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Collaborative Research-Based ESP Program to Enhance University Students' Critical Writing and Reflective Thinking Skills

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Abstract

The present research aimed at enhancing university students' critical writing and reflective thinking skills. This was achieved through applying a Collaborative Research-Based ESP Program. The research adopted two groups design with pre/post-test treatment. The sample consisted of 50 students. The following instruments were designed and used: A Critical Writing Skills Checklist (CWSC); A Critical Writing Skills Pre/Post Test (CWST); A Reflective Thinking Questionnaire (RTQ) and a Reflective Thinking Skills Pre/Post Test (RTST). Results of the research indicated that there were statistically significant differences at 0.05 level between the mean scores of the experimental group on the pre/post administrations of the pre/post-tests, the CWST and the RTST, in favour of the post ones. In addition, the experimental group students outperformed their counterparts in the control group students in the target skills. Consequently, the proposed Collaborative Research-Based ESP Program proved to be effective in developing critical writing and reflective thinking skills for university students.

Keywords: Differentiated Instruction, Multiple Intelligences, Critical Reading Skills.

Introduction and Overview

In today's global world, the importance of English cannot be denied or ignored since English is the most common language spoken everywhere. With the help of new technology, English has been playing a major role in many fields including education which is the most important field where English is needed. Consequently, English should be the medium of instruction at universities for various reasons including finding a high-quality job, communicating with the international world, and accessing scientific and academic sources in the students' major fields.

English is the most dominant used language due to globalization which supports interaction and communication among people. Therefore, various aspiring instructive changes have been implemented to profoundly integrate English into educational curricula to qualify the learners with the

skills needed everywhere in the world. The implementation of English in education and mainly on tat university level has become an urgent necessity through designing English courses to meet the needs of the diversified students of different specializations. This goal-directed approach is reached by the teaching of a special type of English commonly known as English for specific purposes, or simply ESP (Gohar, 2019).

English for Specific Purposes (ESP)

The field of ESP addresses the communicative needs and practices of particular professional or occupational groups. It has developed rapidly to become a major branch in the teaching and research of the English language. The strength of ESP is based on an eclectic theoretical foundation and a commitment to research-based language education which aims at revealing the limitations of social contexts in language use and how learners can gain control over these contexts through the various means of mastering the different language skills (Hyland, 2007).

ESP emphasizes the importance of writing since writing is an essential skill in many teaching and learning situations. ESP learners need to learn about their specialization, search, gather information, and thus achieve academic and professional success. For enhancing the development of writing in general and critical writing in particular, collaborative research-based ESP programs can be considered a relevant source for engaging students in critical writing and reflective thinking via works of art. Davis and Quinn (2018) stated that ESP programs can support various skills including writing and strengthen reflective thinking and synthesizing skills.

Paltridge & Starfield (2013) defined ESP as a learner-centered approach to teaching English, which focuses on developing communicative competence in a specific discipline such as academics, teaching, and engineering. Unlike many other research areas, ESP has been, at its core, a practitioners' movement, devoted to establishing, through careful research, the needs and relevant discourse features for a targeted group of students.

Milevica (2006) defined ESP as an “*approach*” rather than a “*product*”– meaning that ESP does not necessarily involve any particular kind of language, teaching material, or methodology. The fundamental function of ESP is: “Why does this learner need to learn a foreign language”

Belyaeva (2015) conducted a study to assess students’ attitudes towards studying ESP in the university and to determine the English language skills that are important for them. Participants were 439 second-year students from different faculties. Analyzing the collected data indicated

that students had a positive attitude towards ESP instruction. It was recommended that in order to address learners' specific needs, the content of the ESP should focus on both general (academic) and specialized English elements. The course should start as General English and then the focus can shift towards Specific Academic Purposes.

Nguyen (2017) conducted a study aiming at finding out the academic and occupational English language needs of ESP students from the perspectives of the students themselves and their ESP teachers in an attempt to meet the increased learning needs of students. Using a quantitative descriptive study, two questionnaires were undertaken with one hundred fifty-second-year students majoring in civil engineering and eight teachers who were currently working with ESP programs at this vocational college. The findings indicate that both teachers and students shared similar views on the need for tailoring the course contents and language skills to make the ESP courses appropriate and communicative to students with regard to quality

Critical Writing Skills

Critical writing is defined as an involvement in an academic debate. It requires a refusal to accept the conclusions of other writers without evaluating the arguments and the evidence they provide. It means not to accept information at face value (University of Leicester. Learning Development Centre, 2013).

Hyland (2013) referred to critical writing as a careful analysis of an argument to determine what is said, how well the points are made, what assumptions underlie the argument, what issues are overlooked, and what implications are drawn from such observations. It is a systematic, yet personal response and evaluation of what one reads.

Critical writing is a dynamic interaction of prior and new information to construct knowledge. Students can be positioned to acquire critical writing skills (Golding, 2011). However, while current writing models/approaches emphasize the importance of higher-order thinking in writing, only a few prioritize clear pedagogical processes for developing critical writing skills (Atherton, 2011). Further, critical writing development requires the use of practical, processed, and familiar methods that are grounded in academic literary perspectives (Çavdar and Doe, 2012).

Students may be very knowledgeable about a given subject or domain, but have difficulties applying their knowledge to the writing process (Hyland, 2013). Common critical writing difficulties among

students in higher education include weak or absent evaluation of theoretical assumptions, weak construction of arguments, lack of support for arguments, disorganized presentation of thoughts, lack of elaboration and integration, and lack of critical appraisal (Çavdar and Doe, 2012).

