

Students' Level of Participation, Critical Thinking, Types of Action and Influencing Factors in Online Forum Environment

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Abstract—Due to the advancement of Internet technology, online learning is widely used in higher education institutions. Online learning offers several means of communication, including online forum. Through online forum, students and instructors are able to discuss and share their knowledge and expertise without having a need to attend the face-to-face, ordinary classroom session. The purposes of this study are to analyze the students' levels of participation and critical thinking, types of action and factors influencing their participation in online forum. A total of 41 postgraduate students undertaking a course in educational technology from a public university in Malaysia were involved in this study. In this course, the students participated in a weekly online forum as part of the course requirement. Based on the log data file extracted from the online forum, the students' type of actions (view, add, update, delete posts) and their levels of participation (passive, moderate or active) were identified. In addition, the messages posted in the forum were analyzed to gauge their level of critical thinking. Meanwhile, the factors that might influence their online forum participation were measured using a 24-items questionnaire. Based on the log data, a total of 105 posts were sent by the participants. In addition, the findings show that (i) majority of the students are moderate participants, with an average of two to three posts per person, (ii) *viewing* posts are the most frequent type of action (85.1%), and followed by *adding* post (9.7%). Furthermore, based on the posts they made, the most frequent type of critical thinking observed was *justification* (50 input or 19.0%), followed by *linking ideas and interpretation* (47 input or 18%), and *novelty* (38 input or 14.4%). The findings indicate that online forum allows for social interaction and can be used to measure the students' critical thinking skills. In order to achieve this, monitoring students' activities in the online forum is recommended.

Keywords—Critical thinking, learning management system, level of online participation, online forum.

I. INTRODUCTION

THE rapid growth of Internet and World Wide Web has affect our education system and lead to the adoption of learning management system (LMS). LMS offers new and dynamic learning approaches and also gives exciting new ways for students to interact and share knowledge and information. It also serves as a platform to support the traditional face-to-face learning session. LMS allows its users to share resources and involve in several activities, including online forum, wiki, assignments, quizzes, and journal reflections. Among these activities, online forum is widely

used as it allows its participants to discuss and share ideas and feedback, resulting in knowledge construction.

Students' participation in online forum enables them to involve in the learning process without time and physical constraints. In a blended learning approach in which a combination of face-to-face and online learning is applied, online forum will the participants together to help each other in sharing and gaining knowledge. Moreover, the interaction in an online forum can be monitored as the participants' activities can be tracked from the system. Also, the actions taken by each participant such as posting, editing, viewing or deleting posts in online forum can be analyzed. This information is useful in judging the students' performance in this online forum.

Furthermore, online discussion forum is a great platform in generating students' critical thinking. They relatively interact with each other as well as with the facilitator and construct knowledge through discussion. Besides that, they are able to share various information, ideas and opinions on the topic discussed. This leads to a possible critical dialogue among themselves, be able to reflect on the content discussed and generate higher order level of thinking skills.

Many higher educational institutions are using online forum in their everyday teaching and learning processes. However, the quality of the content discussed is of concern. For instance, there is a challenge for online instructors on ways to retrieve feedback in a large group session and to keep the whole discussion as dynamic and integrated as possible. Also, researchers such as [1] and [2] have reported a low rate of critical thinking (only about 16.7%) shown in the input that the students posted in the forum.

In addition, few interactions among learners in the online forum environment led to a poor quality of students' learning. Prior research suggests that limited interaction in online discussion appears to be a common problem [3]. Besides that, there is also an issue on 'lurkers' or passive participants in the online forum environment [4]. Albeit being silent and passive participants, they still learn from the input posted by their forum colleagues.

There are several factors that can influence students' participation in online forum. In the study conducted by [4], three factors were suggested, and they are personal, behavioral, and environmental influences. The three factors are derived from the work of [5] who proposed Social Cognitive Theory. However, since this theory was proposed prior to the Internet technology, there is a lack of

technological influence as an important element in today's world.

Therefore, the purpose of this study was to investigate the levels of students' participation and critical thinking, types of online forum action, as well as the factors that influence their online participation. The research questions for this study are:

1. What are the levels of students' participation in online forum?
2. What is the students' level of critical thinking in online forum?
3. What are the students' types of action in online forum?
4. What are the factors that influence their participation in online forum?

II. LITERATURE REVIEW

Of late, higher education institutions are using learning management system (LMS) in order to cope with fast development of teaching and learning over the Internet. LMS allows for activities involving learners, instructors, and other online guests in synchronous or asynchronous events, whereby, it acts as document and content storage, discussion boards, chats, and video meetings. LMS offers a great advantage to the learners as it allows them to learn from anywhere and at any time at their convenience. The instructors are the tutors or teachers who facilitate the online learning environment to inform, coach, supervise, and evaluate the students' contributions in the LMS environment [6].

