Using Online Discussion Boards to Promote Active Learning in Formulating Research Questions

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ABSTRACT

In the past ten years, asynchronous communication media such as Online Discussion Boards have been used widely in schools as well as in tertiary institutions. Simultaneously, pedagogical practice has leaned towards student-centred learning. As such, there is a need to investigate the role of an asynchronous communication medium such as the Blackboard Learning System in promoting a student-centred learning environment. This study aims to examine if online discussion boards are conducive for students to interact and engage in active learning which is a central concept of student-centred learning, derived from the constructivist approach. In this study, students of English as a Second language (ESL) studies in the South Australian Matriculation (SAM) programme participated in an online discussion without the intervention of the teacher in order to formulate a focus question (research question). Twenty-seven students in the treatment group individually presented their focus question and the scope of their research paper via a discussion thread. Using this medium, these students were expected to give critical comments on the effectiveness of their classmates' research questions. A control group consisting of 23 students was required to conduct similar discussions by using a more traditional means of face-to-face communication to construct and refine focus questions. The final focus questions and discussion threads were evaluated. The data showed that students in the treatment group had a significantly higher number of good focus questions that allowed for sufficient discussion of the research topic with clearly defined keywords and a narrow scope for in-depth study, when compared to the control group. Analysis of the discussion threads also indicated that students were able to respond critically and constructively using the online discussion board.

Keywords: Asynchronous learning, student-centred learning, online discussion board, focus questions

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1. INTRODUCTION

Currently, there is an emphasis on student-centred learning and the use of ICT in classrooms. Student-centred learning has been described in many ways but fundamentally it emphasises that a student is responsible for the planning of his learning, taking the initiative to interact with the teacher and his peers and ultimately being involved in the assessment of his learning (Ingleton *et al.*, 2000). All these strategies have been found to enhance the learning process of the student in comparison to teacher-centred instruction which mainly

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entails the passive transmission of information from teacher to student. In fact researchers (Barr and Tagg, 1995; Hartley, 1998) have attested that active, learner-centred approaches in the classroom encourage cognitively deeper learning experiences and stimulate critical thinking/higher order thinking for their students.

One concept in student-centred learning is active learning. Active learning occurs when students take control of their learning and become active seekers of knowledge rather than passive recipients (Ocker and Yaverbaum, 2001). Active learning gives rise to collaborative learning in which individuals interact with each other to share, analyse and evaluate information, thus enabling them to construct knowledge together. Conventionally, collaboration has occurred through synchronous face-to-face discussion but with the advent of computer-mediated communication (CMC), collaborative learning can take place through asynchronous online discussion boards.

The use of online discussion forums through Blackboard, an Online Learning Management System (LMS) has been made available to students of the South Australian Matriculation programme in Taylor's University College, Subang Jaya, Malaysia. For these students, ESL studies is a compulsory subject. One of the subject components is the Investigative Study which requires students to undertake research and write a report of approximately 2000 words on a particular social issue or topic of their choice.

In the initial stages of the investigative study, the student is required to formulate a research question or a focus question. To facilitate this, the techniques of selecting a topic, narrowing down a topic and formulating a focus question (research question) are taught in class. Students are then given about a week to two weeks to formulate their questions. However, most students have had problems formulating a suitable focus question and inevitably they approach the teacher to help them with this task. As this problem has been common all these years, the instructors/researchers postulated several reasons: first, that teaching strategies have not been sufficiently learner-centred and that students lack the opportunity to practice critical thinking skills. In light of this, the researchers believe that the use of the online discussion board presents an excellent opportunity to address these issues.