A major challenge for students is the development of writing skills needed to critique and process retrieved information (Çavdar and Doe, 2012). Santangelo et al. (2007) argued that this challenge in translating and developing information into critical writing stems from students' tendency to focus on generating content and neglecting evaluation and critical appraisal. Many student writers continue to emphasize the form and the mechanics, rather than the substance or the process of writing. The importance of critical writing in higher education is increasingly evident. There have been studies accomplished around the world to assess the value and contributions of critical writing skills in higher education classrooms (Santangelo et al., 2007).

Bailey et. al. (2015) conducted a study to highlight the importance of critical writing skills in developing reflective thinking skills, transforming knowledge, communicating expressions, and filling knowledge gaps. They suggested a 6-step process to develop critical writing. Development of critical writing is proposed to occur in a processed manner that transitions from presenting simple ideas in writing, to connecting ideas, formulating a thesis and connecting key components, supporting ideas with evidence, building creativity and originality, and finally, developing strong, integrated, critical arguments. Results of the study asserted that the process of planned instruction developed the students' critical writing. This progression involves a transformation in awareness, thinking, and understanding, as well as advancement in students' level of critical skills.

Ahmed (2018) conducted a study on critical thinking (CT) and critical writing (CW) skills as the core requirements required in Higher Education (HE). The study explored how a targeted intervention could potentially develop students' CT and CW. In particular, the study found that students required explicit instruction on how to apply and demonstrate these concepts in their assignments. Using an action research methodology with a random sample of 10 students, the research found effective strategies through the use of a targeted workshop as an intervention to develop students' CT and CW skills. Participant feedback revealed the workshop had a positive impact on all the students and highlighted the need for such interventions to equip students with the critical demands of studying.

Reflective Thinking Skills

Reflective thinking is a part of the critical thinking process referring specifically to the processes of analyzing and making judgments about what has happened. According to Kennison (2006), reflective thinking is an active, persistent, and careful consideration of a belief or a supposed form of knowledge and the further conclusions to which that knowledge leads. Learners control their learning by actively participating in reflective thinking – assessing what they know, what they need to know, and how they bridge that gap – during learning situations.

Reflective thinking gains a new dimension with today's technology and the relational aspect of the ideas emerges in the virtual environment. In addition, it is thought that technology could be used as a powerful tool to support reflective thinking. Reflective practices help to evaluate the learning processes. In this respect, one way to support the student during the process of problem-solving is to design activities that provide him with the opportunity for reflective thinking about a particular subject (Kennison, 2006).

The idea of setting aside time to allow students to reflect on their learning or teaching is echoed by Davies (2015). These authors stated that the ultimate purpose of reflection is to help students get into the habit of thinking about their experiences. Students must think about what they know and have learned and construct their own meaning. Being a reflective student can be a powerful tool to help students grow both academically and personally.

One method Davies (2015) suggested to help students learn to reflect is through research, gathering information, and doing tasks, either individually or in groups. They recommended setting aside time for students to openly discuss what they have learned, which, in turn, helps improve students' writing skills. Deciding to use reflection in the classroom is the easy part. The difficult part is determining when and how to use it, and in what context.

Reflective thinking skills can be enhanced through various techniques such as essay writing, collaborative work, cooperative activities, and peer discussion. Because of its importance, the intent of higher education to produce educated and reflective thinkers is increasingly evident. There have been studies accomplished around the world to assess the value and contributions of the reflective process in higher education classrooms. (Belland et. al., 2006)

Sinensis et. al. (2020) conducted a study to improve reflective thinking through collaborative problem-solving learning. The method used is descriptive quantitative analysis, a sample of 16 prospective teacher students. The instrument used in this study was a modified Kember reflective level scale. The research began with a pre-test to see the improvement of students' reflective thinking skills. The results showed that the application of collaborative problem-solving models can improve the ability of reflective thinking on high-level thinking.

Yaacob et. al. (2021) conducted a study that aimed to explore students' reflective thinking through collaborative learning. Drawing on multiple methods collected through focus group interviews, reflections, and online feedback, this paper examined the processes in which students develop their collaborative learning to provide peer feedback to improve each other's reflective thinking. Two moments of intervention were set during the project to improve students' critical questioning and reflective thinking. Overall, reflective thinking via collaborative learning promoted knowledge sharing, enhances pedagogical methods and theory, increased understanding of learner characteristics, and fostered professional self-development.

Collaborative Research-Based Instruction (CRBI)

Today's society is knowledge-based. In such a society, key markers of education include research-based learning in which collaborative efforts are highly required to solve a wide variety of complex problems (Reigeluth & Karnopp, 2013). In response to the emerging learning needs, one needs to work and learn collaboratively to deal with this complexity. This can be accomplished through a variety of instructional approaches including effective collaborative learning. More specifically, one approach that has been used is research-based instruction which increases student engagement through learning-by-doing as well as by offering opportunities for collaboration (Reigeluth, 2012).

Of the many possible approaches, collaborative research-based instruction (CRBI) is regarded as one of the most widely utilized approaches. CRBI is a multidisciplinary approach for developing a wide spectrum of knowledge, in which individual specialties are involved during the research (Barron & Darling-Hammond, 2010). Research substantiates that CRBI promotes student content knowledge (Walker & Leary, 2009), student engagement (Brush & Saye, 2008), problem-solving, collaboration, and communication skills (Harada, Kirio, & Yamamoto, 2008).