Online discussion forum is defined as the online text-based communication, where both the learners and instructors are actively engaged with each other. It is a means of communication between the instructor and his/her students, as well as among the students themselves. Online forum also allows interactive debate and serves as a platform for students to reflect their learning, as well as to foster the negotiation of meanings [7]. In the online discussion forum, students and instructors can interact by posting or responding to the messages at any time and at anywhere they prefer.

Through online forum, the students will be able to interact and collaborate on the tasks assigned to them. They will learn from each other and at the same time form the relationship among the group members [8]. It has been reported that an increase in student participation in an online course will improve learning [9]. Facilitation among learners in online communication can lead to an effective participation through the content sharing knowledge and evaluating one's own and other member's idea. In previous study, it was found that students' participation affects positive learning, quality assessment of assignments, achievement, satisfaction and retention rates [8]. Another study was conducted by [10] whereby he analyzed discussions in courses delivered wholly online and found that students perceived greater quality and quantity of learning as a result of participating in the discussions.

Besides that, online discussion forum has emerged as a medium to encourage reflection and critical thinking among learners. Plus, the threaded discussion forum also allows the participants to view back to the discussion thread for reflection

purposes [11]. In online discussion environment, students are allowed to interact socially with other members of the group and at the same time encourage their critical thinking skills. Critical thinking is defined as "the intellectually disciplined process of actively and skillfully conceptualizing, applying, analyzing, synthesizing, and/or evaluating information gathered from, or generated by, observation, experience, reflection, reasoning, or communication, as a guide to belief and action" [2]. A critical thinking model by [12] involves several indicators to measure students' critical thinking. It described critical thinking as the construction of meaning through internal reflection and the sharing of personal constructs, which established a "cognitive presence" in the discussion [13]. In previous study, [14] stated that the content discussed in the online forum by the students affect their levels of critical thinking. However, there are studies which indicate that students are often not learning critically and possessed no reflective thinking in higher education [11].

LMS platform allows the instructor to track the students' online activities. This can be useful in helping instructors to make judgments about the participants' needs [15]. Many online courses used the tracking tools to track students' usage in the online discussion. This information can be used to gauge their levels of participation and to determine their patterns of access [16]. However, the use of tracking data in online learning environment is still a very new and need further research.

Researchers found that technology of interface characteristics, content area experience, student roles and instructional tasks, as well as information overload influence the participation of online learners [17]. In other study conducted by [18], they examined from the perspective of teachers and students on the nature of interaction in an online course and they concluded that the structure of course, class size, feedback, and prior knowledge of computer mediated communication are the factors affecting the interaction. It is recommended that the focus be specific on the behaviors rather than individual characteristics as well as be oriented towards the informational needs of students and directed towards changeable behavior [19]. These point out that, to achieve robust information regarding the factors influencing students' participation in online forum, one should consider all three influences: personal, behavioral, and environmental influence.

III. RESEARCH METHODOLOGY

This study applies a quantitative method involving a survey and content analysis of an online forum. The participants involved in this study are 41 postgraduate students from a public university in Malaysia who are currently pursuing a master's degree in Education and undertaking a course in educational technology. The course was conducted in a hybrid mode where online discussion forum is used actively using a LMS. Every week, the instructor posted topics in the online forum several days prior to the face-to-face class session. Students were required to participate in the online forum with the condition that each of them should post at least one

question or issue pertaining to the topic assigned for the week and respond to their peers' questions.

The students' activities and participation in the online forum were analyzed using content analysis method whereby data from the log file was extracted from the online forum. Their activities were tracked down based on the number of posts they viewed, posted, edited, or deleted. In addition, the inputs or messages posted by the students in the online forum were also analyzed to assess their level of critical thinking. The critical thinking instrument adopted from [12] was used in this study (Table I). Each post from the participant was analyzed, and later identified either as critical thinking (+ sign), or as uncritical thinking (- sign). Two raters were used to identify the levels of critical thinking based on the posts made by the participants in the online forum, and the inter-rater reliability was used to measure the reliability of their analysis. Based on the analysis, a Kappa value of .811 was reported for the inter-rater reliability – indicating an outstanding value [20].

TABLE I
CRITICAL THINKING RUBRIC [12]

Category	
R+-	Relevance
I+-	Importance
N+-	Novelty; new info, ideas, solutions
O+-	Bringing outside knowledge or experience to bear on problem
A+-	Ambiguities: clarified or confused
L+-	Linking ideas, interpretation
J+-	Justification
C+-	Critical assessment
P+-	Practical utility (grounding)
W+-	Width of understanding (complete picture)

Apart from that, a self-designed questionnaire adapted from a study by [4] was used to identify the factors influencing the students' participation in online forum. It consists of 24 items covering demographic section (4 items), personal influence (6 items), behavioral influence (6 items) and environmental influence (8 items). For these last three sections, a five-point Likert scale (Strongly Disagree, Disagree, Neutral, Agree, and Strongly Agree) was used. The questionnaire was distributed to the students at the end of the semester to measure their perceptions regarding the factors that influence their online forum participation.

