCTION

In the educational field, technology is treated as a supporting tool in learning. There are varieties of online learning tools that students can use for learning discussions. Social networking tools, like Facebook, for example, have been widely used as learning media [1]. Discussion and communication through this medium involves intensive interaction either between students and their instructor, or between students and their peers. Among these two types of interactions, peer interaction should be encouraged more because students are more comfortable learning from their peers than learning from their instructor [2], and that can facilitate the development of the learning process [3].

Peer interaction is a collaborative type of learning in which students are encouraged to work together in the same context. As reported by Delucchi [4], students prefer collaborative learning, as it enables them to exchange more opinions and ideas. These students will learn to find their own resources and share the knowledge with others with a sense of responsibility toward peer learning. The feeling of being responsible in self-learning and peer-learning can build up closeness in their relationships within the learning environment and help students to become less reliant on the instructor [5]. Accordingly, Robertson [6] believed that peer interaction in an online-based environment can be an effective instructional strategy to improve the success of learning in diverse subjects. In a similar vein, Chou and Tsai [7] stated that a web-based environment permits students to create their learning portfolio and interact with peers through a web learning system. For instance, Facebook can record learning activities in which interaction between students takes place.

Interaction and communication are closely related to self-disclosure. The purpose of self-disclosure is social validation, getting feedback, and getting help [8], [9], [10]. Laurenceau, Barrett and Rovine [11] suggested that "an important mechanism that mediates the link between a speaker's self-disclosure and corresponding experience of intimacy is the degree of partner responsiveness that is perceived by the speaker" (p. 3). This shows that in the interaction process, students are dependent on each other; therefore,

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

they will have the desire to participate in the discussion when they are confident in their self-knowledge which is to be shared with others. Moreover, self-disclosure can influence students' decision to manipulate the input and the way they deliver the message to their peers. As stated by Cutler [12], "The more one discloses information, the more others will reciprocate, and the more individuals know about each other, the more likely they are to establish trust, seek support, and thus find satisfaction" (p. 326). In a conversation of exchanging information and knowledge, the breadth and depth of reciprocation of self-disclosure need to be maintained because an imbalance will cause inconsistency in the interaction [13].

Although the potential of peer interaction and self-disclosure has been widely acknowledged (e.g., [14], [15]), these aspects have barely been studied among students especially in an online learning medium such as Facebook. Therefore, the purpose of the present research is to explore the relationship between peer interaction and self-disclosure patterns in a Facebook discussion, and to determine how these relationships could influence students' learning. Due to the significance that this research will most likely have for the education sector, the peer interaction process through self-disclosure is examined via three research aims as follows:

i. to identify peer interaction patterns in Facebook discussions
ii. to identify the level of self-disclosure of students in Facebook discussions
iii. to analyse the peer interaction patterns based on self-disclosure levels.

2. BACKGROUND OF LITERATURE

The background of the literature is discussed based on the following sections.

2.1 Peer Interaction in Online Learning

In online learning, peer interaction commonly occurs when students are interacting with each other to accomplish the same goal. According to Lee [16], peer interaction follows Vygotskian's perspective in which "the picture of social communication being a joint venture is characterized by reciprocity and co-construction, wherein both partners rely on each other and are mutually dependent in shaping each other's context". In peer interaction, each participant needs to participate actively and contribute ideas for knowledge exchange. Throughout the interaction, the participant relies on the partner to support and provide a scaffold for continuous interaction [17]. Furthermore, William [18] asserted that peer interaction can be viewed as a platform for the sharing of experiences and co-learning in adopting others' perspectives, which is essential for both social and cognitive developments. Hence, when developing online course activities, students should be given the opportunity to interact with one another with activities such as discussions, peer assessments etc. which can influence them to develop significant connections with each other, the instructor, and the content.

Many related models on peer interaction are available and can be used to facilitate understanding of the peer interaction patterns which are being developed through course activities. By using appropriate models of peer interaction with the correct data analysis, patterns of peer interaction can be uncovered; however, the results may vary based on different contexts or subject matter. As mentioned earlier, there are many models related to peer interaction, of which the most popular is the Issue Based Information System (IBIS) discussion model [19]. This model has been constructed to structure discussion activities of collaborative design and analysis of student online group work [20]. It is also used to encourage higher order learning skills in online learning environments, due to its argumentation tools feature. Thus, this model is appropriate for use in analysing peer interaction.

2.2 Self-disclosure

Wheeless and Grotz [21] conceptualized self-disclosure as "any message about the self that a person communicates to another" (p. 47). The term "self-disclosure" was popularised by [22]. At the same time, there are also other terms, such as "verbal accessibility" (e.g. [23]), and "social accessibility" (e.g. [24]), which describe the same concept. In essence, self-disclosure is a central stage in communication and relationship development [25]. It also reflects the interpersonal attitude towards any conversation [26] and can influence people to control their interaction with others [11]. For this research paper, self-disclosure is used, since this term refers to a process which occurs during interaction with others.

