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Promoting university students' critical thinking skills through peer feedback activity in an online discussion forum

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This study investigated the impact of the critical inquiry model through peer feedback strategies in an online environment on university students' critical thinking skills and examined their attitudes towards learning through the critical inquiry model and peer feedback strategies. Pre- and post-tests were employed to measure critical thinking skills based on Bloom's questioning cognitive levels, together with a rubric designed to assess significant abilities involved in critical thinking in a domain-explicit manner. A questionnaire was used to investigate students' attitudes. The findings reported an increase in the post-test mean scores, showing that the application of the critical inquiry model and peer feedback strategy can promote critical thinking skills. Results from the questionnaire suggested that students who used the critical inquiry model to provide peer feedback had favorable attitudes toward learning, higher levels of motivation, and increased levels of confidence when using discussions with peers in an online forum.

Cette étude a examiné, d'un part, l'impact du modèle de recherche critique par les stratégies qu'emploient des étudiants à l'université pour la rétroaction des pairs en ligne et, d'autre part, les attitudes de ceux-ci relatives à l'apprentissage par le modèle de recherche critique et la rétroaction des pairs. Une analyse des pré- et post-tests et une rubrique conçue pour évaluer, en fonction de certains domaines, des habiletés significatives impliquées dans la pensée critique ont servi dans l'évaluation des aptitudes de réflexion critique selon les niveaux d'aptitudes cognitives de Bloom. Les attitudes des étudiants ont été recueillies par un questionnaire. Les résultats révèlent une augmentation dans le score moyen au post-test, indiquant ainsi que l'application du modèle de recherche critique et les stratégies de rétroaction des pairs peuvent développer la pensée critique. Selon les réponses au questionnaire, les étudiants s'étant servi du modèle de réflexion critique pour offrir de la rétroaction à leurs pairs avaient des attitudes favorables face à l'apprentissage, un niveau de motivation plus élevé et plus de confiance lors des discussions avec les pairs dans un forum en ligne.

Genuine learning can emerge when students engage in interactive, asynchronous online discussion (Ertmer, Richardson, Belland, Camin, Connolly, & Coulthard, 2007). Asynchronous online discussion is a substantial tool that students use to communicate with each other in their courses. Its main aims are to activate students' schemata and help construct knowledge (Haavind, 2006). Online collaborative discussion can foster students' interaction, communication, debate, love of learning, learning to learn, questioning, critiquing, teamwork,

interpersonal skill development, and ability to challenge one another, as well as build autonomy as a learning agency. Interactive online discussion has the capability to challenge students' knowledge and beliefs, and introduce new ways of thinking about ideas and reflecting on their own learning journey (Browne & Freeman, 2000). According to Mory (2004), meaningful reflection contributes to students' ability to recognize knowledge and alter beliefs. As such, online discussion is a useful platform where critical thinking can be promoted (Stein, Wanstreet, Glazer, Engle, Harris, & Johnson, 2007). Apart from allowing students to discuss course topics at their convenience outside the classroom, interactive online discussion can be structured to move beyond a simple level of information exchange and foster higher levels of cognitive thinking (Garrison, 2003). In this regard, the model of critical inquiry proposed for this study can be used to provoke students' critical thinking skills through online discussion. Bloom's Taxonomy is a widely accepted framework through which teachers can guide their students through the learning process, and peer feedback can be blended into the learning process as a tool to encourage students' critical thinking.

Role of Peer Feedback

Peer feedback is a process where students read each other's drafts and give comments on that work. Studies show that by using this process, students can become aware of their writing difficulties and see their own progress (Krashen, 1978, as cited in Erfanian, 2002). According to Roehler and Cantlon (1997), the process of online peer feedback enables students to grow and learn from each other in a form of co-constructing knowledge and understanding. Many advantages have been recognized through online peer feedback such as multiplying the timeliness of feedback, cultivating interactive learning slots for both givers and receivers of feedback, and refining the environment, including strengthening community (Corgan, Hammer, Margolies, & Crossley, 2004). As attested by Liu, Lin, Chiu, and Yuan (2001) through online peer feedback, students improve other skills, such as reading, comparison, inquiry, constructive suggestion, and articulating positive aspects of their peers' work. Such learning empowers students to become more autonomous and interdependent by learning to learn through peers, and as such, these interpersonal activities become the driving force of the curriculum (Caldwell, 2012). Teaching materials and resources, as well as instructor's consultation, are more accessible. Moreover, learning schedules are more flexible to both instructor and learners. Online peer feedback leads to more flexibility and quick accessibility of teaching resources. Students also talk about experiences from multiple perspectives, reflect on those experiences, and implement knowledge for decision making and problem solving (DeMarco, Hayward, & Lynch, 2002).

