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An exploration into the impact of WebQuest-based classroom on EFL learners' critical thinking and academic writing skills: a mixed-methods study

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ABSTRACT

The present study explored the impact of WebQuest-based classroom on EFL learners' critical thinking and academic writing skills by collecting and analysing the data through a sequential explanatory mixed-methods approach. Two intact classes, each with ten EFL learners, attending an IELTS course at a language institute in Sanandaj, Iran, took part in the study. California Critical Thinking Skills Test form B was used to assess the participants' critical thinking skills, IELTS academic writing task 1 and task 2 were used to assess their academic writing skills, a semi-structured interview was conducted to assess their perceptions towards the impact ofy the WebQuest-based classroom on critical thinking and academic writing skills, and the researcher/instructor journals were used to contribute to the qualitative findings. One-way MANOVA and one-way MANCOVA were used to analyse the quantitative data. The results revealed that both the WebQuest-based and the face-to-face classrooms developed the learners' critical thinking and academic writing skills, while the former outperformed the latter both in post- and delayed post-tests (i.e. short and long term effects) and took fewer sessions to cover the required materials. In addition, thematic analysis, used to analyse the qualitative data, uncovered a number of themes which addressed the learners' positive perceptions towards the impact of the WebQuest-based classroom.

1. Introduction

1.1. Active and student-centred learning

One of the most important goals in education is to create a student-centred learning environment in which students manage their own learning (Cannon & Newble, 2000; Shea et al., 2012). The characteristics of a student-centred

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learning environment is that students are independent and responsible for their own learning, the teacher has a coaching role, and knowledge is regarded as a tool instead of an aim (Dochy, Segers, Gijbels, & Van den Bossche, 2002). In traditional lectures, on the other hand, the students' role is passive, which might cause learning difficulties (Bligh, 2000). Although, conducting traditional lectures is not much demanding for educators and teachers, it is a challenge for educators and teachers to design and conduct student-centred learning environments as they are not sufficiently prepared and supported in this regard (Brush & Saye, 2000).

Online applications have addressed such challenges by providing an active and student-centred learning environment (e.g. Chen, Shih, & Liu, 2015; Ebadi & Rahimi, 2017; Ravid, Kalman, & Rafaeli, 2008; Zorko, 2009). In online learning approaches students are able to complete their pre-class assignments, so that they are more active and successful in class activities. In such approaches the instructor facilitates the students' problem-solving activities, and require them to use the knowledge they had gained through the completion of their assignments (Milman, 2012). In addition to student-centeredness, online applications help instructors check students' collaborative learning processes in general and collaborative writing processes in particular by analysing user behaviours, such as students' amount of editing, participation equality, and their link to writing outcomes (Yim & Warschauer, 2017). However, students need to acquire relevant sophisticated information literacies in order to appropriately deal with such online applications and e-learning environments (Macgregor & McGill, 2005).

1.2. WebQuests

A form of online active learning strategy is using WebQuests. WebQuests is regarded as an enquiry-oriented activity (Dodge, 2001) that is based on the principles of the constructivist educational theory (March, 1998). As March (2004) put it:

> A WebQuest is a scaffolded learning structure that uses links to essential resources on the World Wide Web and an authentic task to motivate students' investigation of a central, open-ended question, development of individual expertise and participation in a final group process that attempts to transform newly acquired information into a more sophisticated understanding. The best WebQuests do this in a way that inspires students to see richer thematic relationships, facilitate a contribution to the real world of learning and reflect on their own metacognitive processes (p. 2).

The first WebQuest was developed by Bernie Dodge at San Diego State University in 1995 (Dodge, 2007). The authors have suggested a five component structure for the WebQuest: Introduction, Task, Process, Conclusion, and Evaluation. The introduction states the goals of the WebQuest, the task requires the learners to use the Web-based resources and information, and higher-order

thinking skills, the process lists and details the resources and the steps required to complete the tasks, the evaluation helps the learners to evaluate and reflect on their learning, and the conclusion is a summary and closure of the project (Dodge, 1997; Maddux & Cummings, 2007; March, 2004). In a WebQuest environment students look for and enquire into Web-based materials (Dodge, 2001). Dodge (1998) maintains that WebQuests provide enquiry-oriented activities, rely on Web-based resources, require the learners to participate in group work activities, and develop higher-order thinking skills by providing the learners opportunities to reflect on the enquiry processes and their individual results. In this line, McAndrew, Scanlon, and Clow (2010) claim that engaging students with such open educational resources/open educational practices (Borthwick & Gallagher-Brett, 2014; Littlejohn & Hood, 2016; Thomas & Evans, 2014) can help them develop their knowledge and skills needed to participate successfully in wider social and cultural contexts.