Collaborative RBI is a learner-centered approach that entails students performing research together aiming at learning through helping each other on the same tasks. CRBI is the active exchange of ideas within small groups which not only increases interest among the participants but also promotes reflective thinking as well. There is persuasive evidence that collaborative teams achieve at higher levels than students who work quietly as individuals and thus become critical thinkers (Stein & Hurd, 2000).

Putri and Sela (2010) conducted a study to investigate the impact of the research-based instruction method on the students' critical thinking skills in writing. A case study was implemented to reach the conclusion. Fifty (50) Global Class students majoring in Information systems were observed to gain the result. Questionnaire result was used to support the observation data. The result showed there was an improvement in students' critical thinking in writing after joining the class. Further, the result also found the method may help the students sharpen their 21st Century skills such as collaboration and communication.

Webb and Chang (2015) carried out a study to examine the effect of students' research and prior writing knowledge on their written essay quality. To do so, 60 students were grouped into high, intermediate, and low-level groups based on the scores which they achieved on pretests. Findings indicated that students' writing quality has been improved as a result of their improvement in prior knowledge based on their research. Conclusions in this study further suggested that this was because prior knowledge has a large effect on the size of learned words made through extensive research which in turn incorporated in enriching the growth of the writing skills.

Despite these advantages, most of the research studies on CRBI have been done at the primary and secondary levels. Yet, there is little empirical evidence of its effectiveness at the college level. The present study was designed to study the impact of using a collaborative research-based ESP program as it relates to learning outcomes at the college level.

Background of the problem

University students often remain intimidated and unmotivated to handle writing tasks in their academic pursuits. While writing, students always face a multitude of obstacles in the streams known as language skills. More specifically, one can agree to a certain point that the learners have poor learning background in critical writing and reflective thinking

skills. Thus, this study is an attempt to improve critical writing skills and reflective thinking skills among ESP learners.

A pilot study was conducted to assess university students' ESP critical writing and reflective thinking skills. A Critical Writing Skills Test (CWST) and a Reflective Thinking Skills Test (RTST) were designed and applied to a group of the Faculty of Fine Arts students (N=100). The maximum score of the items in each test was (50) marks (10 marks for each of the five skills). Results of the pilot study are presented in table (1) and table (2):

Table (1): Students' Score on the Critical Writing Skills Test (CWST)

Critical Writing Skills	score	Min.	Max.	Mean	SD	%
Suggesting an independent point of view.	10	1	6	3.66	1.10	36.6%
Presenting reasons to defend a particular finding.	10	1	6	3.77	1.07	37.7%
Showing relevance between pieces of information.	10	1	6	3.63	1.03	36.3%
Judging the value (strengths and weaknesses) of ideas.	10	1	6	3.70	1.06	37%
Providing supporting evidence based on research.	10	1	6	3.52	0.99	35.2%
Total	50	8	27	18.30	2.83	36.6%

Results of the Critical Writing Skills Test (CWST) indicated that University Students had a relatively low level of critical writing skills.

Table (2): Students' Score on the Reflective Thinking Skills Test (RTST)

Reflective Thinking Skills	score	Min.	Max.	Mean	SD	%
Stating general assumptions to reach a specific purpose.	10	1	6	3.65	1.17	36.5%
Producing logical and relevant interpretations.	10	1	7	3.63	0.94	36.3%
Judging the relevance and irrelevance of information.	10	1	6	3.58	1.06	35.8%
Identifying changes and patterns of thoughts.	10	1	7	3.72	1.19	37.2%
Exploring the available options concerning the writing task.	10	1	6	3.43	0.97	34.3%
Total	50	10	29	18.08	3.29	36.1%

Results of the Reflective Thinking Skills Test (RTST) indicated that University Students had a relatively low level of reflective thinking skills.

Statement of the problem

Based on the results of the pilot study and the review of related literature, it was noticed that university Students needed to improve their critical writing and reflective thinking skills. Thus, the current study suggested using a Collaborative Research-Based ESP Program (CRBP) to enhance university students' critical writing and reflective thinking skills.

Questions of the study

This study was an attempt to answer the following main question:

What is the impact of the proposed Collaborative Research-Based ESP Program (CRBP) on enhancing University Students' Critical Writing and Reflective Thinking Skills?

For research purposes, this main question is subdivided into the following questions:

- (1) What are the most important ESP Critical Writing Skills (CWS) needed for university students?
- (2) What are the most important ESP Reflective Thinking Skills (RTS) needed for university students?
- (3) What are the features of the Collaborative Research-Based ESP Program to enhance university students' critical writing and reflective thinking skills?
- (4) To what extent can CRBP enhance University Students' Critical Writing Skills?
- (5) To what extent can CRBP enhance University Students' Reflective Thinking Skills?

The Purpose

The main purpose of this study was to improve the necessary ESP Critical Writing and Reflective Thinking Skills for university students through the proposed ESP program; Collaborative Research-Based ESP Program (CRBP).

Significance

The present study derived its significance from the following considerations:

- (1) It suggests an effective approach to the teaching of Critical Writing Skills through using CRB ESP Program.

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- (2) It provides the instructors with an attempt to integrate Collaborative Research-Based ESP program into the teaching/learning process.
 - (3) It might contribute to increasing instructors' awareness of incorporating critical writing skills, reflective thinking skills, and student-centered strategies into their teaching methods and benefiting from this knowledge in their learning/ teaching process.
 - (4) It might assist students themselves through raising their awareness of the recent learning methods to develop their critical writing and reflective thinking skills as well as their positive attitude towards learning collaboratively.