This study was conducted in the interest of exploring the efficacy of online discussion boards in stimulating critical and constructive discussion among ESL students. The research questions are as follows:

1. Can discussion boards assist students in formulating good focus questions?

2. Do discussion boards have an advantage over face-to-face discussion in formulating focus questions?

3. Can the use of discussion boards stimulate constructive and critical discussion among students?

2. LITERATURE REVIEW

Since the 1990s, pedagogical research has increasingly emphasised a student-centred learning environment. During this time, teaching and learning practices have seen a shift from the teacher-directed classroom that centres on the transmission and acquisition of knowledge to an environment where the learners are encouraged to interpret and construct

knowledge in a socially negotiated, collaborative environment (Jonassen and Land, 2000; Rubin and Hebert, 1998).

Student-centred learning has its roots in the constructivists' view of cognitive development. The constructivists view learning as a process embedded in a social context and that individuals construct knowledge based on interactions with their social and cultural surroundings (Vygotsky 1962, cited in Hirumi, 2002). This view encourages new technologies such as computer mediated communication (CMC) to facilitate active and collaborative learning (Hirumi, 2002; Ocker and Yaverbaum, 2001). One mode of computer mediated communication is the asynchronous learning network or asynchronous online discussion boards which have been extensively used for collaborative purposes in recent years.

Several studies have explored and evaluated the use of asynchronous discussion boards. Collaborative learning using asynchronous methods have shown to effectively supplement group work outside of the class especially for large groups (Ferdig and Roehler, 2003-04; Kay, 2006). Compared to face-to-face communication, asynchronous online discussions allow students to find information independently, construct meaning, critically evaluate the information and draw conclusions (Ellis, 2001; Knowlton and Knowlton, 2001). Some studies (Ellis, 2001; Schallert *et al.*, 2003) also reveal that students have a positive attitude towards online discussion.

With the presence of both face-to-face discussion and CMC, the question now arises if one method is more effective then the other and if there are added advantages of this discussion when group collaboration is required. In a study by Miller and Benz (2008), it was found that both CMC and face-to-face techniques were effective in producing results. However, they do acknowledge that the use of discussion boards does not limit the time it takes for the students to respond in comparison to face-to-face method of collaboration.

The study by Jonassen and Kwon (2001) comparing face-to-face (F2F) to online forums highlighted some advantages of computer-mediated-communication (CMC). The main observation was that online forums contained less off-task threads and more sophisticated discourse patterns (Jonassen and Kwon, 2001). The analysis of content of the online threads indicated a greater number of agreement and disagreement messages among students using online forums. They had exchanged more ideas and perspectives than those in the F2F environment. Moreover these students stated that they felt 'freer to take issue with different perspectives' (Jonassen and Kwon, 2001: 48) and this allowed them to exercise critical thinking and achieve greater levels of personal reflection. It was also observed that group interaction and patterns of reasoning were more complex among the CMC users. The online forums contained multi-threaded patterns that allowed participants to reflect on their group approach to problem solving.

Several researchers have developed forms of measurement for assessing cognitive processing or level of cognition in discussion threads (Garrison *et al.*, 2000; Knowlton and Knowlton, 2001; Kay, 2006). In developing a metric for assessing discussion board effectiveness among high school students, Kay (2006) used a revised version of the Bloom's Taxonomy of cognition to analyse the quality of discussion threads and to observe patterns of cognition. Bloom's Taxonomy outlines six cognitive levels ranging from convergent thinking skills of knowledge, comprehension and application to divergent thinking skills of

analysis, synthesis and evaluation. Convergent thinking skills involve mastery of facts and their usage. On the other hand, divergent thinking skills place emphasis on original thinking, open-ended reasoning and judgement (Gronlund 1970). The taxonomy also clearly defines the parameters of each cognitive domain to clearly afford a basis of evaluation for discussion thread discourse.

Despite substantial research on learning through online forums, there are papers that argue that our understanding and use of online discussion in a meaningful way is limited (Blignaut and Trollip, 2003; Kay, 2006). Therefore, more research on a variety of populations is needed in this area.