Moreover, Dodge (1997) and March (2004) emphasise the transformative thinking processes involved in the WebQuest learning environment, which stimulate learners to use the information meaningfully. They suggest that Web-Quests should provide learners with opportunities for problem solving and answering questions by categorising, manipulating, and integrating the information. In a similar vein, some foreign language researchers have emphasised the role of WebQuests in developing students' active learning (e.g., Altstaedter & Jones, 2009; Godwin-Jones, 2004). Godwin-Jones (2004) propose that Web-Quests are student-oriented and collaborative since they engage the learners in constructivist activities. Zheng, Perez, Williamson, and Flygare (2008) reveal that the most important constructs of WebQuests are constructivist problem solving, social interaction, and scaffolded learning. Moreover, they claim that the variables that influence the teachers' perceptions on WebQuests are the objective of the WebQuest, teaching experience, and the experience in using WebQuests. In addition, Kuimova, Golousenko, Nikiforov, and Shcherbakov (2015) argue that WebQuests provide a superior context-based learning environment, increase learners' knowledge and experience on various topics, and help to promote creative, critical, and problem-solving skills.

1.3. *WebQuests and critical thinking skills*

Drawing on the aforementioned characteristics of WebQuests, one purpose of the present study aims at developing English as a foreign language (EFL) learners' critical thinking skills through WebQuest-based classroom and compare it with the impact of face-to-face classroom on the learners' critical thinking skills (Facione, 2011; Yang & Chou, 2008). Critical thinking could be conceptualised as either cognitive skills or social and emotional disposition. Critical thinking as cognitive skills includes a set of higher-order thinking skills, such as analysis, inference, evaluation, deductive and inductive reasoning, which are assumed to

be taught and transferred. The disposition part, on the other hand, comprises truth seeking, open-mindedness, systematicity, analycity, maturity, inquisitiveness, and self-confidence (Facione, 2011; Yang & Chou, 2008). It could thus be argued that critical thinking is 'skilful and responsible thinking that facilitates good judgment because it (a) relies on criteria, (b) is self-correcting, and (c) is sensitive to context' (Weinstein, 2000, p. 41). Skilfulness refers to the appropriate practice of critical thinking embedded in contexts that invokes reliable information. Responsible thinking refers to the responsibility of the critical thinker in the community to present reasons for acceptable standards or challenge the standards by convincing arguments. In the light of judgment, critical thinking refers to the non-routine thinking that cannot be based on mechanical procedures, but on situations that hinge on the assessment and determinations of priorities, truth, and relevance. Criteria refers to the reasons of the critical thinker's assessment of the essential factors, considered when analyse or support and challenge a claim. Self-correction behoves the critical thinker to apply critical thinking processes to develop the procedures that he or she adopts. Finally, sensitivity to context refers to the application of the developed criteria in different contextual settings (Weinstein, 2000).

It is argued that teaching students 'how to think rather than what to think' (Bruning, Schraw, Norby, & Ronning, 2004, p. 180) (i.e. critical thinking skills) help them 'pay attention to the context in which their actions and ideas are generated.' In addition, the students 'become skeptical of quick-fix solutions of single answers to problems and of claims to universal truth. They also become open to alternative ways of looking at, and behaving in the world' (Brookfield, 1987, p. ix). It is claimed that nurturing critical thinking skills and dispositions help teachers foster the students to think critically (Facione, 2011; Halpern, 2001). Facione (2011) maintains that ideal critical thinkers are

> habitually inquisitive, well-informed, trustful of reason, open-minded, flexible, fair-minded in evaluation, honest in facing personal biases, prudent in making judgments, willing to reconsider, clear about issues, orderly in complex matters, diligent in seeking relevant information, reasonable in the selection of criteria, focused in inquiry, and persistent in seeking results which are as precise as the subject and the circumstances of inquiry permit (p. 27).