McBride and Wahl [27] suggested that self-disclosure can be used as a strategy to create the classroom environment. This is because a student's

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

ability to connect and share information is recognized as a critical factor in the development of logic and cognitive functioning, and in the socialization process [28], [29]. Since then, many scholars have widely explored its impact in teaching and learning. For example, Barak and Gluck-Ofri [13] explored the impact of self-disclosure on different types of online forums and discovered that self-disclosure in emotional support forums recurs more frequently than in neutral discussion forums. In addition, Dietz-Uhler, Bishop-Clark and Howard [30] also showed that patterns of self-disclosure can take place in a synchronous chat room when the students are involved in discussing a specific topic. This is proven by Leung's [31] study, which shows that chatting in a chat room context is linked to the depth of comment and intent for self-disclosure. In essence, the abovementioned studies have significantly confirmed that self-disclosure plays an important role in an online interaction environment.

For this present research, the symbolic interactionism theory was used as the base framework for analysing self-disclosure levels in an online discussion forum. The distinction of self-disclosure was made based on three categories: information (facts), thoughts, and feelings. Based on these three categories of self-disclosure, [29] developed three rubrics to devise a reliable measure for the study of self-disclosure. The three levels of self-disclosure are Level 1 (no disclosure), Level 2 (little disclosure), and Level 3 (high disclosure).

2.3 Facebook for Interacting and Disclosing

Facebook is now acknowledged as a social environment that people use to interact for many reasons. The various features and the popularity of Facebook have contributed to its use in facilitating the main communication obstacles, like language barriers and social inhibitions [32]. Communication via this platform is also known to increase the levels of self-disclosure [33]. Research has found that students who interact with their peers via Facebook use more intimate questions and self-disclosures compared to students in face-to-face conversations [34]. In addition, student–student interaction through online media can present opportunities for observing and imitating successful behaviours and achievements, which essentially results in changes in peer levels of competence in a task [35]. Hence, the use of Facebook in a teaching and learning context could lead to more positive student outcomes [36], [33], [37], [38].

As increasing numbers of students and teachers are interested in using Facebook as a communication tool [39], it is important to comprehend how students use and reason via Facebook to communicate with each other. Nevertheless, to date, research has barely explored the relation between peer interaction and self-disclosure via Facebook for learning purposes. Such comprehension can provide useful information and expectations for behaviour for teachers who use Facebook to communicate with students relating to a spectrum of learning matters. Thus, the aim of this study is to explore the relationship between peer interaction and self-disclosure patterns in a Facebook discussion, and to determine how these relationships could influence students' learning.

3. THEORETICAL FRAMEWORK

The theoretical framework for this study was based on [40], who developed the issue-based information system (IBIS) model to structure discussion activities of a collaborative design. In this model, the key "issues" of a decision-making problem are seen as the central elements for structuring the argumentation processes. Conklin and Begeman [19] then established a graphic interface to denote the IBIS model in a hypertext style, as shown in Figure 1.

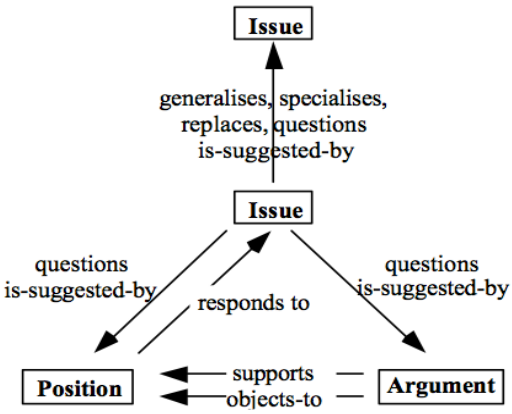

Figure 1: IBIS Discussion Model

The application-independent IBIS concept supports the argumentation elements of nine logical types of interaction [41], which are as follows:

i. Issues: The questions to be decided or goals to be achieved.
ii. Positions: The alternative solutions which have been proposed for resolving an issue or achieving a goal.

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

iii. Arguments: Assertions about the properties or attributes of each position, which speak for or against choosing.
iv. Group development: Questions that arise regarding co-ordinating members to work together.
v. Response: A suggested answer to a group development question.
vi. Acceptance of response: The acceptance of or agreement with a response.
vii. Objection to response: Student objection to or disagreement with a response.
viii. Conflict: Contradiction occurring among students.
ix. Support request: A request for resources and help from other group members.

The nine types of interaction as stated above were implemented during the peer interaction. The data were collected based on the online discussion forum created by the researchers. Those nine types of interaction can be the indicators to distinguish the peer interaction patterns involved in the online discussion forum among students.