3. METHODOLOGY

3.1. Sample

This study was conducted on students of the 2009 March intake of the South Australian Matriculation programme in Taylor's University College. One class, consisting of 30 students, was selected as target group and one class of 27 students was selected as a control group. These classes comprised both male and female students of varying levels of English language proficiency. All students had access to Blackboard, an Online Learning Management System (LMS) provided by the College. The base-line proficiency of all students was their SPM English results which were known prior to the exercise. Both control and treatment groups consisted of students in approximately the same range of proficiency

3.2. Procedure

The students in the target group were introduced to the investigative study component through lessons on selecting a topic, narrowing it down and formulating an analytical or argumentative research question. They were then introduced to the discussion board on Blackboard and given explicit instructions on how they were to use it as a tool to communicate and share information with each other so that each student would have sufficient input to formulate a focus question on his/her topic. They were then given 10 days to conduct the discussion. Students of the control group were given approximately the same duration to conduct group discussions in class. The main difference of time between the two groups is that students in the target group were able to use the discussion board at anytime during the given 10 days while the control group had to discuss and evaluate their focus questions mainly during class time. If the latter group did have any discussion outside of class, it could not be monitored. The students were given instructions on the method of choosing a topic, narrowing down the specific topic and presenting general questions or guidelines for research. This question would then be submitted in the Research Proposal.

3.3. Method of Using the Discussion Board (Instructions)

There were two roles taken by each student. The first is as an Introducer who has to place his/her focus question (FQ) and guidelines on the discussion board. Every student took this role. The second role was of a Responder in which the student gave critical comments on the output of their classmate. They gave opinions, suggestion and ideas on how to

produce a good focus question. This role was optional as they did not have to comment on every thread.

To ensure student participation on the discussion board, the teacher did not participate or provide in-class consultation. She, however, monitored the discussion through observing the interaction of the students online. It has been recommended that online discussion be student-led and that the teacher should only intervene if irresolvable problems arose (Kay, 2006). The students were not graded on the use of the discussion board but the teacher emphasised the idea that the focus question was crucial to the final grade of the investigative study. After 10 days, the students submitted their Research Proposal with the final focus question for approval and comments.

3.4. Method of Using Group Discussion in Class (Instructions)
Students were assigned groups in which they tabled their baseline focus questions. Based on preliminary readings they were also required to list possible avenues for research. Once that was completed, other members would then give feedback on the proposal with special emphasis on central issues, key terms and narrowing of topic. To ensure that students were aware of the task at hand, they had been given several examples and simulations prior to the administration of the task. Once groups were assigned, the teacher withdrew to maximise peer tutelage and to create an environment similar to that of the target group which recommends student-led discussions (Kay, 2006). Once the time-frame was up, students had to submit their final focus questions.

3.5. Data Collection and Analysis
Two sources of data were collected:
i. A list of the final research question of each student
ii. Discussion threads of the forum from the Blackboard learning system.
    The analyses of these data are described below.

3.5.1. The Final Focus Questions (Research Question 1)
According to the SACE Board of South Australia, which is responsible for the design of the syllabus, a focus question for the investigative study should be limited in scope and allow for the analysis of the topic, instead of providing a factual account. Furthermore the wording of the question should allow for directed inquiry. In other words, focus questions should delineate a specific area and be analytical in nature. The rating of the focus questions was done by a person who did not teach these students and thus could be considered an independent or external party. In addition, the rater was also familiar with the requirements of the assessment and the syllabus.

Using these criteria, the investigators rated the questions as shown in Table 1. The number of questions corresponding to each rating was then categorised and tabulated.