In line with Dodge's (1998) claim, a number of research studies suggest that WebQuests include enquiry-oriented activities that develop higher-order thinking skills in general (Lee, 2013; Polly & Ausband, 2009) and critical thinking skills in particular (Chang, Chen, & Hsu, 2011; March, 1997, 1998; Vidoni & Maddux, 2002). For instance, Aydin (2015) reviewing a body of research studies indicated that WebQuests are effective tools in enhancing critical thinking and other higher-order thinking skills, and that students are more satisfied with acquiring and learning linguistic and extra-linguistic knowledge when using WebQuests. Sen and Neufeld (2006), on the other hand, argue that WebQuests

provide the EFL learners with relevant and useful information to think critically, critically evaluate, and intelligently exploit the Web-based resources through individual and autonomous meaning construction. March (1997) proposed that students not only receive the information in WebQuests learning environments but also use that information actively to achieve certain purposes by involving themselves in critical thinking activities which involve problem solving, judgment, analysis, and synthesis. Similarly, Ikpeze and Boyd (2007) claimed that WebQuests provide different activities for in-depth study of content, and facilitate critical and complex thinking skills through evaluating the Web resources for determining the authenticity of informationand critiquing different texts. They suggested that teachers' creativity and flexibility in selecting the activities for students determined the success of the WebQuests.

1.4. WebQuests and academic writing skills

As the close relationships between thinking skills and language learning have long been recognised by researchers and theorists (e.g. Piaget, 1970; Vygotsky, 1986), another purpose of this study aims at exploring the impact of WebQuest-based classroom and face-to-face classroom on EFL learners' academic writing skills alongside critical thinking skills. It is claimed that developing students' higher-order thinking skills can help them promote their higher-order learning skills, and vice versa (Vygotsky, 1986). Therefore, critical thinking skills, considered as higher-order thinking skills, are thought to be the tool of writing skills, considered as higher-order learning skills, and writing skills are assumed to be the tool of critical thinking skills. That is, adopting critical thinking skills suitably help students apply writing skills appropriately and using writing skills properly help them apply critical thinking skills appropriately (Condon & Kelly-Riley, 2004).

International English Language Testing System (IELTS) has distinguished four skills required to enhance academic writing: task achievement, coherence and cohesion, lexicon, and grammatical range and accuracy (University of Cambridge ESOL Examinations, 2011). Task achievement deals with presenting key features of the writing and describing the subject or situation through accurate information using the limited number of words. Coherence and cohesion addresses the clarity and fluency of the writing through appropriate paragraphing and linking devices. Lexicon deals with using appropriate vocabulary, collocation, idiomatic expressions, metaphors, prepositions, verbal phrases, and other language features. Finally, grammatical range and accuracy focuses on using appropriate grammatical structures at sentence level and punctuation (University of Cambridge ESOL Examinations, 2011).

In WebQuest-based learning environment, on the other hand, learner-centeredness is encouraged (Crawford & Brown, 2002) to develop the learners' learning outcome in general (Aydin, 2015; Chang et al., 2011) and writing skills

in particular (Hung, 2015; Lee, 2013; Termsinsawadi, 2009). WebQuest-based classroom might provide learners with both peer-corrective feedback (Ebadi & Rahimi, 2017) and teacher-corrective feedback (Ai, 2017), which might subsequently develop their writing skills. The learners, therefore, are more motivated through such learning processes (see Abbit & Ophus, 2008; Barros & Carvalho, 2007; Hung, 2015; March, 1998; Zheng, Stucky, McAlack, Menchana, & Stoddart, 2005). Hung (2015), for instance, investigated the effect of the flipped classroom using WebQuests on English language learners' academic performance, learning attitudes, and participation levels. The findings indicated that structured units of flipped classroom in the form of WebQuests was a more effective instructional design in developing the learners' academic performance, learning attitudes, and participation levels in comparison with the semi-structured units of flipped classroom and non-flipped classroom. Chuo (2007) investigating the impact of the WebQuest and traditional classroom writing instructions on EFL learners' writing performance, writing apprehension, and their perceptions towards the Web-resource integrated language learning, found that learners' writing in the WebQuest instruction class outperformed those in the traditional instruction class. Moreover, both groups experienced significant reduction in writing apprehension, and the learners had positive perceptions towards the WebQuest writing instruction. Termsinsawadi (2009) examining the impact of WebQuests on the learners' writing skills, found that the learners' writing skills significantly and positively improved after using WebQuests. Results also indicated that the learners had positive perceptions towards using the WebQues and that they were more engaged in the learning process. It was found that the authenticity of the tasks was the most effective characteristic of the WebQuests that stimulated the learners to be actively engaged in the learning process.

