Developing Critical Thinking Skills through Writing in an Internet-Based Environment

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Abstract

This research study was aimed to investigate the effectiveness of a writing program on improving Salman bin Abdulaziz University students' critical thinking skills after participating in a seven-week task-treatment using an Internet-based writing program (IBWP) developed by the researcher. The subjects were 98 male students enrolled in a writing course during the first semester of the academic year 2013/2014. The effectiveness of the program was measured by a holistic critical thinking scoring rubric developed by Facione and Facione (1994). The subjects were randomly assigned into two groups: an experimental was taught writing via the Internet-based writing program IBW, and a control group was taught through the ordinary method. The findings of the study revealed that EFL students in the experimental group who used the IBWP showed greater improvement in their critical thinking skills than did the EFL students in the control group who used the ordinary method.

Keywords: critical thinking, essay writing, holistic critical thinking scoring rubric, Internet-based writing program IBWP.

1. Introduction

A multitude of researchers in TESOL emphasize that students' critical thinking skills can be fostered through e-learning communication (Caplan, 2004; Dinevski & Plenković, 2002; Van Erp, 2008). Writing assignments on the Internet can be considered as a real application of critical thinking skills as it involves collecting, analyzing, synthesizing and evaluating information (Kupperman & Wallace, 1998). Dixon, Cassady, Cross, and Williams (2005) emphasize that writing is a vehicle through which students can express their critical thinking, and that writing seems to be an expression of critical thinking when students are trained to use critical thinking methods consistently in writing.

Many researchers explicitly stress the importance of helping students develop into critical thinkers (Brookfield, 1987; Facione & Facione, 2007; Moore, 2004; Muilenburg & Berge, 2000; Paul & Elder, 2006). Paul and Elder (2006) suggest that developing critical thinkers is necessary and should be the central goal of all educational institutions. Paul and Elder (2006) think that instructors can play an important role in the development of Internet-based students' critical thinking skills through the use of effective strategies. Moore (2004) views that developing critical thinkers is fundamental to good education and that critical thinking skills are necessary in order to function as engaged and active citizens of our world. Olson (1984, p. 31) proposes that "By helping students become better thinkers, we would enable them to become better writers and vice-versa."

Critical thinking is an important issue in education and the development of critical thinking skills should be one of the primary goals for educators at all levels (Al-Fadhli & Khalfan, 2009; Gelder, 2005: Guiller, Durndell, & Ross, 2008). Gelder (2005) asserts that improving students' critical thinking skills can be considered a universal goal of all educational endeavors. Chiu (2009, p. 43) describes critical thinking as "A skill of potential value for those who should objectively evaluate what they can and do dredge up from the ocean of online information currently available on the Internet". Chiu adds, teachers who wish to maximize the influence of online programs on the improvement of critical thinking are recommended to take the role of facilitators.

Critical thinking is a highly desirable goal of online higher education courses. In every discipline there is an agreement that college students need to improve their critical thinking skills (McLean, 2005). Critical thinking is more than just knowledge acquisition or a collection of processing skills; rather it is the development and continual use of analytical skills (Scriven & Paul, 2004). Overall, educators are concerned about improving critical thinking skills among students in higher education and find it a desirable outcome of undergraduate education (Halpern, 2001; McLean, 2005).

Theorists are divided into two camps regarding whether critical thinking is best taught as a general skill applied to all disciplines or as a skill used in a particular discipline. Theorists in the field, including (McPeck, 1981,1990; Nosich, 2005; Paul, 2005), agree that critical thinking skills need to be taught within the context of a discipline, not as an isolated discipline. McPeck (1981), for example, believes that critical thinking cannot be taught as a separate subject. He suggests studying critical thinking as it relates to a specific academic discipline. Critical thinking instruction is not effective when taught in isolation. It must be a holistic and integrated component of the classroom curriculum McPeck (1990). On the other hand, Facione (1998) and Siegel (1988) disagree and believe that there are critical thinking skills that are general and can be applied throughout all disciplines.