3.5.2 Analysis of Discussion Threads (Research Question 2)
In this study, a broad range of responses was seen to the introducer's threads on the discussion board. The aim of Research Question 2 is to determine if students could contribute

Table 1. Rating of focus questions

Rating	Descriptor
Very good (4)	The question leaves room for thorough discussion on an established social issue with key terms that are clearly defined
Good (3)	The question allows sufficient discussion of the issue with clearly defined key words with a narrow scope for in-depth study
Fair (2)	The question allows discussion but is not sufficiently narrow for an in-depth analysis of a social issue
Poor (1)	There is an obvious answer or the question is too ambiguous for detailed and thorough study. Research is not necessary or is not focused enough

to the discussion in a constructive and critical manner, and if such a discussion involved application of knowledge, analysis, generation of ideas or synthesis and evaluation. The investigators defined constructive comments as comments that offer assistance to the Introducer in any way. These could include comments that provided suggestions for resources or comments that suggested alternate focus questions. On the other hand, critical responses are defined as comments that are analytical or evaluative in nature i.e., a critique on the initial focus question or corrections to the articulation of the focus question. Responses such as the above would be categorised as corresponding to higher levels of cognition as described in Bloom's Taxonomy.

The discussion threads of the treatment group forums were first coded by categorising them according to the nature of the responses. The number of responses under each category was then calculated and cross-referenced to the levels of cognition based on Bloom's taxonomy. The decision of the final analysis was made collectively by the three investigators.

4. RESULTS

4.1. The Final Focus Question

4.1.1. Treatment Group

During the period of the study, two students did not participate; one student changed her focus question completely, thus resulting in 27 final focus questions being submitted. The results of the analysis are shown in Table 2a.

It is encouraging to note that 56% of the students were rated as having good and very good focus questions. This indicates that half the sample population was able to formulate good research questions using the online discussion board.

These findings indicate that a considerable number of students were able to use the discussion threads of their classmates and formulate good questions without relying on the teacher.

However, 11% of the population studied was only able to produce focus questions rated as fair or poor which could be an impediment to further research in the investigative

Table2a. Analysis of focus questions of treatment and control groups

	Treatment group		Control group	
	Number	Percentage	Number	Percentage
Very good	7	26	2	9
Good	8	30	4	17
Fair	3	11	1	4
Poor	2	7	2	9
Unchanged	7	26	14	61

Table 2b. Successful changes to the rubrics in focus questions of the treatment group

	Baseline focus question	Final focus question
Student 1	Mobile phones – Trend? Or has it become a part of our daily necessity in life?	How has mobile phones brought a huge effect in our daily lifestyle?
Student 2	Does petroleum can be replaced successfully by renewable energy resources in the near future/	Can petroleum be replaced successfully by solar energy as the main source of energy for cars?
Student 3	Should childhood marriages be eradicated in this changing world	Should marriage at a younger age be encouraged?

study. One reason could be these students' inability to sufficiently narrow the scope of their research, which could have prevented the Responders from providing meaningful comments. Another observation made among those rated as fair was that they changed topic halfway through the discussion and so were rushed into making a decision in formulating their questions.

Finally, 7% of the students produced poor focus questions. Upon closer analysis, some of these students were unable to clearly define their topic while 26% did not heed comments to modify their questions. Yet others were unable to draw upon the responders' comments to construct the focus question. This is an area that requires further investigation.

Many students were able to adjust the rubrics and terms used in the focus question as displayed by several examples presented in Table 2b.

4.1.2. Control Group
During the period of study, a sample of 27 students was used as the control group. They were given opportunities to orally respond and give feedback on the quality of their peers' focus question while the teacher was an observer. Of the 27 students identified, 1 did not participate and 3 made changes to their central issue, so a total of 23 students were used for

analysis. The instructions given were identical to that of the target group. The results of the analysis are shown in Table 2a.

A large majority (61%) did not make any changes to their baseline focus questions. The initial submissions were practically identical to that of the final submissions giving rise to the fact that face-to-face discussion did not contribute to the refining or even, in some cases, the identification of current social issues. However, it must be noted that some of these did include baseline submissions that were already of good quality but did not indicate any form of improvement following the face-to-face discussion activities. A total of 9% did not make any significant changes to their focus questions. Some attempt was made at correcting language errors but this did not involve correction of key terms and scope of study.