1.5. Purpose of the study

As the review of the literature reveals, designing a WebQuest-based learning environment is an effective strategy to develop various variables in EFL contexts. However, as some Web 2.0 tools, such as blogs and wikis, have been frequently studied (Wang & Vásquez, 2012), a few research studies seem to have been done so far to explore WebQuest-based classroom in EFL settings (Chuo, 2007). In particular, WebQuest-based classroom was found to develop both learners' critical thinking and writing (e.g. Chuo, 2007; Termsinsawadi, 2009). Nevertheless, the impact of the WebQuest-based classroom on EFL learners' critical thinking skills (i.e. analysis, evaluation, inference, deductive and inductive reasoning) and IELTS academic writing skills (i.e. task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy) has remained unexplored. WebQuest-based classroom is thought to provide opportunities for authentic material, meaningful content, and collaboration among students (Simina & Hamel, 2005). Therefore, exploring critical thinking and academic writing

skills through WebQuests might be more feasible, which can subsequently illuminate profound insights into the way that these particular skills are developed in EFL learners. Moreover, there is a lack of research studies exploring the EFL learners' attitudes and perceptions towards the impact of the WebQuest-based classroom on critical thinking and academic writing skills.

As a result, on the one hand, the present study sets out to investigate the impact of the WebQuest-based classroom and the face-to-face classroom on EFL learners' critical thinking and academic writing skills, and on the other hand, it explores the perceptions the learners hold towards the impact of the WebQuest-based classroom on critical thinking and academic writing skills by collecting and analysing the data through a sequential explanatory mixed-methods approach. Therefore, the following research questions are addressed:

1. Compared to face-to-face classroom, how effective is WebQuest-based classroom in developing EFL learners' critical thinking and academic writing skills?
2. What are EFL learners' attitudes and perceptions towards the impact of WebQuest-based classroom on critical thinking and academic writing skills?

2. Method

A sequential mixed-methods approach (Riazi & Candlin 2014; Tashakkori & Teddlie 2003) to both data collection and analysis was used to address the research questions. The Explanatory Design of mixed-methods approach (Creswell, Plano Clark, Gutmann, & Hanson, 2003) was applied in which the qualitative findings were used to help explain, refine, and clarify the quantitative findings. To this aim, a semi-structured interview was conducted with the group that outperformed the other group on critical thinking and academic writing skills in the quantitative phase to help explain the reasons for their critical thinking and academic writing development. Mixing of the quantitative and qualitative methods occurred at two stages: when selecting the participants for the semi-structured interview and creating the semi-structured interview questions based on the quantitative findingsand when discussing the findings from the two phases for better interpretation.

2.1. Context and participants

Convenience sampling method (Dörnyei, 2007) was used to select the participants of the study. Two intact classes at a private language institute in Sanandaj, a city located in western Iran were selected; one was randomly assigned as the experimental group and the other as the control group. In each class there were ten EFL learners in the age range of 25–30 and with the same first language (Kurdish). They were attending an IELTS course to develop their four English

language skills (i.e. listening, reading, writing, and speaking,) for the IELTS examination. The proficiency level of the participants was measured via the standards of the language institute and DIALANG, which is an online adaptive diagnostic Web-based assessment tool. DIALANG assesses language skills including the writing skill, and provides the participants with scores related to the Common European Framework of Reference for Languages (CEFR) (Huhta et al., 2002). The results of the DIALANG test, which were reported in levels from A1 to C2, indicated that the participants' writing skills in both groups were at B1 level. Prior to the study, none of the learners had any prior learning experience in WebQuest-based classrooms.

Pseudonyms were used instead of the participants' real name to protect their identity. L1, L2, …, and L10 were used to name the participants in the experimental group and L11, L12, … .., and L20 were used to name those in the control group. In addition, they were assured that the results would be used only for the research purposeand that they would remain strictly confidential.

The second author was the researcher of the present study and the course instructor in both groups. He had already taught EFL courses for many years in different universities and language institutes and had conducted research studies accordingly.