This study also integrates symbolic interactionism theory as the foundational framework for investigating self-disclosure. The theory, which was developed by [42], emerged from social interaction theory. Blumer [42] stated that symbolic interactionism emphasizes that human behaviour is guided by the meanings that emerge during the interaction process between people, and not through other particular initiating factors, such as attitudes, motives, or social roles. Figure 2 shows the diagram of symbolic interactionism theory.

The symbolic interactionism diagram summarizes the following ideas:
i. We are all similar, with differences defined by our roles.
ii. We manage these differences in ways we generally agree are acceptable.
iii. This management is done through a self-regulating process of communication.
iv. Effective communication involves our ability to perceive ourselves accurately through the eyes of others.
v. We have the ability to develop ourselves by altering our communication to better align with the roles we define for ourselves and others define for us.

In symbolic interactionism, individuals act toward others based on the meanings given in response to them. This approach emphasizes that self-disclosure has meanings for the disclosers, which becomes the centre of the communication process of self-disclosure. Furthermore, the new round of communication interaction between the discloser and the recipient can further contribute to the meanings that self-disclosure has for the disclosers. Therefore, self-disclosure is seen as an ongoing and constructive process, rather than as the product of conditioning.

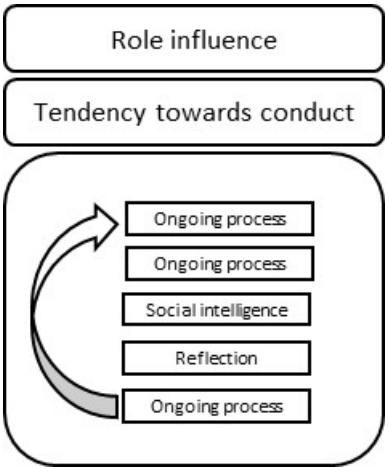

Figure 2: Symbolic Interactionism Diagram

Along with the symbolic interactionism theory as the core framework, the researchers adopted the Self-Disclosure rating scale, which was developed by [29]. The scale was further explained by [43], who divided self-disclosure into three categories, namely, information (facts), thoughts, and feelings. Furthermore, Vondracek and Vondracek [29] developed the rubric for the Self-Disclosure Rating Scale to distinguish the levels of self-disclosure. The three rating scales developed are Level 1 (no disclosure), Level 2 (little disclosure), and Level 3 (high disclosure), which were later used in interpreting the data on self-disclosure.

The learning activity approach for this research was adapted from the computer-supported collaborative learning (CSCL) approach. According to Hsiao [44], CSCL is facilitated by a "computer-based network system that supports group work in a common task and provides a shared interface for groups to work with" (p. 1). CSCL can support and facilitate the learning in an online group-based

Journal of Theoretical and Applied Information Technology
15th June 2018. Vol.96. No 11

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

discussion environment in ways that are not achievable in the traditional learning environment.

Based on the two types of framework and the learning approach, the researchers then present a framework that reflects the overall content of this study. Figure 3 shows the research framework, which incorporates the combination of two models and two scopes of analysis in an online learning platform.

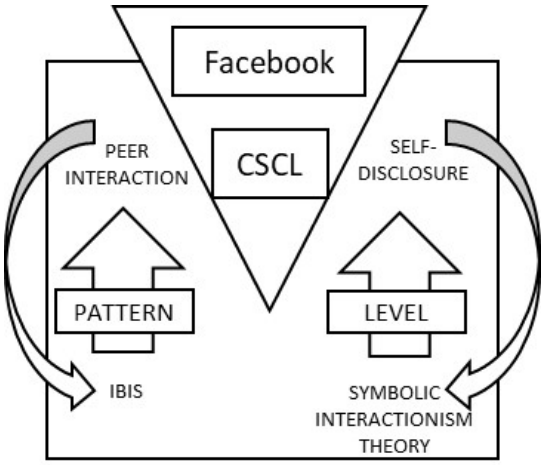

Figure 3: Research Framework

4. RESEARCH METHODOLOGY

This research used a quantitative research design, which involved the qualitative data in the Facebook discussion. Before the research was carried out, a discussion group was created by the researchers on the Facebook page. A CSCL approach was adapted for designing the learning activities on Facebook. After that, the comments derived from the Facebook discussion were collected and analysed by the researchers. The research procedure is summarized in Figure 4.

The collected data from the Facebook discussion were analysed, interpreted, and quantified by counting the number of times each type of response occurred. The responses were also reported as frequencies, and the relationships between the sets of categories or variables through the use of contingency tables were examined. To analyse the data on patterns of peer interaction, the researchers used the coding scheme developed by [19], which is stated in Table 1.