Critical Thinking Skills

Critical thinking is defined by Scriven and Paul (2003) as the process to conceptualize, apply, analyze, synthesize, and/or evaluate information collected from observation, experience, feedback, reasoning, or communication, as a way to believe and act. Critical thinking is the ability to analyze and evaluate information, and includes attitude, value and character, or the whole being. Critical thinking is an art of life—to live one's life with head and heart. It is a skill all can develop to improve oneself and others. Paul and Elder (2000) recommended that teachers plan activities and tasks to facilitate students to think their way through questioning

tasks. To reinforce student critical thinking skills, teacher instruction should provoke students to presume, suspect, generalize, create, and assess, including giving chances for students to identify and solve problems, particularly those that are relevant and of interest and concern to them (Pizzini, Abell, & Shepardson, 1988).

As Paul and Elder (2000) mention, students' critical thinking skills can be mobilized after acquiring two important components of thinking: the ability to identify the parts of their thinking and evaluate the use of these parts. Such *parts* (reasoning ability) relate to purpose, problem solving, assumption, point of view, information and evidence, concept and idea, interpretation, and implication. It is necessary for students to realize the characteristics of expected responses so that they will deliberately think and reflect in a critical way when responding online.

Instructional models have been employed as guiding tools to stimulate students' responses according to particular questions. According to Nussbaum, Hartley, Sinatra, Reynolds, and Bendixen (2002), starter questions that are used as platforms to stimulate thinking can increase students' higher-order thinking and diminish copycats of others' opinions. Dabbagh and Bannan-Ritland (2005) investigated the effect of facilitator precedent by coding the posts and responses of students' online discussion and the assessment rubric to measure significant communication of asynchronous online interchange. Their study revealed that assessment criteria, along with periodical and precise reflection, had an influential impact on students' quality of communication. In a similar fashion, Swan, Schenker, Arnold, and Kuo (2007) stated that increases of frequencies and quality of students' contributions were manifest after assessment criteria were indicated. Ertmer et al. (2007) used peer feedback to enhance students' ability to communicate more effectively. Their study revealed that when students were expected to provide comments on their peers' posting, the meaningful quality of feedback was promising. According to Bai (2009), the practical inquiry model is a discourse guide to facilitate students' critical thinking in an online discussion. Bai used the functional interrogatory pattern as a guide to assist students to think critically in four phases: stimulating issue, investigating, coordinating, and resolving. The aforementioned models provided tangible guidelines to students of what a good contribution might be. Therefore, the quality of responses could be identified.

Garrison, Anderson, and Archer (2010) suggest that computer conferencing provides opportunities for students to engage in critical reflection and discourse. According to Jonassen and Bosung (2010), argumentation plays a significant role in facilitating conceptual transformation especially for problems with uncomplicated structures. Students can change their understanding or modify their responses to accommodate new views. Moreover, to promote critical thinking, appropriate goal-oriented assessment tasks should be set to enable students to manipulate cognitive skills (Thompson, 2011).

The Critical Inquiry Model

Bloom's taxonomy can help educators identify the intellectual level at which individual students are capable of working. The three highest levels of the taxonomy are analysis, synthesis, and evaluation. Choosing one of these three to use for a given measurable student outcome depends upon the original goal to which the measurable student outcome is connected. For instance, there are knowledge-based goals, skills-based goals, and affective goals. Measurable student outcomes that require higher levels of expertise will require more sophisticated classroom assessment techniques.

Table 1

Bloom's Questioning Cognitive Levels

Level of Expertise	Description of Level	Example of Measurable Student Outcome
Knowledge	Recall, or recognition of terms, ideas, procedure, theories, etc.	When is the first day of Spring?
Comprehension	Translate, interpret, extrapolate, but not see full implications or transfer to other situations, closer to literal translation.	What does the summer solstice represent?
Application	Apply abstractions, general principles, or methods to specific concrete situations.	What would Earth's seasons be like if its orbit was perfectly circular?
Analysis	Separation of a complex idea into its constituent parts and an understanding of organization and relationship between the parts. Includes realizing the distinction between hypothesis and fact as well as between relevant and extraneous variables.	Why are seasons reversed in the southern hemisphere?
Synthesis	Creative, mental construction of ideas and concepts from multiple sources to form complex ideas into a new, integrated, and meaningful pattern subject to given constraints.	If the longest day of the year is in June, why is the northern hemisphere hottest in August?
Evaluation	To make a judgment of ideas or methods using external evidence or self-selected criteria substantiated by observations or informed rationalizations.	What would be the important variables for predicting seasons on a newly discovered planet?