Delimitations

The study was delimited to:

- (1) A sample of students (N=100) registered in the first year at the Faculty of Fine Arts, Mansoura University in the academic year 2020-2021.
- (2) Some critical writing skills required from the target participants (namely suggesting an independent point of view, presenting reasons to defend a particular finding, showing relevance between pieces of information, Judging the value (strengths and weaknesses) of ideas, and providing supporting evidence based on research).
- (3) Some reflective thinking skills required from the target participants (namely stating general assumptions to reach a specific purpose, producing logical and relevant interpretations, judging the relevance and irrelevance of information in a written task, identifying changes and patterns of thoughts, and exploring the available options concerning the writing task).

Hypotheses

The present study tested the following hypotheses:

1. There is a statistically significant difference at (0.05) level between the mean scores of the experimental group students and those of the control group students on the post-administration of the Critical Writing Test in favor of the experimental group.
2. There is a statistically significant difference at (0.05) level between the mean score of the pre and post administration of the Critical Writing Test of the experimental group students in favor of the post administration.
3. There is a statistically significant difference at (0.05) level between the mean scores of the experimental group students and those of the control

group students on the post-administration of the Reflective Thinking Test in favor of the experimental group.

4. There is a statistically significant difference at (0.05) level between the mean score of the pre and post administration of the Reflective Thinking Test of the experimental group students in favor of the post administration.

Methodology

Participants

The participants of the study were a group of ESP University Students (N=100) selected from the First Year Students at the Faculty of Fine Arts, Mansoura University. Those participants were divided into two groups: the experimental group and the control group.

Design

The study adopted the quasi-experimental design in terms of dividing the participants of the study into two groups: experimental and control. The experimental group was trained using the proposed ESP program (CRBP) while the control group used the regular method. The adopted quasi-experimental design (see figure 1) in this study (pre-post test) was as follows:-

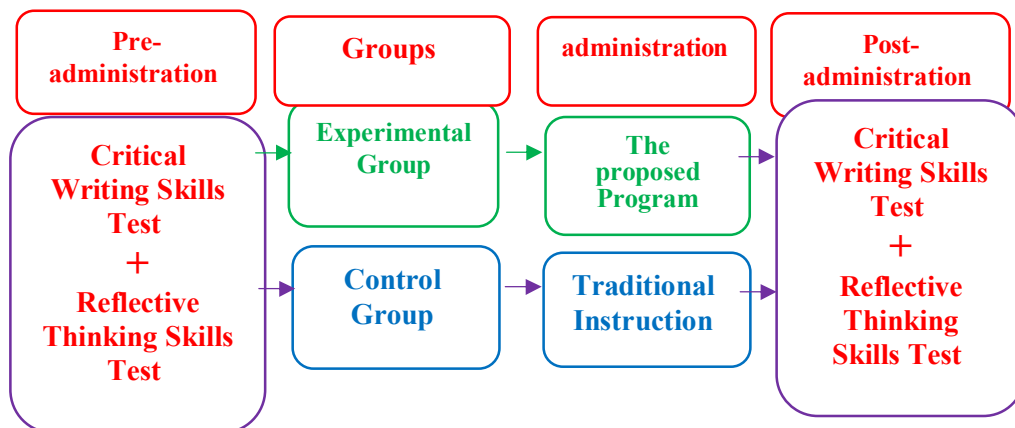


Figure (1): CRB ESP Experimental Design

Instruments

The present study employed the following instruments:

- 1- A Critical Writing Skills Checklist (CWSC) to identify which of the Critical Writing Skills were needed for ESP University Students.

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- 2- A Critical Writing Skills Test (CWST) and a rubric were designed and used to assess and score students' critical writing performance.
 - 3- A Reflective Thinking Skills Questionnaire (RTQ) to identify which of the reflective thinking skills were needed for ESP University Students.
 - 4- A Reflective Thinking Skills Test (RTST) and a rubric were designed and used to assess and score students' reflective thinking performance.

Procedures

To answer the research questions, the following procedures were adopted: -

- 1- Reviewing the relevant literature and the previous studies related to the variables of the study.
- 2- Designing the checklist of ESP Critical Writing skills to determine the most important skills for the target participants and validate it by jurors.
- 3- Preparing the instruments of the study (Critical Writing Skills Test, The Rubric and the Reflective Thinking Skills Test and the Questionnaire).
- 4- Establishing the validity and reliability of the instruments.
- 5- Designing the proposed ESP program.
- 6- Selecting the participants of the study from the Faculty of Fine Arts, Mansoura University.
- 7- Administering the Critical Writing skills Pre-Test.
- 8- Administering the Reflective Thinking Skills Pre-Test.
- 9- Administering the proposed ESP program on the participants.
- 10- Administering the Critical Writing skills post-test.
- 11- Administering the Reflective Thinking Skills post-test.
- 12- Analyzing the data statistically.
- 13- Reporting results, making conclusions, and suggesting recommendations.

Definition of terms

Collaborative Research-based Instruction

Collaborative Research-based ESP Program is operationally defined in the present study as learning tasks or activities where students work together in teams small enough for everyone to participate on a collective

task that has been clearly assigned. Each student can then achieve his or her learning goal if the team members achieve theirs.

English for Specific Purposes (ESP)

ESP is operationally defined in the present study as the movement that seeks to serve the language needs of learners who need English in order to carry out specific roles (e.g. student, engineer, nurse) and who need to acquire content and real-world skills through it rather than master the language for its own sake.