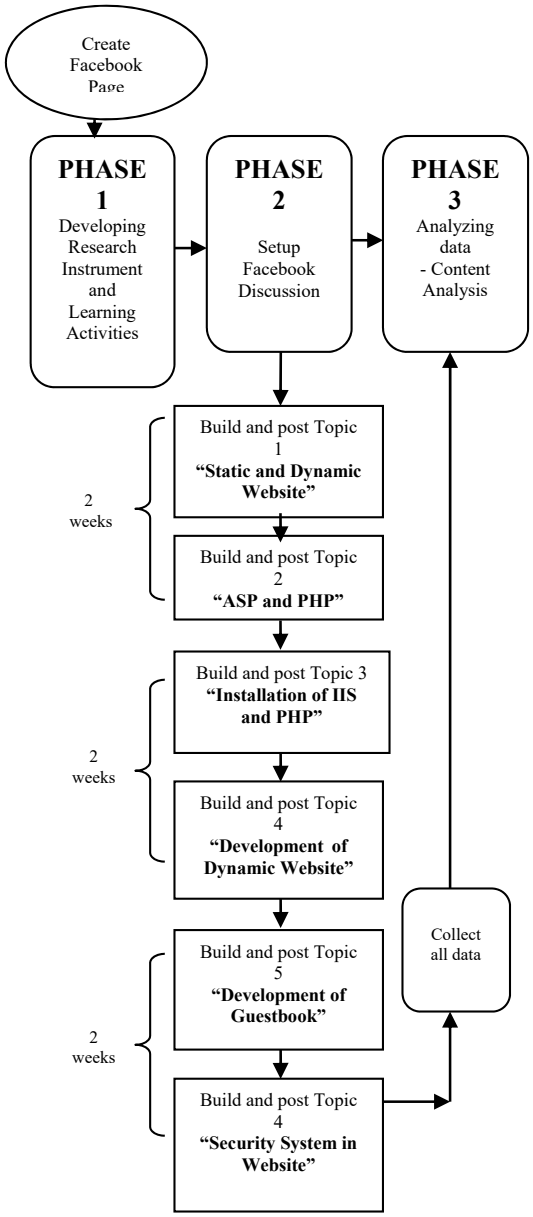

Figure 4: Research Procedure

Table 1: Coding Scheme for Peer Interaction

Type	Description	Example
Issue	What needs to be done and problems to be solved, and related to the concepts and skills being learned by students.	- "What should I import in our program?" - "What does 'increasing strings' mean?" - "How can I record the input words as a string after pressing a button?"

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Position	Methodology for solving an issue, and are answers from peers in response to the issues.	- "Just import javax.swing" - "Use Stringstr=e.getSourceCommand();" - "State c.getContentPane allows you to create a location in your window where information can be stored."
Argument	Opinions that support or object a position	- "Oh, right. Then I should use another variable." - "No, that's more troublesome."
Group Development	Questions raised to coordinate members to work together	- "Does anyone know how to write the program?" - "Who is my partner?" - "Does anyone have any opinions on this problem?"
Response	A suggested answer to a group development question	- "Actually, we can try page 289." - "I've developed a draft graphical user interface. I think that's enough."
Acceptance of Response	The acceptance or agreement of a response	- "Okay! I will wait for you." - "I agree to try page 289."
Objection to Response	Student objection or disagreement to responses	- "I do not have JDK. How can I write that program?" - "No, I cannot finish the first part of the program."
Support request	A request for resources and help from other group members	- "I don't have the example. Can you give it to me?'' - ''Has anyone finished the program? I have only partially finished."
Conflict	Contradiction that occurs among students	- "Go away, don't interrupt the discussion." - "Idiot!!"

On the other hand, to analyse the level of self-disclosure, the researchers adopted the Self-Disclosure rating scale that was developed by [29]. The rating is tabulated in Table 2.

Table 2: Self-disclosure Rating Scale

Category	Level	Description	Example
Information	1	Statements that provide general or routine information only, without any personal reference.	-"Brazil won the soccer game against Ecuador last night."
	2	Statements providing general information about the writer.	-Age, occupation, description of family members, interests
	3	Statements revealing personal information that exposes self or people close to the writer, such as descriptions of physical appearance and behaviour.	-Personal characteristics and traits, description of personal experiences, reporting of problematic behaviours of self and family members.
Thought	1	No indication of any thoughts or ideas on any subject that refer to the writer personally; expressing of general ideas only.	-"I think feeding dogs with human food causes them damage."
	2	Statements expressing the writer's personal thoughts on past or future events.	-"I think I'd like to study biology when I go to college."
	3	Statements expressing thoughts relating to the writer's personal characteristics, physical appearance, health, and ideas.	-"I hate myself for insulting someone and apologizing immediately afterwards."

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Feeling	1	No expression of feelings at all.	-Writing may include a prosaic description of facts or personal ideas, without expressing any emotion or affective relevance.
	2	Expressing of some mild feelings, such as confusion or inconvenience; expressing ordinary concerns, frustrations, or minor deficiency.	-"I was frustrated by getting a B in math. I envied my girlfriends for getting higher marks." -"I'm tired of my boss. He makes me nervous."
	3	Expressions of deep feelings, including humiliation, agony, anxiety, depression, fears, and pain.	-"I'm desperate. I don't want to live anymore." -"There is nobody home. I'm so afraid. Oh, my God. I'm shaking with fear."