The hierarchy of Bloom's taxonomy is the widely accepted framework through which all teachers can guide their students through cognitive learning processes with simple knowledge-based recall questions as the base. Key words and the structure of questions can assist and encourage students' critical thinking, especially in relation to the higher levels of analysis, synthesis, and evaluation. With that in mind, the study discussed here created guiding questions for student participants. Closed questions were created to appraise students' knowledge and comprehension in lower-order thinking skills such as describe, restate, or identify. Open questions were created to evaluate students' knowledge in higher-order thinking skills such as application, analysis, synthesis, and evaluation of critical thinking was probed and refined in explicit manners through the application of such an inquiry model. Table 1 shows Bloom's taxonomy for questioning cognitive levels (Bloom & Krathwohl, 1994, as cited in Anderson & Krathwohl, 2001).

Students were asked to respond to the questions online. They were required to share information and provide feedback or comments. The process of peer feedback provides opportunity for mutual learning and introduces students to new perspectives, which can help students gain more insightful and accurate comprehension (Waterman & Stanley, 2004).
The purpose of this study was to investigate the effects of the critical inquiry model used as a guide for answering the questions through peer feedback strategy on students' critical thinking skills and to explore students' attitudes towards learning through peer feedback strategy in an online discussion forum. It was hypothesized that the postings of students would demonstrate more evidence of critical thinking. The three research questions were:

Research question 1: To what extent will students' critical thinking skills improve as a result of using the critical inquiry model and peer feedback strategy?

Research question 2: Will the students' critical thinking in the three groups allocated by critical thinking skills be significantly improved after they are taught through the critical inquiry model based on online peer feedback? If so, to what extent does it improve their skills?

Research question 3: What are students' attitudes towards learning through the critical inquiry model and peer feedback strategy?

Research Methodology

Participants

This study employed a one group pre-test/post-test design. There were 1,840 second-year students enrolled in English for Communication Arts Professionals (EN314) in the first semester of the 2012 academic year of Bangkok University. There were 48 sections altogether. Since students were already assigned to their sections, cluster sampling was employed to get one section. As a result, this study was made up of 39 students from one section who participated in this study. All of them were students from the School of Communication Arts. They were sophomores ranging from 18-22 years of age with no prior experience in peer feedback. The class was held 140 minutes per week for one semester or 14 weeks. All students had taken three fundamental English courses during the past three semesters.

Research Instruments

Research instruments used for collecting data consisted of pre- and post-tests and a five-rating scale questionnaire, followed by four open-ended questions (see Appendix A).

Pre- and Post-Tests

The pre- and post-tests were created by the researcher. They consisted of six questions that were intended to provoke students' critical thinking in the domains of factual knowledge, conceptual knowledge, procedural knowledge, and meta-cognitive knowledge accordingly. Both tests had similar questions and used the same TV commercial: *Honda™*, *Hate Something, Change Something*. After having watched the TV commercial twice on *YouTube™*, and studied language and vocabulary, students were required to answer the questions. The time allotted for each test was 50 minutes with a total score of 30 points. The questions and scoring rubric were designed to follow Bloom's questioning cognitive levels as follows:

- Question 1: knowledge;
- Question 2: comprehension;
- Questions 3: application;
- Question 4: analysis;
- Question 5: synthesis; and
- Question 6: evaluation.

Students' answers were evaluated according to the rubric adapted and condensed into a five-level variation: the basics of understanding, attaining the issue and concept, students' perspectives and positions going beyond the given, quality of supporting data and assessment, and reflection of their own assertions without egocentricity. The scoring rubric for each discussion question ensured that instructor and students assessed the quality and depth of critical thinking abilities embedded within each response on the same grounds.

After the test was created, the content was checked and commented on by three experts at the Language Institute of Bangkok University. The experts were also asked to rate each item so as to see whether it was congruent with the objective. Then, the Item-Objective Congruence (IOC) Index was calculated by assigning scores to three kinds of answers: congruent = 1.00, questionable = 0.00, incongruent = -1.00. In this study, all items were rated higher than 0.50 of the IOC index, indicating that they were acceptably congruent with the objectives. In this study, its content validity measured by the IOC Index was between 0.66-1.00. Then, the test was piloted with the 39 students enrolled in EN314.