Wade (1995) identifies eight characteristics of critical thinking. Critical thinking involves asking questions, defining a problem, examining evidence, analyzing assumptions and biases, avoiding emotional reasoning, avoiding oversimplification, considering other interpretations, and tolerating ambiguity. Dealing with ambiguity is also seen by Strohm and Baukus (1995, p. 56) as an essential part of critical thinking, "Ambiguity and doubt serve a critical-thinking function and are a necessary and even a productive part of the process."

One of the important characteristic of critical thinking identified by many sources is metacognition. Kurfiss (1988) underlines three sides of critical thinking: declarative knowledge: the facts and concepts of the discipline or field; procedural knowledge: how to reason, inquire, and present knowledge about the discipline; and metacognition: being able to evaluate the outcomes of the thinking process. Metacognition is thinking about one's own thinking (Sendag & Odabas, 2009). More specifically, "Metacognition is being aware of one's thinking as one performs specific tasks and then using this awareness to control what one is doing" (Jones & Ratcliff, 1993, p. 10).

Over the past decade, researchers have speculated that there may have been a relationship between the use of online discussions and the development of critical thinking skills (MacKnight, 2000). One hypothesis is that Internet-based communication provides a social context for learning that gives learners time to think about their contributions and organize their thoughts prior to responding. It is believed that developing students' ability to reflect on their own learning process can help them progress in learning. Higher-order thinking skills promote higher-order learning skills which in turn enable students to reach higher levels of language proficiency (Renner, 1996).

Gilster and Gilster (1997) view critical thinking as the most important skill when using the Internet, because the Internet is full of false, incomplete, obsolete, etc. information. So, including that the Internet contains an immense range of information that is posted by individuals and organizations, and the difficulty of ensuring the quality of this information. Students need to learn critical evaluation skills which enable them to identify information that meets their needs.

According to Yang, Newby, and Bill (2005), states that Socratic questioning is an effective means for promoting critical thinking in asynchronous online discussions. Such discussions give learners time for "thoughtful analysis, composition, negotiation, and reflection as their discussion of an issue evolves and allows instructors to model, foster, and evaluate the critical thinking skills exhibited during the discussion." According to them, because reflection takes time that the Internet-based discussions are more helpful to critical thinking than face-to-face discussions occurring in real time.

1.1 Statement of the Problem and Purpose of the study

The problem of this study is that most of Salman bin Abdulaziz University EFL students exhibited low critical thinking skills. Therefore, the aim of this study was to investigate the effectiveness of an Internet-based writing program on improving Salman bin Abdulaziz University students' critical thinking skills. Given this, the researcher hoped to provide Saudi students with an opportunity to increase their critical thinking skills through participating in the Internet-based writing program developed by the researcher.

1.2 Research Hypothesis

According to the theoretical and practical literature reviewed, the researcher hypothesized that there would be a statistically significant difference at ($\alpha \leq 0.05$) between the mean scores of the experimental group and those of the control group of English major students' critical thinking skills at Salman bin Abdulaziz University that can be attributed to the IBWP. Accordingly, this study attempts to answer the following research question:

What is the effect of the Internet-based writing program on developing English major students' critical thinking skills at Salman bin Abdulaziz University?

1.3 Significance of the Study

This study is significant and original for several reasons. First of all, research on teaching writing for critical thinking using Internet-based tools is still relatively new. To the knowledge of the researcher, there have been no previous studies in the field of EFL education that have attempted to connect Saudi EFL learners with Internet-based programs to develop writing for critical thinking skills. Second, the study provides curriculum designers with a framework to begin creating new curricula supported by the Internet. In addition, this study may raise Saudi EFL instructors' awareness of the crucial benefits the learners can gain from exposure to Internet-based programs to improve critical thinking skills. Furthermore, perhaps instructors of English are encouraged to design activities that can foster meaningful engagement for their students both inside and outside the classroom. Finally, the study encourages Saudi EFL students to take more active part in their own language learning by fostering autonomous learning in a classroom and non-classroom environment.