This study also identifies the existence of a significant relationship between peer interaction patterns and levels of self-disclosure. To analyse the relationship between the pattern of peer interaction and the level of self-disclosure, the researchers used SPSS software to calculate the correlation between the two variables. As the findings were discrete data from an ordinal scale, the researcher used Spearman's rank correlation coefficient (*r*) to test the correlation of the variables. The strength of the correlation is based on the interpretation suggested by [45]. In particular, Guilford [45] offered an interpretation of the degree of the coefficients' correlation evaluates the relationship strength between the two variables in this research. Table 3 shows the value of (*r)* and the interpretation of the value.

Table 3: Interpretation of (r) Value

(*r*)	**Interpretation of Strength of Correlation**
<0.20	Slight correlation: almost negligible relationship
0.20 - 0.40	Low correlation, definite but weak relationship
0.40 - 0.70	Moderate correlation, substantial relationship
0.70 - 0.90	High correlation, marked/strong relationship
0.90 – 1.00	Very high correlation, very dependable/strong relationship

5. RESEARCH FINDINGS

5.1 Peer Interaction Pattern in Facebook

Table 4 shows the types of peer interaction by each of the respondents. This table is quite informative in terms of the frequency of different types of peer discourse interaction by respondent distribution. Based on Table 4, Student 13 had the highest frequency with 45 comments followed by Student 3 with 38 comments and Student 14 with 31 comments.

5.2 Level of Students' Self-disclosure on Facebook

The researchers identified 377 comments that represented different categories and levels of self-disclosure. The findings of the level of self-disclosure by each respondent are summarized in Table 5. Based on Table 5, most of the students were greatly self-disclosing based on information, with the highest frequency coming from Student 3 and Student 13 (both with 18 comments) followed by Student 19 with 15 comments.

5.3 Peer Interaction Patterns based on Self-disclosure Levels

Throughout the six weeks, the students showed a variety of peer interaction types and different categories of self-disclosure. The findings of patterns of peer interaction and levels of self-disclosure by each respondent are summarized in Table 6.

Journal of Theoretical and Applied Information Technology
15th June 2018. Vol.96. No 11

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Based on Table 6, the patterns of peer interaction were significant regarding self-disclosure. The findings revealed that the students frequently contributed to the response type of peer interaction and commonly self-disclosed with information or facts. Self-disclosure with feelings, which received 111 comments, was more common than self-disclosure with thought. In addition, there were 84 comments offering the position type of peer interaction, while the students often gave argument and acceptance with response types of peer interaction with 47 and 44 comments, respectively. In order to distinguish the pattern of peer interaction and self-disclosure, a correlation analysis was performed to investigate the relationship between peer interaction and self-disclosure. The scatter plot and correlation is presented in Figure 5 and Table 7, respectively.

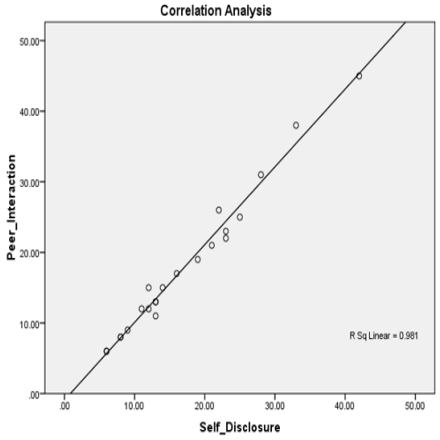

Figure 5: Relationship between Peer Interaction and Self-disclosure

Table 5: Category of Self-disclosure with Level by Each Respondent

Student	Categories of Self-Disclosure with Level												
	Information				Thought				Feeling				
	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total	Level 1	Level 2	Level 3	Total	Overall Total
S1	10	0	0	10	3	2	0	5	5	1	0	6	21
S2	6	0	0	6	0	0	0	0	0	0	0	0	6
S3	18	0	0	18	8	2	0	10	5	0	0	5	33
S4	4	0	1	5	3	1	0	4	3	1	0	4	13
S5	8	1	0	9	2	5	2	9	5	2	0	7	25
S6	8	1	0	9	0	0	0	0	4	1	0	5	14
S7	3	0	0	3	5	0	0	5	12	3	0	15	23
S8	5	0	0	5	1	1	0	2	2	0	0	2	9
S9	2	0	1	3	5	0	0	5	2	2	0	4	12
S10	9	0	0	9	5	1	2	8	4	1	0	5	22
S11	2	0	0	2	1	1	0	2	2	0	0	2	6
S12	6	0	1	7	3	0	0	3	7	2	0	9	19
S13	18	1	2	21	6	8	0	14	4	3	0	7	42
S14	6	1	0	7	3	4	0	7	8	5	1	14	28
S15	5	0	0	5	5	1	0	6	2	0	0	2	13
S16	4	0	0	4	2	1	1	4	4	0	0	4	12
S17	4	1	0	5	1	0	0	1	1	1	0	2	8
S18	5	0	0	5	0	0	0	0	6	0	0	6	11
S19	15	1	2	18	3	1	0	4	1	0	0	1	23
S20	2	0	1	3	0	2	0	2	2	1	0	3	8
S21	7	1	0	8	2	1	0	3	2	0	0	2	13
S22	4	2	0	6	3	1	0	4	6	0	0	6	16
Total	**151**	**9**	**8**	**168**	**61**	**32**	**5**	**98**	**87**	**22**	**1**	**111**	**377**