A Questionnaire

The second instrument was an attitudinal questionnaire related to this learning activity, investigating the students' attitudes towards learning through the critical inquiry model and peer feedback. There were two parts to the questionnaire. The first part consisted of ten items. A Likert five-rating scale (1 = strongly disagree, 2 = disagree, 3 = neither agree nor disagree, 4 = agree, and 5 = strongly agree) was used for a post-study survey. Draft questionnaire items were checked for their content validity by three experts in the English teaching field. The items with IOC index higher than 0.6 were acceptable. In order to test the proper reliability of the questionnaire, the questionnaire was piloted with 39 undergraduate students who were not the target group, and calculated for proper reliability value by using Cronbach's Coefficient Alpha. The Coefficient Alpha of 0.87 indicated that all items were acceptable. After that, the questionnaire was distributed to participants at the end of a lesson in week 12. The data obtained from the opinion questionnaire were calculated by applying mean and standard deviation and interpreted as levels to indicate students' attitudes towards learning through the critical inquiry model and peer feedback strategy. A mean score of 1.00-1.50 reveals having an attitude at a very negative level, 1.51-2.50 at a negative level, 2.51-3.50 at a moderate level, 3.51-4.50 at a positive level, and 4.51-5.00 at a very positive level. The second part consisted of four open-ended questions: What benefits are gained through the course using online discussions? What are drawbacks of using this strategy? How do you feel after taking this course? and What would you recommend to improve the course?

Peer Feedback as an Instructional Tool

Peer feedback was partly used as a tool to provoke students to think critically. Students were required to give reflections on other students' posts if they agreed or disagreed with reasons. Moreover, they were to give scores based on the same rubric the teacher used. Therefore, peer feedback was like a pre-grading for students. Students were given guidelines for providing peer feedback, and taught how to specify strong and weak points and make suggestions to improve responses to the questions. Even though peer comments were not actually counted, they affected students' attitudes. Peer feedback caused students to rethink, review, revise, and rewrite their final papers. Studies have revealed that the revision process is one of many advantages of peer feedback, which provokes students to work harder to write since their writing will be read by their peers, not only by their teachers (Rollinson, 2005; Wichadee, 2010).

TV Commercials as a Learning Tool

The selection of TV commercials as a learning tool in this study was responsive to the objectives of the course design. TV commercials were expected to serve particular needs and interest of the Communication Arts students majoring in Advertising. The medium was appropriate and applicable in the EFL classroom for several reasons. First of all, the TV commercials were relatively short, 30-50 seconds, and age appropriate (Erkaya, 2005). The format facilitated a pause at critical points, and students could replay the commercial, if they wanted to. The commercials also had visual and musical appeal (Smith & Rawley, 1997). Similar to movies, the TV commercial were easy to access, free, and allowed students an entertaining venue that exposed them to real-life scenarios through sensational and intellectual perceptions. Furthermore, students could experience lively and authentic languages, accents, slangs, catchy words, and dialects, as well as the challenges of subtle or vivid contents, clues, hidden meanings, motives, morals, culture, and values.

Complicity of both content and language was considered the major function. Otherwise, students would face failure and discouragement at the starting line. There were six thought-provoking TV commercials, each with different themes/values, such as thinking out of the box, thinking different, being different, and making the difference. The TV commercials used in the study were: *Mercedez Benz®*, *Sorry*; *McDonald's™*: *The Showdown* ; *Apple™*: *1984*; *Monster.com: When I Grow Up*; *Coca-Cola®*: *Mean Joe Green©*; and *Greenpeace: Alien Invasion*. For the purposes of this study, only commercials that were award-winning, professionally screened, and highly recommended, were chosen.

Teaching and Learning Procedure

In order to keep students on track, orientation to the course included the interactive learning approach to be exploited, expectations in online discussion behaviors, class agreement to help one another learn and build upon one another's ideas, and consideration of the possibility of various answers. In the study, promoting student critical thinking skills was the priority. Thus, English was regarded as a medium to the end. Grammar correction was not credited in the setting. The main purpose of the assignments was focused on reasoning. Therefore, students were assured to be at ease on grammar or writing styles. Their exploration and expression of original ideas with unstructured and intuitive forms of communicative writing was welcomed in

order to engage them to reflect on what they watched and perceived. The steps used to the watch TV commercials were as follows:

1. Pre-watching: TV commercial scripts, language, vocabulary, expressions, including slangs, were introduced to prepare students' basic understanding in the scenario for further discussions;
2. While-watching: Students noted key words and messages they could capture;
3. Review questions: To assure their understanding of the questions, and to make them aware of where to seek the possible answers, questions were clarified;
4. Re-watching: Teacher replayed and paused as necessary to facilitate students' listening and to search for hints, since few but significantly meaningful words were used;
5. Discussing: Students discussed strategies used in the TV commercial and exchanged ideas together with supporting evidence; and
6. Working as a group: Students were given questions based on Bloom's critical thinking domains and assigned to work individually and in group setting.