2.2. Materials and instruments

The California Critical Thinking Skills Test (CCTST) form B developed by Facione and Facione (1993) was used to assess the participants' critical thinking skills. This test addresses the following five areas: analysis, evaluation, inference, deductive and inductive reasoning. There are 34 multiple choice questions each with one correct answer. The participants receive one for each correct answer and zero for each incorrect one, so the maximum total score of the CCTST is 34 and the minimum score is zero. However, each individual question assesses one or more than one sub-critical thinking skill (i.e. they assess one, two, or three sub-critical thinking skills simultaneously). For instance, question one assesses both evaluation and deductive reasoning and question 5 assesses both analysis and deductive reasoning. The maximum score of each sub-critical thinking skill was as follows: analysis = 9, evaluation = 14, inference = 11, deductive reasoning = 16, and inductive reasoning = 14. Similar to the overall CCTST score calculation, the participants receive one for each correct answer and zero for each incorrect one, as a result, the score of each sub-critical thinking skill ranges from 0 to 9, 14, 11, 16, and 14 respectively. Facione, Facione, Blohm, Howard, and Giancarlo (1998) found that this test enjoyed acceptable reliability of 0.78 (calculated through KR-20) and measured precisely what it purported to measure (i.e. construct validity).

The participants' academic writing skills were presented based on IELTS academic writing task 1 and task 2. In IELTS academic writing task 1 the candidates

are presented with a graph, table, chart, or diagram, and are asked to describe, summarise, or explain the information in their own words. The candidates might alternatively be involved in describing the stages of a process or how something works, or describing an object or event. In IELTS academic writing task 2 the candidates are asked to write an essay in response to a point of view, argument, or problem. IELTS writing band descriptor-task 1 was used to mark the participants' academic writing skills for task 1, and IELTS writing band descriptor-task 2 was used to mark their academic writing skills for task 2. Writing band descriptors assess the participants' academic writing skills in the four areas of task achievement (i.e. presenting key features, having an overview and accurate information, and word count), coherence and cohesion (i.e. organisation of information, paragraphing, and linking devices), lexicon (i.e. using appropriate language, collocation, and the number of errors made), and grammatical range and accuracy (i.e. using a range of grammar structures and tenses, punctuation, and the number of errors made). The participants were given a mark from 1 to 9 for each area of the test (i.e. task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy). The second author (the researcher/instructor) assessed and marked each participant's academic writing skills. Writing task 1 formed about 30 per cent of the participants' mark and writing task 2 about 60 per cent. The final IELTS academic writing skills of each participant were a calculation of his/her task 1 and task 2 marks, which ranged from 1 to 9 at intervals of 0.5.

In order to reduce the subjectivity and bias in the marking process, inter-rater reliability was run. The participants' pre-tests, post-tests, and delayed post-tests on academic writing skills were marked by another experienced and debriefed IELTS instructor to corroborate the consistency of the marks. The results revealed acceptable consistency between the marks of the two raters (r = .92).

The two types of IELTS writing tasks were selected from IELTS Introduction developed by McCarter (2012), and Collins Writing for IELTS developed by Williams (2011), which were established by the language institute to prepare the candidates for the IELTS examination.

To explore the participants' attitudes and perceptions towards the impact of WebQuest-based classroom on developing their critical thinking and academic writing skills, a semi-structured interview adapted from Hung (2015) was applied (see the Appendix). Each interview was audio-recorded and transcribed for subsequent analyses.

To determine the credibility of the transcribed interviews, a member checking technique (Creswell, 2007; Morse, Barrett, Mayan, Olson, & Spiers, 2002) was conducted. To this aim, the researcher/instructor restated and summarised the information in each question during the interview sessions to check the participants' agreement or disagreement about the accuracy of the interview-results regarding their views, feelings, and experiences. Moreover, at the end of the interview the analysed data and report were given to the learners to review and

check if an authentic representation was made of what they conveyed during the interview, and make modifications, if needed.

2.3. Procedures

The CCTST form B was given to the participants, as a pre-test, to assess their critical thinking skills. To assess academic writing skills, as another pre-test, an IELTS academic writing task 1 and an IELTS academic writing task 2 were presented to the participants. For the IELTS academic writing task 1 the participants were asked to present and analyse the information of a table. They were required to write at least 150 words in about 20 min. For the IELTS academic writing task 2, the participants were presented with an argument to write about. They were required to write at least 250 words in about 40 min.