Journal of Theoretical and Applied Information Technology
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ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

Table 6: Types of Peer Interaction and Self-disclosure Category by Each Respondent

Student	PEER INTERACTION										SELF-DISCLOSURE			
	Issue	Position	Argument	Group Development	Response	Acceptance of Response	Objection of Response	Support Request	Conflict	Total	Information	Thought	Feeling	Total
S1	0	6	2	2	5	3	0	0	3	21	10	5	6	21
S2	0	3	0	0	3	0	0	0	0	6	6	0	0	6
S3	1	6	2	3	16	3	0	0	7	38	18	10	5	33
S4	1	3	1	1	2	3	0	0	0	11	5	4	4	13
S5	1	2	5	4	6	2	0	1	4	25	9	9	7	25
S6	0	3	1	1	4	2	0	2	2	15	9	0	5	14
S7	1	2	2	4	4	5	0	3	1	22	3	5	15	23
S8	0	1	0	0	6	1	0	0	1	9	5	2	2	9
S9	0	1	4	0	6	0	0	0	1	12	3	5	4	12
S10	0	3	1	3	9	5	0	4	1	26	9	8	5	22
S11	0	1	0	0	4	1	0	0	0	6	2	2	2	6
S12	0	8	2	1	4	3	0	1	0	19	7	3	9	19
S13	0	10	2	2	23	3	0	4	1	45	21	14	7	42
S14	2	6	3	0	8	1	0	8	3	31	7	7	14	28
S15	0	6	4	0	3	0	0	0	0	13	5	6	2	13
S16	0	1	3	0	4	4	0	2	1	15	4	4	4	12
S17	0	3	0	0	4	1	0	0	0	8	5	1	2	8
S18	0	1	3	1	4	2	0	0	1	12	5	0	6	11
S19	0	10	2	0	9	0	0	1	1	23	18	4	1	23
S20	1	2	4	0	1	0	0	0	0	8	3	2	3	8
S21	0	4	4	1	3	0	1	0	0	13	8	3	2	13
S22	0	2	2	1	2	5	0	3	2	17	6	4	6	16
Total	**7**	**84**	**47**	**24**	**130**	**44**	**1**	**29**	**29**	**395**	**168**	**98**	**111**	**377**

The scatter plot with the regression line shows the relationship between peer interaction and self-disclosure. Figure 5 illustrates a strong positive correlation between the Y-axis and the X-axis, which indicates the reasonableness of assuming a linear association between self-disclosure and peer interaction. The chart also reveals that as self-disclosure increases, peer interaction also increases.

As shown in Table 7, the findings from the correlation analysis indicate that the strength of association between peer interaction and self-disclosure was very high, with *rs*=0.973, and the correlation co-efficient was highly significant, with $p<0.01$).

Table 7: Correlation of Peer Interaction and Self-disclosure Communication

			Self-disclosure
Spearman's rho	**Peer Interaction**	**R**	.973**
		Sig. (2-tailed)	.000
		N	22
**. Correlation is significant at the 0.01 level (2-tailed)			

6. DISCUSSION

The results showed that most of the students were slightly active in participating in the Facebook discussion. However, five students (Student 2, Student 8, Student 11, Student 17, and Student 20) were not active in in the peer discussions, acting only as observers rather than participating in the discussion. This research also found that most of

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

the students used a response type of peer interaction followed by a position type of peer interaction. This shows that most of the students like to respond to and answer peers over an issue that was raised. However, with only one student giving one comment of the objection of response type of peer interaction, this research indicates that most of the students did not like to argue or disagree with each other. This is expected, as an extensive body of research has revealed that Asian students are less appreciative of being criticized by their peers [46], [47]. Moreover, only six students contributed to the issue type of peer interaction; thus, it can be said that the majority of the students were not willing to propose a problem to initiate a new discussion with their peers. The students seemed to lack the confidence to start a conversation for problem-solving matters or to ask for clarification from their peers on the subject matter. They often acted as the reflectors in that they reflected their peers' feedback and assisted each other in answering the question raised by the facilitator.