In week 2, the introduction of weak and strong reasoning according to LeBeau, Harrington, and Lubetsky (2000) was introduced together with how to give reasons by expressing opinion with logical, clear, and specific reasons or examples or by using common sense to the majority, experts' opinion, or statistics to convince the audience. Students were trained to practice reasoning during weeks 3-5. Throughout the course, the students practiced answering the same six questions and TV commercials allowing them to progress from lower-order levels of thinking to higher-order levels of thinking. Commercial scripts were also given to the students to help reduce any perceived anxiety regarding language. The teacher provided scores and feedback by applying the guidelines studied as exampling illustrations of possible answers and concrete measurements were given as well. According to Bean (2011), writing can be linked with thinking. Therefore, the most intensive and demanding tool for eliciting and promoting critical thinking in the classroom is a well-designed writing assignment on a subject matter problem.

During weeks 6 and 7, the guidelines of giving feedback were introduced. Students were instructed on how to give general comments by expressing compliments, giving suggestions and modifications, and questioning ideas. They were also taught how and where to give feedback on each particular question. They were informed about the purpose and advantages of peer feedback. They were instructed not to criticize, but to help review their drafts and point out ways to improve and revise the final paper. Peer feedback was assigned as individual and group tasks of five to six people.

In weeks 7 and 9, students were assigned to watch the last two TV commercials on YouTube™, brainstorm, discuss, conclude their group answers, and post their first draft on Moodle, the learning management system (LMS) provided by the university. To motivate students' participation in this activity, the course provided them with a game where 10 points could be earned and allocated into four parts: the first draft, individual comments, group comments, and group final paper. Their comments were scored according to reliability and effort in applying what was studied. To earn scores for group comments, within one week, the group representative posted group feedback on another group's paper posted in online forums. For the individual task, to earn two points, each student was expected, within one week, to post two comments on two responses posted by other groups for any two discussion questions. The

procedure of giving feedback and the application of what was studied were scored. After one week, each group considered comments received, revised their papers accordingly, and then, submitted their final paper back on Moodle.

Data Collection

It took 12 weeks to complete the study, starting with the pre-test conducted in the first week. Students were given scripts and language was clarified. Students were requested to watch two TV commercials: *Coca-Cola®*: *Mean Joe Green©* (week 7) and *Greenpeace: Alien Invasion* (week 9). After that, students were required to post their group's first draft on Moodle within one week. Students were assigned to give responses on two groups' postings within one week. For an individual task, each student was requested to give feedback on any two responses within one week. Students' applications regarding how to give comments on each question were evaluated for group and individual tasks. All peer feedback was used by students in both individual and group final papers. Then, students were given the post-test and the questionnaire during week 12.

Data Analysis and Statistical Procedure

This study employed two raters for marking the papers. Each student's performance was recorded in terms of points. In order to confirm the reliability of test scores, inter-rater approach of reliability estimates were calculated. The correlation coefficients were calculated and the results from the pre-test scores were 0.732 while the correlation coefficients of the post-test scores were 0.835.

The pre-test score was used to divide the students into three groups, namely high-, intermediate-, and low-critical thinking groups. The cut-point was determined by using mean ±0.50 SD. The range of the "high" group was higher than 11.78 while the range of the "intermediate" group fell between 7.50-11.78. The range of the "low" group was lower than 7.50. The scores from both tests were compared as a way to learn whether and to what extent students' critical thinking skills improved as a result of using the critical inquiry model and peer feedback strategy as well as to find out the significant differences. Moreover, in an attempt to learn what the students thought about this learning activity, they were asked to answer a questionnaire after the post-test. The data obtained from the pre- and post-tests, as well as the questionnaire, were analyzed by Statistical Packages for the Social Sciences (SPSS®). An analysis was done for mean, standard deviation, and paired samples t-test.

Regarding the measurement of critical thinking skills, the rubric used for scoring the tests was adapted from Elaina Bleifield and the Paulus CT Group. The full score was set at 30 points. The rubric corresponds to each question to measure six categories of critical thinking: knowledge, comprehension, application, analysis, synthesis, and evaluation. The 1-5 score rating is based on:

1. Accuracy in identifying and summarizing the problem/question at issue;
2. The quality of supporting data/evidence;
3. Accuracy in identifying and providing a well-developed explanation of contextual issues with a clear sense of scope;
4. Demonstration of higher level thinking by interpreting the author's meaning or any potential

bias, and;

5. Ability in making an evaluation and conclusions with a well-developed explanation and an objective reflection of their own assertions.

Research Results

Results from the Pre- and Post-Tests

Research question 1: To what extent will students' critical thinking skills improve as a result of using the critical inquiry model and peer feedback strategy?

Table 2 shows students' mean scores before and after the intervention (M_{pre} = 9.64, M_{post} = 17.95). In order to discover whether students' critical thinking abilities were significantly improved, the pre-test and post-test scores were compared applying paired samples t-test. Table 2 reveals that the mean score of the post-test was higher than the mean score of the pre-test. The application of the critical inquiry model and peer feedback strategy can promote students' critical thinking skills.