1.4 Operational Definition of Terms

The terms below, wherever seen, have the following definitions:

- **Critical thinking**

Due to the many definitions of critical thinking, the researcher adopted the definition of Facione (1990, p. 3) who defined critical thinking as: "purposeful, self-regulatory judgment that results in interpretation, analysis, evaluation, and inference, as well as explanation of the evidential, conceptual, methodological, criteriological, or contextual considerations upon which that judgment is based." In this study, critical thinking consists of five skills: interpretation, analysis, evaluation, inference, and explanation. Students were engaged in lessons and writing tasks that enhanced their ability to apply these skills. The scores were valued on a scale from 1 (poor) to 4 (very good) based on Facione and Facione (1994) scoring rubric.

- **Internet-Based Writing Program (IBWP)**

It referred to the program developed by the researcher, delivered via the Internet and supported by the attributes and resources of the Internet. The program provided the students with lessons, activities, tasks on writing for critical thinking, and other Internet-based tools that are mediated and supported via the IBWP without having face-to-face contact between the instructor and students.

- **Ordinary Method**

In this study, it referred to the current method based on pencil/pen and paper. The students were provided with all the course materials having face-to-face contact with the instructor.

1.5 Limitations of the study

In this study, there a number of limitations that may affect the results. One of the limitations is that this study it is limited to the students of Salman bin Abdulaziz University in Saudi Arabia. Another limitation, this study is limited to the students of level four at the Department of English enrolled in the course of Writing Skills (4). In addition, the study is limited to the IBWP designed by the researcher and its components taken from the textbook (*Critical Thinking: A student's Introduction*). Finally, this study is limited to the development of students' writing for critical thinking through the IBWP.

2. Method and Procedures

This section describes the method and procedures that were used in this study. It includes: subjects, instruments and their validity and reliability, description of the IBWP, procedures of the program, equivalence of the groups, control extraneous variables, design, statistical analysis, and procedures.

2.1 Subjects of the Study

The subjects of the study were 98 male students from the Department of English at Salman bin Abdulaziz University during the first semester of the academic year 2013/2014. The subjects were randomly assigned into two groups, an experimental group and a control group; each group consisted of two classes as follows:

Table 1: The Distribution of the Students into Experimental and Control Groups

group	Class	Number of Subjects	Total Number of Subjects
Experimental Group	Writing Class A Writing Class B	25 24	49
Control Group	Writing Class C Writing Class D	26 23	49
Total			98

2.2 Instruments of the Study

The following instruments were used in this study:

2.2.1 The achievement test

In order to answer the research questions, data in this study were collected using an essay-writing test. In the first session, before students received any instruction all the students, the experimental group and the control group, sat for a pretest. All subjects were asked to write a five-paragraph essay. The essay test was developed by the researcher to measure students critical thinking skills, which was evaluated using a holistic critical thinking scoring rubric developed by Facione and Facione (1994). In the last session of the treatment, a five-paragraph essay was given as a posttest to all subjects in the two groups.

2.2.2 The Internet-Based Writing Program (IBWP)

This program was an Internet-based writing program developed to teach writing for critical thinking through a website designed by the researcher. Lessons on critical thinking skills were chosen in accordance with the course syllabus in the textbook of the first semester: *Critical Thinking: A student's Introduction*, Fourth Edition, authored by Gregory Bassham. Also, the IBWP consisted of seven tasks of writing to help students apply the critical thinking skills they have learned. Students were given specific topics related to the course syllabus or topics that were relevant to the themes in the textbook. In addition, the IBWP was supported with Internet-based tools such as e-mail, text-based chat rooms, and search engines, to give students the opportunity to discuss what they have learned about the topics in groups.

2.2.2.1 Objectives of the (IBWP)

The objectives of this program can be summarized as follows:
1. To measure the effect of an IBWP on the development of EFL students' critical thinking skills.
2. To support Saudi EFL students with useful resources and tools to facilitate their writing for critical thinking.
3. To encourage EFL students rely on themselves without interference from the instructor.
4. To engage EFL students in meaningful interactions where they could work with their partners, share information, solve problems, draw on their existing knowledge and eventually become users of the target language.

2.2.2.2 Description of the Procedures of the IBWP

First, the researcher fully explained the program to the instructor who participated in teaching the program. Then, in the first meeting of the class in the experimental group, the instructor started an orientation session to direct students towards the IBWP. Following, was administering the lessons of the program, which lasted for two months. Each task took three sessions (each session 50 minutes). Seven writing tasks were tackled within the sessions, three meetings every week. sessions started with a pretest and ended with a posttest given to the two groups. The instructor taught the experimental group using the IBWP, while he continued teaching the control group using the ordinary method.