Critical Writing

Critical writing is operationally defined in the present study as the process of actively using the previously gained information throughout the research process to derive a new understanding, to increase students' proficiency in critical writing and thinking, to increase students' proficiency in assessing and evaluating information, to facilitate team writing and to control Bias and Plagiarism.

Reflective Thinking

Reflective thinking is operationally defined in the present study as the skills that can be enhanced throughout various techniques including essay writing, cooperative activities and team and/or peer discussion in order to reach new understanding, appreciation, solving problems, and judgments. Reflective thinking asks students to think about and respond to the learning.

Statistical Analysis and Results

The results of the research are discussed in light of the statistical analysis of each instrument. A discussion of the results is provided after each statistical analysis as well as a discussion of the overall results.

Establishing the homogeneity of the groups

To establish the homogeneity of both the experimental and the control group, two pre (*t*) tests were administered. One is for critical writing and the other is for reflective thinking skills. The following table (3) shows the results of the pre (*t*) test concerning critical writing skills:

Table (3): Comparing the mean scores of students' Performance in the Critical Writing Skills Pre-Test in both Groups

Skills	The group	No. of cases	Means	S. D	df	t. Value	Sig.
Suggesting an independent point of view	Control	50	3.30	0.814	98	1.082	0.282 Not Sig.
	Experimental	50	3.12	0.849			
Presenting reasons to defend a particular finding	Control	50	2.72	0.757	98	-0.538	0.591 Not Sig.
	Experimental	50	2.80	0.728			
Showing relevance between pieces of information	Control	50	2.60	0.808	98	-0.252	0.801 Not Sig.
	Experimental	50	2.64	0.776			
Judging the value (strengths and weaknesses) of ideas	Control	50	2.74	0.853	98	-0.491	0.624 Not Sig.
	Experimental	50	2.82	0.774			
Providing supporting evidence and arguing an opinion based on research	Control	50	2.48	0.886	98	-0.464	0.644 Not Sig.
	Experimental	50	2.56	0.837			
All Test	Control	50	13.84	3.053	98	-0.164	0.870 Not Sig.
	Experimental	50	13.94	3.060			

It is evident from the results of table (3) that there are no statistically significant differences between the mean scores of the students of the experimental and control groups in all the skills of the critical writing skills test in the pre-application and in the total score of the test, as all the values of (*t*) were not statistically significant. This means that the two groups are homogeneous before applying the program to them. This result indicates that the students were at the same level before the implementation of the proposed learning program.

The following table (4) shows the results of the pre (*t*) test concerning reflective thinking skills:

Table (4): Comparing the mean scores of students' Performance in the Reflective Thinking Skills Pre-Test in both Groups

Skills	The group	No. of cases	Means	S. D	df	t. Value	Sig.
Stating general assumptions to reach a specific purpose	Control	50	0.64	0.942	98	-0.211	0.834 Not Sig.
	Experimental	50	0.68	0.957			
Producing logical and relevant interpretations	Control	50	0.32	0.741	98	0.277	0.782 Not Sig.
	Experimental	50	0.28	0.701			
Judging the relevance and irrelevance of information in a written task	Control	50	1.12	1.003	98	-0.200	0.842 Not Sig.
	Experimental	50	1.16	0.997			
Identifying changes and patterns of thoughts	Control	50	1.64	0.776	98	0.960	0.339 Not Sig.
	Experimental	50	1.48	0.886			
Exploring the available options concerning the writing task	Control	50	0.96	1.009	98	1.639	0.105 Not Sig.
	Experimental	50	0.64	0.942			
All Test	Control	50	4.64	1.687	98	1.298	0.197 Not Sig.
	Experimental	50	4.24	1.379			

It is evident from the results of table (4) that there are no statistically significant differences between the mean scores of the students of the experimental and control groups in all the skills of the reflective thinking skills test in the pre-application and in the total score of the test, as all the values of (*t*) were not statistically significant. This means that the two groups are almost identical before applying the program to them. This result indicates that the students were at the same level before the implementation of the proposed program.

Results of the Statistical Treatment

To investigate the change fostered by the implementation of the proposed program employing Collaborative Research-Based ESP Program on the target students' performance in the critical writing and reflective thinking skills tests, the hypotheses of the study were tested. The following section tests each hypothesis individually.

Testing the Hypotheses

Hypothesis One

“There is a statistically significant difference at (0.05) level between the mean scores of the experimental group students and those of the control group students on the post-administration of the Critical Writing Test in favor of the experimental group”.

To investigate the change fostered by the implementation of the proposed learning program employing CRB ESP on the experimental students' performance in critical writing skills and to compare their post level of skill performance developed by the proposed learning program, a *t*-test for the paired sample was used to determine any statistical differences between the students' mean scores on the post test. These findings are presented in table (5).