In the experimental group the researcher/instructor created a WebQuest to develop the learners' critical thinking and academic writing skills. As the learners did not know about the way they should deal with the WebQuest-based classroom to learn better, at the first session of the course they were trained in this regard. To this end, the learners were presented some sample videos, with which the researcher/instructor elaborated on the whole technical issues of WebQuests, and answered the learners' questions in that regard.

Drawing on open educational resources/open educational practices (Borthwick & Gallagher-Brett, 2014), general guidelines and explanations, ready-made educational videos, and other e-learning materials and useful links to the valid and acceptable websites were included in the WebQuest. Hence, the participants could view and study the materials prior to the class-time in order to be prepared, and to free up the class-time to initiateand cooperatively practise and discuss critical thinking and academic writing skills. Furthermore, the researcher/ instructor helped the participants to find information easily through the WebQuest, enabled collaboration in-class, and supported open-editing of content.

Following the process-oriented writing instruction (Seow, 2002), each session the students were first provided with a topic for academic writing task 1 and a topic for task 2 and related problems that they should find possible solutions. Then, at home they searched the relevant resources related to critical thinking and academic writing skills in the WebQuest and analysed and synthesised the information and accomplished the tasks and found solutions to the problems. After that, they shared and discussed the online resources and their accomplished tasks in the classroom and revised and/or made modifications to their academic writing assignments, if needed.

Table 1 provides an outline of the WebQuest-based classroom conducted through different components of the WebQuest (i.e. Introduction, Task, Process, Evaluation, and Conclusion).

In the control group (face-to-face classroom) traditional face-to-face instruction was conducted to develop the learners' critical thinking and academic

Table 1. A brief description of the WebQuest designed for the study.

Component	Activity
Introduction	The learners were familiarised with critical thinking skills (i.e. analysis, evaluation, inference, deductive and inductive reasoning) and IELTS academic writing task 1 and task 2 and the relevant skills (i.e. task achievement, coherence and cohesion, lexicon, and grammatical range and accuracy), and that they were encouraged to develop these skills.
Task	The learners were informed of the main tasks that they should accomplishand how they are able to perform by accomplishing the tasks. They were informed how the WebQuest developed their critical thinking skills and IELTS academic writing skills both in task 1 and task 2.
Process	The learners were guided step by step to (1) think critically on different learning situations, especially for the writing tasks and watch the related videos, (2) fully understand IELTS academic writing task 1 and task 2 through some guidelines and watching some relevant videos, (3) discuss what they learned from different steps and videos, and (4) work in pairs to share the information and techniques that they learned about critical thinking skills and IELTS academic writing task 1 and task 2.
Evaluation	The California Critical Thinking Skills Test form B was used to assess the learners' critical thinking in the five areas of analysis, evaluation, inference, deductive and inductive reasoningand IELTS writing band descriptors for both task 1 and task 2 were used to assess their academic writing in the four areas of task achievement, coherence and cohesion, lexicon, and grammatical range and accuracy. The learners were made aware of these assessments in advance.
Conclusion	The learners were reinforced that they learned the important skills to think critically in the context of English language learningand that they are able to appropriately write IELTS academic writing task 1 and task 2.

To view the WebQuest follow this link: http://www.zunal.com/webquest.php?w=326045.

writing skills. As in the experimental group (WebQuest-based classroom), in the face-to-face classroom the learners were instructed on the content-related issues of critical thinking and academic writing skills at the beginning of the course. Subsequently, the students were provided with a topic for academic writing task 1 in one session and a topic for task 2 in the following session and some problems that they should deal with. Then, at home they reviewed the materials related to critical thinking and academic writing skills in printand did the tasks. Afterwards, they discussed their accomplished tasks in the classroom and revised and/or made modifications, if necessary.

Both groups were designed to provide input, elicit interaction, and produce output: three important factors to acquire the second language (Chapelle, 1997; Pica, Holliday, Lewis, & Morgenthaler, 1989). Input in the WebQuest-based classroom came from the Web-resources and in the face-to-face classroom it was in print. Interaction in the WebQuest-based classroom took place between the students and the technological medium, the students and the researcher/ instructor, and among the students themselves, while in the face-to-face classroom the interaction took place only between the students and the researcher/ instructor and among the students themselves. The output in both groups was a completed academic writing task 1 and task 2. Although in the WebQuest-based classroom e-learning materials were incorporated to develop the participants' critical thinking and academic writing skills and in the face-to-face classroom the traditional print format was incorporated, the content remained identical in both groups.