The students were encouraged to communicate with one another using the chat rooms to generate ideas and to review their writings with peers.

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They were also encouraged to use the supplementary materials such as the writing websites offered by the program to be acquainted with the topics. The students were asked to submit seven writing tasks via e-mail, one task each week. The researcher and the instructor checked the assignments and sent them with comments back to the students. Each writing task was carried out in three sequential stages, the prewriting stage, the while/during writing stage, and the post writing stage. These stages were the followings:

- **The prewriting stage: The preparation and brainstorming stage**

The students were required to research the topic they would be working on the next meeting outside the class hours using one of the search engines, Yahoo or Google. In the first session, students were asked to browse the web page containing the critical thinking skills lessons where they worked independently to study the lesson set for the task of writing and thus learning critical thinking skills for thirty-five minutes. Then, students were asked to sign in to the text-based chat room which was linked in the homepage to share and exchange ideas and opinions on the topics they were to write about in groups of four. This activity lasted for fifteen minutes.

- **The While Writing Stage: (The drafting Stage)**

Were encouraged to read a sample model on the topic they were to write about. Then, students were asked to organize the information and ideas they had generated in the pre-writing stage and to put them in an essay applying the critical thinking skills they had learned before from the lessons link for 50 minutes.

- **The Post Writing Stage: Revising, Editing, and Publishing**

The students shared their first drafts with other peers using text-based chat to get feedback. This stage allowed time to reflect upon what had been written to rethink, re-see, and reshape words and ideas. Students received comments, discussed them further with peers and decided what to incorporate in their final drafts. Finally, students were requested to send their final drafts only to the instructor by posting them through the instructor's e-mail.

2.3 Validity and Reliability of the Instrument

The validity of the instruments was ascertained by giving the instruments to a group of EFL jurors: experienced university professors who expressed their views and gave suggestions. Their suggestions were taken into consideration and the instruments were modified accordingly.

The reliability of the instruments was achieved through a pilot study. The researcher selected thirty students from the Department of English at Salman bin Abdulaziz University out of the original total of subjects and administered the test and the IBWP on them. The researcher applied the test/retest method, with a difference of two weeks between the first application and the second application. The value of Pearson Correlation between the two applications was (0.90). Additionally, the researcher calculated the value of Kronbach Alpha (0.82). Accordingly, this value was high and indicated the reliability of the instruments for the purposes of the application of the study.

2.4 Equivalence of the Groups

To establish the equivalence between the two groups, the researcher compared the means and standard deviation of the experimental and the control groups obtained on the writing pretest. The researcher then conducted the One-way ANOVA to find out whether there were statistical significant differences in these. It was found that the two groups were equivalent according to group variable and, thus, any later significant change in students' critical thinking skills will be due to the effect of the implementation of the IBWP.

2.5 Control Extraneous Variables

Toavoid the extraneous variables the researcher performed the following:

1. The same instructor taught the two groups.
2. The same content was taught to the two groups (the experimental and the control groups).
3. The program was implemented to the experimental group, and the control group was not allowed to see the program. The program was secured by a proxy that prevented students from the other group from using the program.
4. The time limit to implement the experiment was determined.
5. The researcher activated only the materials that were being used inside the classroom.

6. Students did the task of writing inside the classroom not outside. Students only gathered information about the topics outside the classroom.

2.6 Design and Variables of the Study

This study used the quasi-experimental design. The design for this experiment involved two groups; the experimental group, and the control group. Both groups were taught the same contents. For this study, there were two independent variables: the IBWP which was used to teach the experimental group, and the ordinary method which was used to teach the control group. The dependent variable was the EFL students' critical thinking skills.

2.7 Statistical Analysis

Quantitative data about students' critical thinking skills before and after the treatment was computed and reported using the holistic critical thinking scoring rubric developed by Facione and Facione (1994). Then, data was entered and analyzed using the Statistical Package for Social Science (SPSS). The Statistical techniques used in this study were Means, Standard Deviation, and One-way ANOVA.