Table (5): Comparing the mean score of students' Performance in the Critical Writing Skills Post Test in both groups

Skills	The group	No. of cases	Means	S. D	df	<i>t</i> . Value	Sig.
Suggesting an independent point of view	Control	50	4.28	0.671	98	-	0.05
	Experimental	50	7.60	0.571			
Presenting reasons to defend a particular finding	Control	50	3.62	0.567	98	-	0.05
	Experimental	50	7.30	0.789			
Showing relevance between pieces of information	Control	50	3.32	0.621	98	-	0.05
	Experimental	50	6.92	0.829			
Judging the value (strengths and weaknesses) of ideas	Control	50	3.96	0.669	98	-	0.05
	Experimental	50	7.14	0.729			
Providing supporting evidence and arguing an opinion based on research	Control	50	3.44	0.675	98	-	0.05
	Experimental	50	7.16	0.792			
All Test	Control	50	18.62	1.999	98	-	0.05
	Experimental	50	36.12	2.738			

The statistical results of table (5) show that there are statistically significant differences between the mean scores of the experimental and control groups in all skills of the critical writing skills test and the overall score of the test in the post administration in favor of the experimental group (Mean = 36.12). All the values of (*t*) were statistically significant at 0.05 level. These results agree to the first hypothesis and confirm its validity. The researcher attributes these differences to the proposed program.

Hypothesis Two

“There is a statistically significant difference at (0.05) level between the mean score of the pre and post administration of the Critical Writing Test of the experimental group students in favor of the post administration”.

To investigate the change fostered by the implementation of the proposed learning program employing CRB ESP on the experimental students' performance in critical writing skills and to compare their post level of skill performance developed by the proposed learning program, a *t*-test for the paired sample was used to determine any statistical differences between the students' mean scores on the pre-post test. These findings are presented in table (6).

Table (6): Comparing the mean score of the Experimental Group Students' Performance in the Critical Writing Skills Pre/Post Test

Skills	The group	No. of cases	Means	S. D	df	<i>t</i> . Value	Sig.
Suggesting an independent point of view	pre – test	50	3.12	0.849	49	-31.211	0.05
	post – test	50	7.60	0.571			
Presenting reasons to defend a particular finding	pre – test	50	2.80	0.728	49	-29.633	0.05
	post – test	50	7.30	0.789			
Showing relevance between pieces of information	pre – test	50	2.64	0.776	49	-25.675	0.05
	post – test	50	6.92	0.829			
Judging the value (strengths and weaknesses) of ideas	pre – test	50	2.82	0.774	49	-28.864	0.05
	post – test	50	7.14	0.729			
Providing supporting evidence and arguing an opinion based on research	pre – test	50	2.56	0.837	49	-31.575	0.05
	post – test	50	7.16	0.792			
All Test	pre – test	50	13.94	3.060	49	-39.998	0.05
	post – test	50	36.12	2.738			

Findings in the previous table indicate that there are statistically significant differences between the mean scores of the experimental group students in the pre and post applications in all skills of the critical writing skills test and the overall score in favor of the post application (the highest average), where all the values of (*t*) are statistically significant at a level of significance (0.05) and a degree of freedom (49). These results are consistent with the second hypothesis and confirm its validity. The researcher attributes these differences to the program or strategy. This proves that the proposed learning program was effective in developing the identified critical writing skills.

Estimating the Effect Size (η^2)

To calculate the effect size, the researcher used the effect size scale (η^2) as shown in table (7).

Table (7): Values of (η^2) and the effect size of the treatment on the Critical Writing skills

Skills	η^2	Effect size
Suggesting an independent point of view	0.952	High
Presenting reasons to defend a particular finding	0.947	High
Showing relevance between pieces of information	0.931	High
Judging the value (strengths and weaknesses) of ideas	0.944	High
Providing supporting evidence and arguing an opinion based on researching	0.953	High
Total Test	0.97	High

The table above shows the effectiveness of the proposed program on the overall score for testing critical writing skills and its sub-skills, where the values of (η^2) ranged from (93.1%) for the sub skill (Showing relevance between pieces of information) to (95.3%) for the sub skill (Providing supporting evidence and arguing an opinion based on research). Results also show that the effect size of the proposed program on the students' performance in the critical writing skills test and its components is high (97%). These results indicate that the total variance in the critical writing sub skills and the total test can be attributed to using the Collaborative Research-Based ESP program and this indicates the effectiveness of the proposed program.

Hypothesis Three

"There is a statistically significant difference at (0.05) level between the mean scores of the experimental group students and those of the control group students on the post-administration of the Reflective Thinking Test in favor of the experimental group".

To verify the results gained from the post test and to present a stronger proof of such improvement, the researcher compared the mean scores of the post test of the students in the two groups (the experimental and the control) composing the reflective thinking skills test. The results of this investigation are shown in tables (8).

Table (8): Comparing the mean score of students' Performance in the Reflective Thinking Skills Post Test in both Groups

Skills	The group	No. of cases	Means	S. D	df	t. Value	Sig.
Stating general assumptions to reach a specific purpose	Control	50	0.84	0.997	98	-5.817	0.05
	Experimental	50	1.80	0.606			
Producing logical and relevant interpretations	Control	50	0.68	0.957	98	-6.199	0.05
	Experimental	50	1.72	0.701			
Judging the relevance and irrelevance of information in a written task	Control	50	0.96	1.009	98	-5.418	0.05
	Experimental	50	1.84	0.548			
Identifying changes and patterns of thoughts	Control	50	1.28	0.970	98	-4.320	0.05
	Experimental	50	1.92	0.396			
Exploring the available options concerning the writing task	Control	50	0.92	1.007	98	-4.299	0.05
	Experimental	50	1.68	0.741			
All Test	Control	50	4.68	0.957	98	-21.758	0.05
	Experimental	50	8.96	1.009			

The statistical results of table (8) show that there are statistically significant differences between the mean scores of the experimental and control groups in all the skills of testing reflective thinking skills and the overall score of the test in the post administration in favor of the experimental group (the highest average), where all the values of (t) were statistically significant. These results agree to the third hypothesis and confirm its validity. The researcher attributes these differences to the proposed program.