IV. RESULTS AND DISCUSSION

Throughout the study, the level of participation is observed from the students' number of postings in the online forum. Based on the suggestion by [8], student with at least five posts are said to be active users, moderate users are those with 1 to 4 posts, while inactive users are those who did not post any messages. Most of the students (22 or 53.7%) are categorized as moderate users. Meanwhile, only eight students (19.5%) are considered active in participating in the online discussion forum. However, 11 students (26.8%) are inactive since they

did not post anything except viewing other participants' posts. The students' levels of participation are shown in Table II.

TABLE II
STUDENTS' LEVEL OF PARTICIPATION IN ONLINE FORUM

Participation Level	No. of Students	Percentage
Inactive	11	26.8
Moderate	22	53.7
Active	8	19.5
Total	41	100

In this course, it is required for the students to participate in the online forum. Therefore, this requirement ensures most of them to participate in the online forum. Researchers such as [19] agreed that awarding grades to students who participate in the discussion forum are counterproductive to facilitate learning experience. Interestingly, in this study, *active* students are the minority in the online forum. Since most of the students in this course are working adults and are taking part time study mode, they do not have ample time to actively participate in the online forum. Reference [16] revealed that lack of interesting questions and active interaction among students might have prevented them from being active participants. Moreover, students still prefer the traditional, face-to-face approach rather than the online mode of communication in their learning session. This is probably one of the reasons why there is a lack of active participation from the participants in this study.

Level of critical thinking in online forum recorded a total of 263 critical inputs and 33 uncritical inputs, indicating that the frequency of critical thinking is higher than that of uncritical thinking. The highest frequency of critical thinking skills was indicator J+ (justification) with 50 inputs (19.0%) and the lowest was indicator A+ (clear statements) and P+ (practical utility) with 8 inputs (3.0%). Reflection and critical dialogue in online discussion allow the learners to assemble new and updated knowledge, link ideas and theory to practical, as well as gain wider understanding of what is being learned [21]. The process of learning occurred unintentionally while the students facilitate critical thinking skills in the discussion forum environment. Table III shows the frequency of each indicator in critical thinking.

TABLE III
CRITICAL THINKING BASED ON [12]

Positive Indicator	Frequency	Percent
R+	35	13.3
I+	22	8.4
N+	38	14.4
O+	29	11.0
A+	8	3.0
L+	47	18.0
J+	50	19.0
C+	15	5.7
P+	8	3.0
W+	11	4.2
Total	263	100

Some examples of critical thinking indicators observed in the forum are:

“Learners must understand the instructional goal and objectives of the lesson. They must construct new knowledge and enhance their critical thinking skills to fulfill the desired learning outcome” <R+>, <I+>.

“However, I would like to elaborate the four steps mentioned above based on my point of view, through relevant examples” <L+>, <J+>, <C+>.

“For instance, if my learning domain is more on cognitive strategy, it requires students to figure out how to solve ill-structured problem and require learner to manage their thinking and apply multidimensional approach” <O+>, <A+>, <L+>, <J+>.

Meanwhile, uncritical indicator L- (repeating information, stating that one shares the ideas stated) provides the highest frequency with 14 inputs (42.4%) while zero frequency was reported for I- (unimportant), O- (squashing attempt to bring outside knowledge), P- (discuss in a vacuum), and W- (narrow discussion) indicators respectively. The inputs or messages provided by the students indicate that they still hold on to their own opinion as well as repeating the same information without making inferences on their own statement. Table IV shows the frequency of each indicator in uncritical thinking.

TABLE IV
UNCITICAL THINKING BASED ON [12]

Negative Indicator	Frequency	Percent
R-	1	3.0
I-	0	0
N-	12	36.5
O-	0	0
A-	1	3.0
L-	14	42.4
J-	4	12.1
C-	1	3.0
P-	0	0
W-	0	0
Total	33	100

Some examples of uncritical thinking indicators found in the forum are:

“As you know this model is based on designing and conducting formative evaluation of instruction whereby designer tries to identify areas of the instructional materials that are in need of improvement” <L->, <J->.

“DCC model is certainly useful in decision making process as it allows instructional designers to identify the subordinate skills that are relevant in achieving the main objective” <J->, <C->.