2.8 Procedures of the Study

To achieve the purpose of this study, the researcher followed the following procedures:

1. Designing the Internet-based writing program IBWP.
2. Preparing the achievement writing tests (pretest and posttest).
3. Assessing the test validity by giving it to a group of experts.
4. Assessing the test reliability through a pilot study.
5. Obtaining permission of Salman bin Abdulaziz University and the Department of English.
6. Obtaining approval of the instructor who taught the two groups.
7. Administering the writing pretest to both the experimental group and the control group.
8. Implementing the IBWP on the experimental group and the ordinary method on the control group.
9. Administering the writing posttest to both groups under the same conditions.
10. Rating the results by the researcher and an instructor using Facione and Facione (1994) scoring rubric.
11. Finally, discussing the results, and providing a conclusion and recommendations.

3. *Findings of the Study*

This section reports the findings of the study that examined the effect of the IBWP on Salman bin Abdulaziz University students' critical thinking skills. To answer the question of the study, "What is the effect of the Internet-based instructional program on developing English major students' critical thinking skills at Salman bin Abdulaziz University?" means and standard deviations obtained by the experimental group and the control group on the critical thinking posttest were computed as presented in Table (2):

Table 22: Means, Standard Deviations and Number of Cases of Critical Thinking Posttest according to Group Variable

Dependent Variable	Group	N	Mean	Std. Deviation
Critical Thinking	Experimental	49	2.98	.721
(posttest)	Control	49	2.61	.731

Table (2) shows a slight variance in the means of the posttest according to group variable. The findings showed that there were differences in the scores attained by the experimental group (M = 2.98, SD = .721) and the scores achieved by the control group (M = 2.61, SD = .731). To find out whether there were statistical significant differences in these means, One-way ANOVA was conducted and the results are shown in Table (3):

Table (3): One-way ANOVA Results of Critical Thinking Posttest Related to Group Variable

Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.306	1	3.306	6.271	.014
Within Groups	50.612	96	.527		
Total	53.918	97			

Table (3) shows that there were statistically significant differences at (α= 0.05) in the critical thinking posttest due to Group variable, in favor of the experimental group [$F(1,96) = 6.271$, $p = .014$]. These results were in favor of the experimental group as the value in the "Sig. (2-tailed)" column is less than (α= 0.05).

4. *Discussion of the Findings*

The findings of the study showed that there were statistically significant differences between the experimental group and the control group in favor of the experimental group. This indicates that the Internet-based environment must have had a positive effect on the students' critical thinking skills. This study agreed with many research findings (Caplan, 2004; Dinevski & Plenković, 2002; Grafstein, 2007) which considered the Internet-based environment a suitable environment to enhance critical thinking skills at the university level. The high mean score of the experimental group was due to the implementation of the IBWP for several reasons:

First, students were required to search for information using search engines. One of the places where students had to use their critical thinking skills was in the area of searching for information on a given topic from the Internet sources. Gilster (1997) regarded critical thinking as the most important skill when using the Internet, because the Internet is full of false, incomplete, obsolete, etc. information. Therefore, including that the Internet contains an immense range of information that is posted by individuals and organizations, and the difficulty of ensuring the quality of this information (Li, Agarwal, Hadidi, & He, 2012). Students need to acquire critical evaluation skills which enable them to identify information that meets their needs. To achieve this, students were encouraged to compare and contrast different information using criteria including questioning the accuracy "Is this information accurate?", authority "Who is the author?", objectivity "Is the information biased?", authenticity "Is the information authentic?", timeliness "Is the information current?", relevance "Is the information helpful?", and efficiency "Is this information worth the effort?" (Kuhlthau, 2004).

Through the students' use of the previously mentioned questions, the researcher ensured the students' ability to use critical thinking skills when deciding what fit with the topic and left what did not throughout the vast amounts of information. Carter, Bishop, and Kravits (2007) described critical thinking as the process of collecting information, analyzing it in different ways, and evaluating the objective of gaining understanding, solving a problem, or making a decision. Rankin (1999) confirmed this, saying that good searchers show the ability to evaluate critically the information they are looking for and apply their judgment to the search process.