Besides that, based on Table 4, the contributions for position, argument, response, and acceptance of response types of peer interaction dominated the online discussion. This implies that knowledge exchange occurred to show the students' interest in their learning. Most of the questions proposed for the online discussion were of the opinionated type of question for which everyone would have different answers. Thus, the students' feedback was more towards giving suggestions and opinions for solving the issues that had been raised in the discussion. As Liu, Lin, Chiu and Yuan [48] proposed, when students are asked to offer feedback to peers, they progress beyond their cognitive processes for the completion of a given task as they must now "read, compare, or question ideas, suggest modifications, or even reflect on how well one's own work is compared with others." The following gives the example of a question from the facilitator and the feedback from the students for the topic of "Static and Dynamic Website":

Facilitator (Issue): "From the lecture in the class as well as your own knowledge, what are the strengths and weaknesses of static and dynamic website?"

Student 1(Position): "The simplest answer is to develop a static website that is cheaper compared to the dynamic website as it needs the assistance of experts."

Student 5 (Argument): "Yes… I agree with Student 1, plus, I think the dynamic website is more complex and needs more time to develop compared to a static website, which is simpler and needs less time to develop."

Facilitator (Group Development): "That's the spirit, Student 5! Good. Student 5 has shared his experience; how about the others in the group? Come on, don't be shy. Sharing is caring."

Student 15 (Response): "I've some experience in developing websites during my practical. Since they give us a lot of information, like news and events, we need to upload files and download files, so it's better to use a dynamic website because it's the best way to update the website regularly, and it helps store information in the database in a more potential way."

Moreover, group development, support requests, and conflict types of interaction were also frequently proposed by the students within the online discussion. It can be assumed that the students were taking the opportunity to ask questions or ask for further explanations about the problem. This is because it is easy for them to disclose to their peers a lack of understanding of a certain concept [49]. However, as their peers tried to assist by providing a variety of answers, students often got confused and tended to ask for further clarification or even request extra resources from their peers. According to Mory [50], instructional feedback from peers grants students information that either verifies what they already know or changes their current knowledge and beliefs.

The findings also show that the conflict type of interaction frequently occurred at the beginning, middle, and end phases of the study. Likewise, Thomas [51] revealed that during the early discussion, there were proportionately more hits relative to the number of messages. More hits can be interpreted as students who viewed and read other comments less engagingly in an exploratory activity. This occurs due to students waiting for others' feedback before giving their own as they were nervous about contributing to the interaction. This scenario could also be explained by a study conducted by [52], which revealed that peers' background abilities can influence the ways knowledge exchange occurs in an online peer learning activity and because most students still depend on teachers or moderators to scaffold the interactions process.

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Apart from that, very few objection of response and issue types of peer interaction were proposed by the students. This situation can be attributed to the students' not being sufficiently confident to argue with others, or they might have found themselves being not really expert on the problem. In this case, students were regarded as playing a major role as information providers during the discussion [52]. On the other hand, most of the answers were opinion-based (often based on life experiences); thus, the students might have felt that they lacked sufficient experience to argue or object further in the discussion.

From the comments posted within the six weeks of learning, the researchers identified three categories of self-disclosure, that is, feeling, thought, and information, as shown in Table 5. Each student had a different type of self-disclosure in each of their comments in the online discussion. As people value their own opinion, their willingness to share opinions can reflect self-disclosure [53], as opinions represent thoughts as far as experiences are concerned.

The findings revealed that most of the students had self-disclosed on information. This is expected because the problem or question raised in the online discussion was related to the educational learning; thus, most of the answers would be factual in nature. Therefore, most of the students participated, gave responses, and answered the question as if they were trying to help their friend, particularly by sharing information from past reading experiences. Hancock and Dunham [54] reported that a computer-mediated communication partner forms a deeper impression during task focused communication. Thus, in this study, the students tended to share factual information related to the task-oriented online environment. The following shows a statement related to information, which is taken from the discussion on topic "Security in Website":

Student 19 (Information): "This function is used to login to the website … Sometimes, if you want the website to be secure, you can put this function, ask the user to key in their username and password, so the system will check and compare the input in the text field (username and password) with the database (mysql). If it is correct, the system will go to the next page or return to another page or display an error message, so the user must try once again."

The relationship between patterns of peer interaction and levels of self-disclosure was analysed using Spearman's Correlation Coefficient analysis. Although the earlier findings show that the frequency of peer interaction was higher than the frequency of self-disclosure, the result of the Spearman Correlation Coefficient shows that the different frequency of peer interaction and of self-disclosure was significant ($p < 0.01$) and had a very strong association ($rs = 0.973$). Thus, the correlation provided a measure by which both peer interaction patterns and self-disclosure levels were closely related with each other in the online discussion forum. This also means that the frequency of self-disclosure in online learning will increase when students actively interact among their peers.