Hypothesis Four

“There is a statistically significant difference at (0.05) level between the mean score of the pre and post administration of the Reflective Thinking Test of the experimental group students in favor of the post administration”.

Table (9): Comparing the Experimental Group Students' Performance in the Reflective Thinking Skills Pre/Post Test

Skills	The group	No. of cases	Means	S. D	df	<i>t</i> . Value	Sig.
Stating general assumptions to reach a specific purpose	pre – test	50	0.68	0.957	49	-7.897	0.05
	post – test	50	1.80	0.606			
Producing logical and sensible interpretations	pre – test	50	0.28	0.701	49	-11.225	0.05
	post – test	50	1.72	0.701			
Judging the relevance and irrelevance of information in a written task	pre – test	50	1.16	0.997	49	-5.024	0.05
	post – test	50	1.84	0.548			
Identifying changes and patterns of thoughts	pre – test	50	1.48	0.886	49	-3.718	0.05
	post – test	50	1.92	0.396			
Exploring the available options concerning the writing task	pre – test	50	0.64	0.942	49	-7.286	0.05
	post – test	50	1.68	0.741			
All Test	pre – test	50	4.24	1.379	49	-22.267	0.05
	post – test	50	8.96	1.009			

It is evident from the results of table (9) that there are statistically significant differences between the mean scores of the experimental group students in the pre and post administration in all the skills of testing reflective thinking skills and the overall score in favor of the post administration (the upper average), where all the values of (*t*) are statistically significant. These results are consistent with the fourth hypothesis and confirm its validity. The researcher attributes these differences to the proposed program.

To verify the significance of the differences between the pre-post test scores and the scores of its two groups, the effect size of the treatment, the proposed program was estimated.

Estimating the Effect Size (η^2)

To calculate the effect size of the proposed learning program, the square of Eta (η^2) was estimated from the *t*-value. Results are presented in table (10).

Table (10) Values of (η^2) and the effect size of the treatment on the Reflective Thinking Skills

Skills	η^2	Effect Size
Stating general assumptions to reach a specific purpose.	0.56	High
Producing logical and relevant interpretations.	0.72	High
Judging the relevance and irrelevance of information.	0.34	High
Identifying changes and patterns of thoughts.	0.22	High
Exploring the available options concerning the writing task.	0.52	High
Total Test	0.91	High

Table (10) shows the impact of the proposed program on the overall score for testing reflective thinking skills and its sub-skills, where the values of (η^2) ranged from (22%) for the sub skill (Identifying changes and patterns of thoughts) to (72%) for the sub skill (Producing logical and sensible interpretations). Results shown in the previous table reflect that the effect size of the proposed learning program on the students' performance in the reflective thinking skills test and its components is high (91%). These results indicate that the total variance in the reflective thinking sub skills and the total test can be attributed to using the Collaborative Research-Based ESP program and this indicates the effectiveness of the proposed program.

Results shown above indicate that the differences between the students' mean scores in each skill of the critical writing and reflective thinking skills tests are significant at 0.05 level. It is obvious that the students have achieved greater improvement in the targeted skills. This can be attributed to the proposed program as well as the nature of critical writing and reflective thinking skills as productive skills. The overall improvement of students' performance can be attributed to their interest and need to learn these skills (critical writing and reflective thinking skills) for their academic study.

These results indicate high percentages which reflect high variance because they are higher than the minimum limit percentage (80% > 15%). (Abo-Hatab & Sadek, 1991)

Based on the results of the *t*-test shown in the previous tables and the results of the effect size shown in tables (7) and table (10), the hypotheses of the study are consequently accepted.

In addition to the statistical/quantitative results, the following qualitative analysis could be revealed:

The clear and systematic stages of the applied program helped the students to follow the instructor and to know exactly what they were supposed to do in each stage. Students were given the chance to ask questions, get feedback, and use their sense of humor the thing that made them behave normally. This, in turn, provided the opportunity for the researcher to observe the students' behaviour and how they reacted to the various situations. These observations led to the following qualitative results:

- The students of the experimental group paid more attention to the lessons where they worked collaboratively and confronted new activities. They actively cooperated with their peers. They were more enthusiastic in discussing their essays during the sessions even for low-achievers compared to the control group.
- Another significant result during the implementation of the proposed program was that students shared their points of strength through helping each other and making good use of their potential.
- Students enjoyed being more appropriately challenged to their ability level and generally increased motivations and performance. They became more engaged in learning as they used learning models that match their strengths.
- The concept of students working in groups promoted a setting where collaboration and cooperation are valued and produce better results.
- Compared to the experimental group, it was noticed that almost all of the students of the control group felt bored being seated quietly listening to one another with no effort to get the meaning. This, in turn, resulted in poor performance and a lack of understanding.
- Many students of the control group lacked interactivity, cooperation and enthusiasm. They had few opportunities to practice group dynamics and teamwork. They did not have enough opportunities to gain deeper levels of understanding.
- Students of the control group felt that their potentials are not valued by the teacher the thing that resulted in low learning performance and failing the objectives of the lessons.