Research question 2: Will the students' critical thinking in the three groups allocated by critical thinking skills be significantly improved after they are taught through the critical inquiry model based on online peer feedback? If so, to what extent does it improve their skills?

Based on the pre-test score, students were divided into three groups, namely, high, intermediate, and low. All 39 students in three different critical thinking groups studied in the same class with the same teaching techniques throughout the 12 weeks of the semester. Then they took the post-test to measure their significant improvement in critical thinking skills. In order to find out how much each group of students improved significantly in their critical thinking skills, the pre-test and post-test mean scores were paralleled by employing a paired sample t-test. The findings signify that mean scores received from the post-test of the three groups were significantly higher than those of the pre-test. The differences of mean scores of the high-, intermediate-, and low-proficiency groups were -5.78, -9.21, and -8.88, accordingly. The t-test results also indicated statistically significant differences between the pretest and post-test scores. This reveals that students' critical thinking skills have been elevated in all groups as a result of using the critical inquiry model and peer feedback strategy.

Table 2

Means of the Pre-Test and Post-Test of the Students

	N	Mean	SD	t	p
Pre-test	39	9.64	4.29		
				11.58	.000
Post-test	39	17.95	5.18		

Table 3

The Mean Scores Obtained from Pre-test and Post-test Shown in Three Groups

	N	Mean	SD	t-value	P
High Group					
Pre-test	9.00	15.83	3.22	-4.08	.004
Post-test	9.00	21.61	3.43		
Difference	-5.78				
Intermediate Group					
Pre-test	17.00	9.59	1.42	-8.36	.000
Post-test	17.00	18.79	5.01		
Difference	-9.21				
Low Group					
Pre-test	13.00	5.42	.86	-7.59	.000
Post-test	13.00	14.31	4.29		
Difference	-8.88				

Results from the Questionnaire

Research question 3: What are students' attitudes towards learning through the critical inquiry model and peer feedback strategy?

Table 4 shows that the overall mean score of attitudes toward learning through the critical inquiry model and peer feedback strategy was at a positive level (M = 4.29, SD = .31). Among the 10 items, the highest mean score was no. 1 "With this activity, I was more motivated to learn than usual" (M = 4.56, SD = 0.55); followed by no. 5, "With this activity, I could express my opinions freely." (M = 4.49, SD = 0.51); no. 4, "The activity made me feel part of the class" (M = 4.49, SD = 0.72); no. 7, "I found this activity very useful" (M = 4.46, SD = 0.64); and no. 9 "This activity helped increase my critical thinking skills" (M = 4.33, SD = 0.62). The lowest mean score was no. 8, "Giving on-line feedback supported me to examine issues and discuss in an argumentative format" (M = 3.95, SD = 0.76). All mean scores were at a positive level.

Table 4

Mean, Standard Deviation, and Level of Attitudes of the Students

No	Statements	Mean	SD	Level
1	With this activity, I was more motivated to learn than usual.	4.56	.55	positive
2	Feedback from peers enabled me to improve my critical opinions.	4.00	.73	positive
3	I feel more connected to others with this activity.	4.10	.94	positive
4	The activity made me feel part of the class.	4.49	.72	positive
5	With this activity, I could express my opinions freely.	4.49	.51	positive
6	Through peer feedback, I discovered faults in what I had previously believed to be right.	4.13	.57	positive
7	I found this activity very useful.	4.46	.64	positive
8	Giving online peer feedback supported me to examine issues and discuss in an argumentative format.	3.95	.76	positive
9	This activity helped increase my critical thinking skills.	4.33	.62	positive
10	I was able to apply the knowledge gained during the course to support my online arguments.	4.41	.82	positive
	total	4.29	.31	positive

Results from Open-Ended Questions

When asked about benefits of using online discussions throughout the course, it was found that all responses were unanimously positive. Through online discussions, students were motivated, encouraged, more confident to share, exchange, discuss, communicate their opinions, and work interdependently with their classmates. The strategy suggests that students can use peer feedback to avoid personal confrontation or so called cultural taboos and constructively give and receive comments with a sense of acceptance and freedom. Learning online also allowed most students more time to critically think and rethink, work autonomously, and follow consistent guidelines for commenting constructively on their peers' writing. The following are quotes from participating students:

- "It gives more courage for students to speak out their mind on classmates' works, but in class it would never happen."
- "No one wants to offend anyone, but through online, all students seemed not to take comments received personal. They feel free to give comments."
- "Thai students tend to be shy and keep quite. They feel that they can freely voice out more on online setting."
- "When students feel fun to do something untraditional like online discussions, and accepted by teacher to give wrong answers, think different, or comments, learning is enjoyable."