Taken as a whole, an online discussion forum is used as a platform for people to engage in the sharing of knowledge and asking for information resources related to a specific topic; the readiness and the willingness to share experiences with others are related to interaction behaviour performed through the discussion. The behaviour of peer interaction and self-disclosure in this research was in line with [34], who found that the usage of computer-mediated communication for the purpose of teaching and learning has generated more effective communication exchange with more self-disclosures.

In terms of the impact of this study, it should be noted that this study has attempted to compensate some of the problems related to self-disclosure and peer interaction through online medium in relation to appropriate learning content [55]. This study has examined the depth and breadth of actual disclosure through the qualitative data gathered from the students' discussions through Facebook environment. This practice has eventually led to more disclosiveness among students as opposed to the findings by [55] because that study did not incorporate sound learning activities and only depends on the self-report survey about the impact of self-disclosure on teaching and learning. Therefore, there is a necessity to have well designed learning activities in order for self-disclosure strategy to benefit the teaching and learning process plus, can measure effectively the depth and breadth that occur in observed self-disclosure. Moreover, the activities also need to be closely relevant with the learning goals and objectives (as reflected in the activities

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used for this study) because that might influence the interaction and decision made by the teachers and students. Apart from that, this study has somehow revealed that self-disclosure can indeed happened even if the students are placed in onymous setting (based on their interaction and high level of disclosure) although we did not properly measure the effects of onymity on self-disclosure as that is beyond the scope of this study. This is because the findings by [56] has suggested that it is difficult to practice self-disclosure in an environment where everybody knows each other as that can prevent them to disclose more information during interaction.

7. CONCLUSIONS

The findings from this research show that the students actively participated in and engaged with the online discussion forum. The pattern of peer interaction has illustrated that most of the students were highly active in giving responses, feedback, and resource support. This implies that most of the students were highly engaged as contributors and receivers of peer feedback in the online discussion. High responsive feedback from peers makes learning in an online environment more interesting. Moreover, a study by [57] indicated that the quality of students' responses in a discussion can be intensified through the use of constructive feedback that is prompt, consistent, and ongoing. Hence, to attain this level of feedback in an online environment, educators or facilitators must devote a great amount of time and effort. Training should also be given both to the facilitator and to the students, so they are comfortable and competent with the process.

Furthermore, this research reveals that students have low self-disclosure with their peers in terms of their personal life, as the subject matter of the online discussion forum was more about the educational context and the course. Most of the feedback given by the students lacked emotional content. Meanwhile, in terms of the category of self-disclosure, students were more self-revealing on information. In the educational context, it is important for students to give factual answers on the subject matter rather than randomly giving opinions that are unsupported by facts. In addition, Garrison, Cleveland-Innes and Fung [58] believed that besides taking more responsibility, adjusting to a new climate and context, and synthesising ideas, online learners must also know how to participate, apply ideas or concepts, and stimulate their own curiosity, so that they are able to take self-disclosure into consideration in order to improve the atmosphere of teaching and learning.

Last but not least, this research found a strong relationship between the pattern of peer interaction and the level of self-disclosure. The peer interaction patterns and self-disclosure levels have connections in terms of their presence in an online environment, and it was found that during peer interaction in an online discussion forum, students are developing themselves to be self-revealing with their peers. However, less is still unknown regarding which type of peer interaction levels can influence which type of self-disclosure. Therefore, it is important for future research to examine this aspect and it can be done by applying advanced analyses such as social network analysis, decision tree or association rules analysis.

8. LIMITATIONS AND FUTURE STUDIES

Since this study is a small scale study that involved only one class of students at university level, the findings cannot be generalized to the whole population of university students in Malaysia. However, the research findings can give ideas to other researchers regarding peer interaction and self-disclosure among students through online learning. On the other hand, the researchers did not consider students' skills in using the computer and the Internet and their involvement in the online discussion, as students are assumed to be competent and to enjoy using Facebook as part of their learning process. Moreover, for the purpose of this research, researchers focused only on the Authoring System course, which implies that the findings might be different if the same method is conducted for other courses.

The duration for the online discussion activities was only six weeks. Due to the time constraint, the time allowed for each topic to be discussed was limited, as a new topic was posted each week. This meant students had less discussion with their peers for each topic. The results could have been different with a greater variety of comments that would have reflected the types of peer interaction and self-disclosure, had more time been allocated for discussion.

In depth and high level analysis of the discussion should also be conducted to disclose the hidden and meaningful information and patterns about peer interaction and self-disclosure among

ISSN: 1992-8645 www.jatit.org E-ISSN: 1817-3195

students, which it is believed can be achieved through data mining and social network analysis.

ACKNOWLEDGEMENT

The authors would like to thank the Universiti Teknologi Malaysia (UTM) and Ministry of Higher Education (MoHE) Malaysia for their support in making this project possible. This work was supported by the Research University Grant (Q.J130000.2510.17H93) initiated by UTM and MoHE.

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