Second, the collaborative nature of text-based chat is thought to have improved students' critical thinking skills. The nature of text-based discussions was quite collaborative; this collaborative nature of text-based discussions made it a perfect place to collaborative activities that promote critical thinking skills. Arend (2009) stressed the importance of online discussions to enhance students' critical thinking. He provided, critical thinking should be the goal of most college courses, and online discussions should be utilized to encourage the use of critical thinking. In this study, the text-based discussion that took place among students in groups of four contributed to the enhancement of students' development in critical thinking, since it focused on exploring different views on a topic or concept. In the prewriting session students discussed each others' views and shared their own views with others.

Cooper (1995, p. 8) set forth that putting students in group learning situations is the best way to foster critical thinking. Cooper (1995) clarified "In properly structured cooperative learning environments, students perform more of the active, critical thinking with continuous support and feedback from other students and the teacher." Additionally, Internet-based discussions can give learners time for "thoughtful analysis, composition, negotiation, and reflection as their discussion of an issue evolves and allows instructors to model, foster, and evaluate the critical thinking skills exhibited during the discussion" (Yang, Newby, & Bill, 2005, p. 179).

Third, emphasis was placed on writing as a process of doing and thinking. Writing is a process that involves five distinct steps: prewriting, drafting, revising, editing, and publishing (Zamel, 1982). In this study, students were asked to brainstorm, gather data, outline, write first drafts, peer edit, and write second/final draft. They were required to reflect on the writing process as a mode of thinking and learning (Brand, 1987). The process of writing in the Internet-based discussions can help promote higher-level learning, (i.e., analysis, synthesis, and evaluation) and encourage more clear and precise thinking (Garrison, Anderson, & Archer, 2001).

The process of writing is known as a recursive process but not linear (Applebee, 1986; Susser,1994; Zamel, 1982).

Writers engage in a recursive process when writing and this process is regulated by distinct thinking processes that writers manipulate in their writing (Flower & Hayes, 1977). Writing is a recursive process in that the student can return to a previous stage of the writing process while working on a later stage. In other words, while students were revising their essays, they may find themselves thinking of new ideas that could be included in the essay. This suggests that critical thinking and its skills may be enhanced in the process of students' writing.

Fourth, students were given an array of tasks that stimulated critical thinking. The writing tasks used in this study included: (1) explaining, (2) problem-solving, (3) analyzing causes, (4) analyzing effects, (5) expressing opinion, (6) comparing and contrasting, and (7) evaluating. Students in the program were required to write essays about the different learning tasks. The researcher claims that when students wrote about these essays, their critical thinking skills were greatly developed.

The literature about writing in relation to critical thinking is consistent with the findings of this study. For example, Yang et al. (2005) stated, because reflection takes time, the online text-based discussion is more helpful to critical thinking than face-to-face discussions occurring in real time. As well, Dill (2003) concentrated a study on students' perceptions of the development of critical thinking skills in Internet-based learning environments. She discovered that students considered Internet-based courses as rich environments for the development of critical thinking skills and that there are learning activities that can boost those skills.

5 Conclusions

This study showed that students' critical thinking skills can be developed if they were taught using Internet-based writing programs. That means the Internet-base environment can be a natural fit for meaningful development of critical thinking skills. There were many reasons participated in developing students critical thinking skills. First reason, students were required to use their critical thinking skills while searching for information on a given topic from the search engines. Second reason, the collaborative nature of text-based chat is thought to have improved students' critical thinking skills. Third reason, the emphasis was placed on writing as a process of doing and thinking. The final reason, the writing tasks given to student required them to tap critical thinking skills.

6 Recommendations for Future Research

In light of the results of the study, the researcher recommends that it would be beneficial to replicate this study on other groups of the Saudi population at different educational levels. It would be helpful to have more participants from males and females in order to be able to provide more generalizable, precise and reliable findings on the effectiveness of Internet-based programs for improving EFL students' critical thinking skills. In addition, there is a need to investigate other Internet applications/tools to improve the students' critical thinking skills like facebook, twitter, blogs, and wikis. These areas are new and need further investigation.

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