There were a few of drawbacks of using this strategy. Some students reported that it was more time consuming. Others preferred in-class discussion for more personal contact with the

teacher and peers, immediate responses, real-life scenarios, and perceived workload reduction. Moodle was a relatively new system; therefore, it was hard to navigate for students. Students were not as motivated to check peers' postings and feedback as they were with the previously system. Furthermore, there were technical factors with the wi-fi system that sometimes made it frustrating for participants to use.

Overall, most students in this study expressed positive feelings. For them, this model provided increased opportunities to practice English language skills and improve critical thinking. Students were generally more motivated and eager to learn, read, and search for vocabulary and satisfy their curiosity on peers' postings and comments. Freedom to write with no grammar concerns encouraged more flow of thought. Self-discovery learning took place while exploring other postings and comparing one another's work. Students initiated new and better ideas for revision. The TV commercials and scripts were also appreciated as instructional tools, which helped students to understand levels of language, cultural values, and personal experiences. Here are some examples that students stated in their replies.

- "It is so good to review other postings and compare with my paper. It made me desire to revise mine and understand what is considered good works or bad ones."
- "I enjoyed the class because I was allowed to think different as long as I could justify my answers."
- "I like the way I was offered a chance to review and redo my work."
- "When class atmosphere is wonderful and fun to view various interesting TV commercials, these motivated me to learn more."
- "When I have no worry about grammar, my thoughts were more deliberated."
- "This class gave me more freedom and time to think."

Some students made practical recommendations to improve the course. Three students suggested that it would be nice if Moodle could provide a signal to make users aware of incoming comments, such as those in Facebook. One student proposed a student manual and training of how to utilize the Moodle system. It was also suggested to blend learning with both in- and out-of-classroom learning activities to serve students' different needs and preferences.

Discussion

This research was undertaken to examine the effect of the critical inquiry model on students critical thinking skills and explore students' attitudes towards learning through peer feedback strategy in an online discussion forum. The pre- and post-tests clearly demonstrated students' improvement in critical thinking when they responded to six questions that aligned with Bloom's taxonomy of knowledge, comprehension, application, analysis, synthesis, and evaluation. An increase in critical thinking skills could be a result of the practice of the critical inquiry model based on Bloom's questioning cognitive levels, which aimed to shift students' thought processes from lower-order levels of thinking to higher-order levels of thinking. Students became familiar with reasoning by expressing opinions with logical, clear, and specific reasons or examples, or using common sense, well-supported commentary, or statistics to convince the audience. Students had an opportunity to practice giving reasons in an online discussion forum, which was a useful platform to promote critical thinking (Stein et al., 2007).

The present findings support the significance of the critical inquiry model employed as a guiding tool to stimulate students' responses to particular questions. As previous studies suggested, instructional models were deemed necessary to promote students' communication and critical thinking skills (Dabbagh & Bannan-Ritland, 2005; Nussbaum et al., 2002).
The study presented here employed a process of peer feedback in online discussions that enabled students to use higher-order levels of critical thinking. Peer online discussion assisted students with reflecting, rethinking and revising the content of their papers. These are all learning activities that require analytical, organizational, and evaluation of content (Mory, 2004). Findings also suggest that students' understanding of content, and how to organize and synthesize that content for their final submitted papers, were facilitated and elevated through the process of exchanging ideas, learning together, and comparing peers' responses. Findings from previous research also revealed that reflective processes, such as critical questioning and peer feedback strategies—when used effectively as complementary learning strategies—facilitate students' critical thinking (Bai, 2009).

Students' critical thinking skills in the higher-order thinking levels of Bloom's taxonomy (analysis, synthesis, evaluation) were significantly increased after they used the critical thinking model based on peer feedback strategy. Students were also exposed to in-class instruction before they employed this model, which means that this factor could have influenced the high post-learning-scores. Students were taught how to give reasons, comments, and feedback, through examples and practice. These variables could account for the high scores among the three categorical levels of higher-order thinking by participating students. The primary goal of asking questions (especially questions three through six) was to find out how students would answer them, and if they would answer them in broader or deeper ways with supporting reasons. Therefore, the 10-point game tasks, which the students earned during the four stages of first draft, individual comments, group comments, and group final paper, were regarded as intellectual games or quests, not just motivational ones. Students demonstrated that they could think, rethink, and revise their final papers in different ways. Students also spent extended amounts of reflective time examining each other's peer comments questions, or recommendations. In line with York-Barr, Sommers, Ghere, and Montie (2005), high-order critical thinking happens after one has an opportunity to ponder or more deeply reflect on his or her own individual thoughts, insights, and questions.