On the other hand, a total of 9% did improve greatly with refined key terms in post discussion focus question which also gave a clearer sense of direction in the proposed study. Seventeen percent of the samples were able to narrow the scope of the study with some gaps that could have been further discussed.

Comparing the results of the two groups, it can be deduced that the discussion board can definitely facilitate the formulation of good focus questions and that it is a better medium than face-to-face discussion. However, this conclusion is confined to the population investigated in this study.

4.2 *Analysis of Discussion Threads*

The analysis of the discussion threads is summarised in Table 3.

There were altogether eight types of responses observed in the threads. Another category was the comments that were off-task. However, these were minimal.

The majority of the responses were observed in two categories; 'giving opinions on topic and providing support/reasoning' and 'Comments on the effectiveness of the focus question/topic'. As these responses constituted nearly 90% of the total, they are reviewed below in further detail.

1. The highest number of responses (49.2%) was those giving the responders' opinions on the topic and/or providing reasoning for their response.
   Examples of discussion threads:

   Introducer 1
   Focus question:
   1. Is giving international aid to poor countries really helping them?

   Response 1
   Giving aid can surely help dat (that) country especially when natural disaster(s) strike. By giving help, the country's burden will be lessen(reduced) n(and) giv(give a) chance for the country to improve their(its) economy n(and), upgrade the ppl's (people's) life. International aid oso(also) strengthen(s) the bond between countries and develop(s) understanding among them. This action will encourage every1 (everyone) in the world 2b (to be) more compassion(ate) 2(to) each other.

Table 3. Analysis of discussion threads

	Type of responses	number	%	Level of cognition
A	Asking for clarification/ more information	6	3.1	Knowledge/Understanding
B	Comments of effectiveness of FQ/topic	**67**	**34**	Analysis/Evaluation
C	Other comments on FQ/topic (suggestion to modify/narrow down)	11	5.6	Analysis/Evaluation
D	Comments of resources (difficulty/ availability)	0	0	Knowledge/Application
E	Suggestions / info and resources (+links)	5	2.54	Knowledge/Application
F	Giving opinions on topic and providing support/reasoning	**97**	**49.2**	Knowledge/Application/ Analysis
G	Comparing FQs. Comments on the better options (if more than one FQ was given)	0	0	Analysis
I	Comment on the articulation of FQ	7	3.56	Analysis/Evaluation
	Off-task	4	2.03	
	Total	197	100	

* FQ = focus question

Introducer 2
Focus question:
2. (Does) the Internet alienate personal relationships?

Response 2
The Internet is (was) created to save time, money and space. But every human has their (his/her) own personality that lead(s) to alienating(alienation) of interpersonal relationships. The creation of (I)internet to online chat(s) to online webcam to(and) online games, not to mention the mangas, animes, comics, has make(resulted in) a lot of people sit(ting) in front of the computer. Many spend most of their time in front of the computer, chatting. But alienating interpersonal relations, not quite.(But I am not quite sure the Internet alienates personal relationships) I myself play online games a lot, not to mention I also chat quite a lot, and instead, I dun (don't) find myself alienating interpersonal relations, rather, it has become a tool for me to strengthen the bond.

The responses in this category mostly consisted of cognition levels 1, 3 and 4 of Bloom's Taxonomy. This shows that the responders have some knowledge of the topics, were able to apply that knowledge and analyse the various issues related to the topic. This in turn would be beneficial to the introducer as he/she gets to consider a wide variety of perspectives about the topic/ focus question.

2. The second highest (34%) was the comments on the effectiveness of the focus questions. Example of discussion threads:

Introducer 3
Focus question:
Do national parks really benefit animals?

Response 1
If you put national parks as your FQ (focus question) key word, it seems to be a global thing, which is different in other countries and you should (may) have a hard time looking for data. Malaysia should be something good (Maybe you should narrow it down to Malaysia)

Response 2 (same responder)
On second thought(s), you shouldn't narrow it down, due to(as) you are doing an argumentative FQ, you need good national parks and bad national parks to come to a conclusion tha(as to) whether overall speaking that national parks is(are) good or bad for animals.(…whether, generally speaking national parks are good or bad for animals) Jz(Just) some thought.