In both WebQuest-based and face-to-face classrooms, (1) the learners were encouraged to analyse their accomplished academic writing tasks by breaking

down the content and recombining the information in different ways (i.e. analysis skill), (2) the learners were stimulated to evaluate, judge, and justify the worth, credibility, and strength of their reasoning of their writing tasks (i.e. evaluation skill), (3) the researcher/instructor helped the learners interpret and understand the significance of the resources by clarifying the meaning, so that the learners could form relevant hypotheses and draw conclusions about their academic writing skills (i.e. inference skill), (4) the learners used the provided resources and information in order to form opinions and arguments about their academic writing tasks (i.e. deductive reasoning skill), and (5) they created opinions and arguments about their academic writing tasks by delving into the resources through logical steps (i.e. inductive reasoning skill). Moreover, the learners were stimulated by the researcher/instructor and/or other learners to think reflectively and do not judge their own and other students' academic writing tasks immediately, they were encouraged not to accept the first ideas that came into their mind, they were asked some questions like 'How do you know' in order to make them more meticulous about different academic writing skills used in the accomplished writing tasks, they were asked some questions like 'Why?', even when the applied academic writing skill was right in order to make them reason, they were stimulated to ask some relevant questions which were controversial, they were encouraged to listen to each other's answers and be critical and/or make some suggestions, and the researcher/instructor would ask some questions, such as 'Would you explain a little more?', to encourage the learners to think more.

In addition, both the WebQuest-based classroom and face-to-face classroom were used as a platform for mostly formative and summative assessments of the learners' critical thinking and academic writing skills. To this end, in the process of instruction the researcher/instructor assessed the learners' critical thinking and academic writing skills indirectly and regularly and each session compared their critical thinking and academic writing skills with their previous sessions' to see if they have improved in that regard.

The WebQuest-based classroom took fewer sessions to cover the required materials than the face-to-face classroom, because the learners were well prepared by checking and viewing the online materials before attending the class, so they found the materials in the class-time easy to understand and that they were taught conveniently. In the WebQuest-based classroom the learners accomplished an academic writing task 1 and an academic writing task 2 each session, while the learners in the face-to-face classroom accomplished the two tasks in two successive sessions. The WebQuest-based classroom took 14 sessions and the face-to-face classroom took 28 sessions.

At the end, CCTST form B was given to the participants again, as a post-test to assess their critical thinking skills. To assess the participants' writing skills, as a post-test, IELTS academic writing task 1 and task 2 with the same difficulty level and procedures were administered.

Table 2. IELTS academic writing tasks used for the pre-test, post-test, and delayed post-test.

	Task	Topic	Word-number	Time
Pre-test	Task 1	Describing a table	150	20
	Task 2	Presenting an argument	250	40
Post-test	Task 1	Describing a pie chart	150	20
	Task 2	Writing about the causes and effects	250	40
Delayed post-test	Task 1	Describing a line graph	150	20
	Task 2	Writing about a problem and its solutions	250	40

A semi-structured interview was conducted with each participant to check their perceptions towards the WebQuest-based classroom in developing their critical thinking and academic writing skills. As it is explained in section 3, the students in the WebQuest-based classroom outperformed the students in the face-to-face classroom quantitatively on critical thinking and academic writing skills. As a result, the semi-structured interview was conducted with the students in the WebQuest-based classroom to help explain and clarify the quantitative findings. Each interview approximately took 15 minutes. The result was further verified with a member-checking technique to ensure the validity. The learners were given the opportunity to view the description of their interviews and, if necessary, make changes to it.

To regularly document the ideas, feelings, and problems that the students faced in dealing with critical thinking and academic writing skills and to contribute to the trustworthiness of the data, the researcher/instructor kept a journal (Janesick, 2004) from the beginning to the end of the study to reflect on the learners' learning experience. Like member checking, the researcher/instructor journal, considered as a strong triangulation technique, contributed to the qualitative findings of the study.

In order to assess the long-term effects of the WebQuest-based classroom and the face-to-face classroom in developing the participants' critical thinking and academic writing skills, delayed post-tests similar to the pre-tests and the post-tests were administered one month after the post-tests. Table 2 summarises the information about the pre-, post- and delayed post-tests related to the IELTS academic writing task 1 and task 2 in both groups.