Discussion of Results

The results discussed above reveal that there is an obvious improvement in the identified critical writing and reflective thinking skills of the experimental group on the post administration of the proposed program; Collaborative Research-Based ESP program as follow:

1. There is a statistically significant difference at (0.05) level between the mean scores of the experimental group students and those of the control group students on the post-administration of the Critical Writing Test in favor of the experimental group.
2. There is a statistically significant difference at (0.05) level between the mean score of the pre and post administration of the Critical Writing Test of the experimental group students in favor of the post administration.
3. There is a statistically significant difference at (0.05) level between the mean scores of the experimental group students and those of the control group students on the post-administration of the Reflective Thinking Test in favor of the experimental group.
4. There is a statistically significant difference at (0.05) level between the mean score of the pre and post administration of the Reflective Thinking Test of the experimental group students in favor of the post administration.

It is worth mentioning here that the experimental treatment took place in a collaborative environment. This factor helped the students participate in the proposed program through their fruitful and creative discussion. Furthermore, they expressed willingness to improve their critical writing and reflective thinking skills to become able to express their ideas and suggested solutions by responding to the different activities that document their efforts.

Based on the obtained results of the present study, it was concluded that the proposed program was effective in developing the critical writing and reflective thinking skills for the participants. This was an indication to the effect of the proposed program on developing the participants' targeted skills. In addition, students' overall achievement was satisfactory as no one failed. For this reason, the study joins and adds to the other studies that have investigated similar approaches for developing various aspects of learning and a variety of skills.

Moreover, discussing the obtained results of this research revealed that they are in line with those of many related studies and supported by a certain theoretical background that places more emphasis on the necessity of acquiring critical writing and reflective thinking skills in an authentic and constructivist environment. The results of this research go along with the results of the study conducted by Yacob and Yunus, (2019). The results are also consistent with the results of the research conducted by Revani and Theosebés (2018), Noh and Yusuf (2018), Talib's and Cheung's (2017), and Ghanizadeh (2017). Additionally, the results of this research are consistent with the results of the studies conducted by Sedhu, Choy and Lee (2015), Puzio and Colby (2013), and Marzano (2007).

Thus, CRB approach proved effective in contextualizing English critical writing in particular and language skills in general. Besides, CRB proved successful in making students go beyond the limits of traditional thinking through various activities which enabled them to think reflectively and write critically. Hence, it was illustrated that CRB ESP learning program involves several aspects of learning like active, autonomous, reflective, argumentative, cooperative and collaborative learning. It is mainly based on hands-on learning and learning by doing.

The proposed program was used to appeal to students' interests, readiness and learning profiles. Research and collaboration provide the students with the opportunity to learn according to their own path and to learn by doing through hands-on activities which result, in turn, in improving their imagination, creativity, inquiry and high-level thinking. Hence, it was illustrated that CRB ESP learning program involves several aspects of learning like active, autonomous, reflective, argumentative, cooperative and collaborative learning. It is mainly based on hands-on learning and learning by doing.

To sum up, the previous discussion revealed that all hypotheses of this research were accepted and proved that collaborative research-based learning was effective in developing the ESP students' critical writing and reflective thinking skills.

Recommendations of the research

With reference to the experimental evidence provided throughout the present research and its conclusions, the following recommendations are suggested:

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- It is recommended to use CRB ESP learning program as a medium for learning to develop the identified skills and English language skills in general.
 - It is suggested as well to apply the proposed program on students studying at other stages rather than university students.
 - It is of high importance to explore, enhance and develop critical writing and reflective thinking skills in English. Hence, it is highly recommended to equip students with competencies that would assist them in their academic studies and career later on.
 - It is also very beneficial to apply an authentic, reflective, active, autonomous and cooperative approach that yields very often positive outcomes. Thus, it is recommended to incorporate the CRB ESP learning program in the student's textbook to assist students in the learning process.
 - It is of paramount value to employ CRB ESP learning activities or other equivalent forms of activities in learning the English language or other subjects in accordance with the current teaching trends.
 - It is also of great importance to apply CRB ESP learning program since it has proved to be efficient in increasing levels of autonomy, cooperative and self-directed learning.
 - It is also beneficial to broaden instructional repertoires to include strategies drawing on a wider variety of tasks since incorporating hands-on activities into classroom instruction can lead to great advances in the learning process.
 - It is very necessary to integrate varied activities based on students' specialization to help students find personal meaning in their studies and their learning will be greatly enhanced.
 - Both ESP teachers and students should be aware of the importance of working collaboratively on a given task. Collaborative learning and its applications should be taught as an integral part of the methodology in teacher education programs.
 - Activities, exercises, and tests included in ESP should be built on the lines of the students' specialization and future career. They should provide hands-on experience for students.

Suggestions for Further Research

In the light of the previous recommendation, the following can be considered for future research:

- The study measures the impact of CRB ESP learning program by investigating the development of university students' critical writing and reflective thinking skills. Research could use the proposed program to develop other English language skills such as academic writing, selective reading, purposeful listening and oriented speaking skills for other students.
- The present study focuses on the effect of CRB ESP learning activities on developing university students' critical writing and reflective thinking skills. Research could dig into using online activities to develop these skills for other students in different stages.
- A research study is needed to evaluate the curriculum of ESP to explore whether or not they provide for targeted specialization and students' career.
- Investigating the effectiveness of CRBI in increasing student's proficiency in English and improving their attitudes towards the English language.
- This study could be replicated in secondary, intermediate or primary stages to provide more generalizability about the effect of CRBI on students' achievement.
- Further research could be conducted on designing complete courses using the CRB ESP learning program.
- Further research will be needed to investigate the effectiveness of CRB ESP activities in enhancing the English learning skills – reading, listening and speaking separately.

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