It was pleasing to note that a considerable number of responses (34%) showed the students' skills in analysis and evaluation of the focus question, indicating that they understood the criteria earlier taught and were able to apply this knowledge. For this category students were processing at higher levels of cognition (Bloom's Taxonomy 4 and 6).

Overall, it can be deduced that the students were able to provide constructive comments to their classmates using the discussion board. Whether they were providing opinions, giving information or commenting on the effectiveness or articulation of the focus question, they contributed to the development of the introducer's topic.

The results also indicate that students were able achieve high levels of cognitive processing on the discussion board. The fact that nearly one-third of the responses were evaluative in nature indicates that students are capable of independent and critical thought.

It can be concluded then that, online discussion forums can indeed stimulate constructive and critical discussion among students.

CONCLUSION

The findings of this study suggest that the Online Discussion Board is a promising tool to promote active learning. The discussion board medium clearly makes an allowance for student-centred pedagogical approaches as the teacher's presence is minimised and greater independence is stressed. The feedback given by the peers in the treatment group was well thought out and led to more successful focus questions in comparison with the control group. The results also indicate that there was greater activity of the higher levels of Bloom's Taxonomy in the treatment group. It can be deduced that the use of an asynchronous medium allowed students to effectively put forward ideas, reflect on and evaluate comments, and make revisions to their focus questions and ideas. In other words, they were able to reflect on the threads and use input from their classmates to make decisions when formulating the final focus question.

In the discussion threads, students demonstrated the ability to use higher order cognitive processing such as analysis and evaluation. Thus, it can be concluded that the discussion board did provide an effective environment for constructive discussion among students. Hence, the discussion board challenges students to engage in higher order cognition of Bloom's Taxonomy.

Another distinct advantage of the discussion board is that it allowed students who were normally reticent in class to participate actively in the discussion online. Furthermore the discussion threads show an increase in evaluative thought which inadvertently led to more meaningful learning experiences as students displayed an ability to evaluate themselves more honestly.

In contrast, students participating in face-to-face discussion seemed to have less successful outcomes than those involved in online discussion. While a total of 56% of the treatment group were able to produce 'very good' and 'good' focus questions, only 26% of the control group was able to do so. Furthermore, a large majority of 61% did not make any changes to the baseline focus question indicating the lack of efficacy of face-to-face interactions. Students in the control group also had to deal with time constraints since they had to meet and discuss at an allocated time. These two disadvantages were overcome with the use of the discussion board as it allowed the student time for reflection and evaluation. Since the primary mode of discussion when using the discussion board is written communication, off-task activities were hardly present. Thus, the greater success rate using this medium can be explained by its physical and pedagogical advantages over the face-to-face mode. However, it must be granted that the treatment group also had a high percentage of 26% who submitted focus questions that did not change as compared to their baseline submissions. This requires further study.

As this study is not conclusive, further investigation is needed in certain areas. One important aspect would be the teacher's role as a facilitator of the discussion. In this study about one-fifth of the students in the treatment group were unable to construct effective focus questions. This suggests that the teacher might need to play a bigger role in the discussion. Knowlton's Traditional Model (2001) suggests that facilitators of online discussion paraphrase students' contribution and synthesise students' contribution. The teacher could participate in the discussion to help students who face difficulties. At the same time, the teacher could also direct all students to concentrate or comment on the focus questions rather than debate the topic. This study could be replicated with more in-depth investigation of face-to-face collaboration as synchronous group work is still a common and popular approach in classrooms. Further to this, detailed analysis of threads and a study of student attitudes and perceptions towards online discussion forums will provide more insights into the use of asynchronous online discussion boards as a learning tool for ESL studies.

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