The results from the questionnaire suggested that students had a positive attitude towards learning through the critical inquiry model and peer feedback strategy. This positive outcome was in accordance with Liu, Lin, Chiu and Yuan (2001) who found that feedback strategy promotes students' learning, higher cognitive levels, and positive attitude. The findings of question no. 1 "With this activity, I was more motivated to learn than usual" exhibited the highest mean score. All student responses showed higher levels of motivation and increased levels of confidence when using discussions with peers in an online forum rather than in a classroom setting. Students were taught the guidelines for giving feedback, explicitly given the expectation for behaviors in discussion, and encouraged to set clear goals for the course and agenda of activities. There was a noticeable increase in respect for others and tolerance to differences.

The study found that peer feedback in an online forum promoted a collaborative learning environment and encouraged self-identification toward "what I think," thinking out loud, and listening to other points of view with no offense. This kind of classroom learning would be considered new for Thai students. Thai students accepted new and different ways of thinking.

The TV commercials were found to be entertaining and, as instructional tools, they appeared to play an important role in facilitating student learning and discussion. The role of the instructor was also important to student motivation because throughout the peer feedback process, the instructor was available for students, often serving as a mentor for students.

Limitations of the Study

This research study was conducted in a classroom context and consequently, the sample size was small. The sample consisted of students from one English course at Bangkok University. The findings might depict only this particular population. The generalization of the findings with a small sample size should be cautiously interpreted. The limitation of a one-group pre-test/post-test design may cause little veracity to the causal connection between the independent variable and the outcome measure. In addition, while undergoing the treatments, the students enrolled in this English course were required to develop other skills such as listening, speaking, and reading. Therefore, other variables may have contributed to the increase of students' critical thinking skills. Students' frustration with the Moodle computer system might also have affected the results of this study. Moodle was introduced to Bangkok University students in the previous semester, so students and instructors were less familiar and confident in accessing and utilizing all its functions. A study by Tunison and Noonan (2001) also mentioned that it was difficult for some students to express their thoughts in an online environment and that their ability to communicate and comprehend detailed explanations was more limited in online environments than in face-to-face interaction. The same could have been true for participating students in the study discussed here.

Implications for Practice

Developing critical thinking skills consumes time and requires on-going courses and learning activities. Learning resources should be contemporary, interesting, provocative, entertaining, and rather short, like songs, which would be relevant and compatible to college EFL students' language proficiency. Levels of language complicity are the first challenge. Interactive learning, prompted by critical reflection and questioning, can aid students' comprehension of content. Understanding content must occur prior to higher-order thinking, such analysis, synthesis, and evaluation, respectively. Higher-orders of thinking will definitely take place when students feel comfortable in a classroom where they can confidently speak their minds, freely exchange ideas with peers and instructors, and openly receive different perspectives.

Conclusion

It has been evidenced here that students' critical thinking skills and attitudes were significantly increased through the use of the critical inquiry model based on Bloom's questioning cognitive levels and collaborative learning in online discussions was positively correlated to using peer feedback strategies to learn content. Moreover, other skills and values, such as intercommunication skills, self-respect, tolerance to others, and interconnectedness were promoted in students' learning. TV commercials and scripts served as functional and practical instructional resources in one EFL course to help students learn various levels of language simplicity and thought-provoking content.

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Appendix A

Pre-Test Questions: Honda, "Hate Something, Change Something"

1. What is the advertising about?
2. Interpret the message of Honda's advertising.
3. How would you apply the message of the ad in your daily life?
4. Compare uses of a diesel engine and a noisy old engine.
5. How would you do something to lessen pollution?
6. In your opinion, do you like this ad? Why or why not?

Post-Test Questions: Honda, "Hate Something, Change Something"

1. What does the advertising talk about?
2. What does the message of Honda's advertising convey?
3. How would you implement the concept of the ad in your life situation?
4. Analyze pros and cons of eco-friendly engines.
5. What would you do to ensure less pollution so that creatures can live happily?
6. What do you think about this ad? Give reasons to support your opinion.

Questionnaire Questions

1. With this activity, I was more motivated to learn than usual.
2. Feedback from peers enabled me to improve my critical opinions.
3. I feel more connected to others with this activity.
4. The activity made me feel part of the class.
5. With this activity, I could express my opinions freely.
6. Through peer feedback, I discovered faults in what I had previously believed to be right.
7. I found this activity very useful.
8. Giving online peer feedback supported me to examine issues and discuss in an argumentative format.
9. This activity helped increase my critical thinking skills.
10. I was able to apply the knowledge gained during the course to support my online arguments.

Open-Ended Questions

1. What benefits do you gain through the course using online discussions?

2. What are drawbacks of using this strategy?
3. How do you feel after taking this course?
4. What would you recommend to improve the course?