In terms of type of action in the online forum, the analysis reveals a total of 1085 actions performed by the participants (Table V). *Viewing* the posts recorded the highest action made by the participants (924 posts or 85.1%). The average viewing action by each student is 23 times. This shows that all students participated in the discussion forum by viewing the messages, even though some of them did not reply or interact with the other students in the forum. The actions suggested that they are aware with the topic of discussion posted by the instructor and the need to participate in the online discussion forum. However, there is also a possibility of the students viewing the messages without really understand the content of the

messages or even read the whole content posted in the forum. In addition, 105 posts were added (9.7%) in the forum with an average of 2 to 3 posts from each participant. Again, further study needs to be carried out in order to identify whether they are sincere and honest in posting the messages and participating in the forum, or merely to fulfill the course requirement.

Besides, there are 54 *updated* posts (5.0%) by the students and only 2 *deleted* posts (0.2%) observed in the online forum. There is a possibility that the participant has realized that his/her post is inaccurate, incomplete or even incorrect. Therefore, by updating the post, they hope to provide the correct information and content, the use of workable and right hyperlink, or even correct spelling. Meanwhile, even though *delete* action has been provided in the tracking data tools, very few of these participants have took this action. They tend to be prepared with the information that they wanted to share in the discussion forum, resulting the *delete* post action unpopular among the students.

TABLE V
TYPES OF ACTION IN ONLINE FORUM

Type of Action	No. of Post	Percentage	Average for each student
View Post	924	85.1	23.1
Add Post	105	9.7	2.63
Update Post	54	5.0	1.35
Delete Post	2	0.2	0.05
Total Action	1085	100	

This study also attempts to investigate the factors that might have influenced the students’ participation in the online forum environment. The finding reveals that personal influence is the highest factor (mean: 4.05), followed by behavioral and environmental influences with the mean of 3.85 and 3.83 respectively.

In terms of personal influence, majority of the participants agree that they participated regularly in the forum (32.5% agree and 60% strongly agree). Majority of them also agree that they read the reading materials related to the forum topic before participating in it (42.5% agree and 30% strongly agree). Interestingly, they are equally divided in admitting that their forum participation is only due to the course requirement.

In terms of behavioral influence, majority of the participants agree that they have contributed something to the forum (50% agree and 10% strongly agree). Also, the participants admitted that they posted relevant questions to the forum when they do not understand the topic discussed (50% agree and 20% strongly agree). However, they are equally divided in terms of being selective in choosing the question to reply (40% agree and 10% strongly agree). Moreover, less than 50% of the participants do agree that they read the whole forum prior to contributing to the forum. They also admitted that they participated in a polite manner (37.5% agree and 50% strongly agree).

The analysis of the third factor – environmental influence – also reveals interesting findings. A large majority agree that the posts contributed by the participants are useful (72.5% agree and 17.5% strongly agree). Also, majority agree that the

forum has enhanced their learning (40% agree and 42.5% strongly agree). However, majority of them are unsure whether the posts contributed by their friends are original and not copied from other sources (65% unsure).

The descriptive statistics for the factors influencing their participation are shown in Table VI.

TABLE VI
 DESCRIPTIVE STATISTICS FOR FACTORS INFLUENCING STUDENTS'
 PARTICIPATION IN ONLINE FORUM

	Personal Influences	Behavioral Influences	Environmental Influences
Valid	40	40	40
Missing	1	1	1
Mean	4.05	3.85	3.83
Median	4.00	4.00	4.00
Mode	4 (Agree)	4 (Agree)	4 (Agree)
Sum	162	154	153

Based on the analyses, the findings indicate that personal reason is the main factor that has influenced the students' participation in the forum. Since most of them have personal experience in participating in online forum, they did not have much problem to work in online discussion group and interact with the other group members. The posts contributed in the forum also came from the desire of voicing out their own opinion and ideas to be shared with other members. Also, the students also tend to participate in the forum probably due to the attraction on the topic being discussed and assigned.

Behavioral factor has also influenced their online forum participation. It taught them to be more disciplined and participate in a polite manner. Nevertheless, they are strongly advised to read the whole forum prior to post their input or feedback. The last factor that has influenced their participation is the environment. The forum is found to be very useful to them and it has enhanced their learning- which might have motivated them to continue participating in such environment. Therefore, online forum is proven to be an effective learning environment offered by web technology, and educational institutions should integrate this tool as part of their teaching and learning environment.

V. CONCLUSION

In conclusion, this study shows that students who participate in the online forum can be categorized into different levels of participation based on the posts they contributed. Besides that, the types of actions they made can also be obtained through log data file. With such data, it allows the instructor to monitor the students' forum activities, as well as to plan a strategy in enhancing their learning process. Furthermore, the findings from this study show that the messages posted by the participants indicate more positive critical thinking skills. Such online forum allows the opportunity for them to be involved in social interaction, deep learning, and critical dialogue sessions. The factors influencing their participation in online forum are also useful and have provided some insights on the reasons why people participate and learn in this learning environment. Such

information is pertinent for educators to implement any online forum activities in their teaching and learning processes.

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