2.4. Data analysis

2.4.1. Quantitative analysis

There were two dependent variables (i.e. critical thinking and academic writing) with different sub-components and one independent variable (i.e. WebQuest-based classroom) with two different levels WebQuest-based classroom and traditional face-to-face classroom. As a result, one-way Multivariate Analysis of Variance (MANOVA) was first used to check the differences between the learners' pre-tests on critical thinking and academic writing in the two groups. Next, one-way Multivariate Analysis of Covariance (MANCOVA) was run to investigate the impact of the WebQuest-based classroom and the face-to-face

classroom on EFL learners' critical thinking and academic writing skills on the one hand, and to control for the pre-tests (i.e. covariates) and then compare the post-tests and delayed post-tests on the other hand.

Although we employed a convenient and small sample size, we applied parametric tests (i.e. one-way MANOVA and one-way MANCOVA) to analyse the quantitative data. The reason was that the study met some assumptions underlying parametric tests, such as having interval (continuous marks assigned to the learners' performance on critical thinking and academic writing skills) and normal data. We analysed the normality of the data through Kolmogorov-Smirno, the results indicated that the data for the pre-tests, post-tests, and delayed post-tests were non-significant, which indicated that all the data were normal and there were no outliers. In addition, the parametric tests provide the most precise information (Dörnyei, 2007), as applied in other similar studies conducted in very much the same way as the present study (e.g. de Vries, Cucchiarini, Bodnar, Strik, & van Hout, 2015; Kılıçkaya, 2015).

On the other hand, ACTFL (American Council on the Teaching of Foreign Languages) (2010) issued the following position statement on class size:

> Since the goal of a standards-based language program is to develop students' ability to communicate, there must be opportunities for frequent and meaningful student-to-teacher and student-to-student interaction, monitored practice, and individual feedback during instructional time. Therefore, while ACTFL recognizes the fiscal realities faced by schools and institutions of higher education, ACTFL supports the recommended class size of no more than 15 students, made by both the National Education Association (NEA) and the Association of Departments of Foreign languages (ADFL). Since the most important consideration in determining class size should be pedagogical efficacy, ACTFL's position applies to both traditional and online classroom settings.

Therefore, following the aforementioned position statement by ACTFL and recommendations of Locastro (1989) that in her article entitled 'Large size classes: The situation in Japan' reported ideal class size as between 10–12 students, we believe that the quality of instruction and learning in educational contexts and the validity of the research findings are enhanced when there is a reasonable number of students in the classroom, especially in IELTS and academic writing courses, which are more demanding and time-consuming.

2.4.2. Qualitative analysis

In order to uncover the important themes related to the perceptions of EFL learners towards the impact of the WebQuest-based classroom on their critical thinking and academic writing skills and the researcher/instructor's journals (i.e. diaries and notes kept by the researcher/instructor during the course of the research project), thematic analysis (Boyatzis, 1998) was applied. To this aim, the transcribed interviews and the researcher/instructor's journals were coded and analysed on the basis of open thematic coding, the interrelationships among the core variables were examined to organise them based on their content, and

then each cluster was labelled covering the shared theme within that cluster. A reiterative, bottom-up approach was run to identify the core variables and to classify them into the related categories.

3. Results

3.1. The quantitative analysis

3.1.1. Critical thinking and academic writing

First, in order to examine the differences between the learners' pre-tests in both experimental and control groups regarding their critical thinking and academic writing, a one-way MANOVA was run. Table 3 presents the results of the descriptive statistics.

As Table 3 indicates, there were subtle differences between the means of the pre-tests of both groups. As a result, it was revealed that both groups' basic skills in critical thinking and academic writing were identical.

Table 4 shows the results of the one-way MANOVA.

Table 4 reveals that there were no significant differences between the learners' critical thinking and academic writing in the two groups.

Prior to the main analyses, a preliminary one-way MANCOVA was run to check the assumptions on the one hand and to check the homogeneity of variance covariance and the homogeneity of regression slopes on the other hand. The results showed that the linear relationship between the independent variable (i.e. WebQuest-based classroom) and the covariates (pre-tests) was not significant and their interaction effects with the post-tests and delayed post-tests were non-significant, which generally met the assumptions of the one-way MANCOVA.

As a result, the main one-way MANCOVA was run to examine the impact of WebQuest-based classroom and the face-to-face classroom on the post-tests and delayed post-tests of the participants' critical thinking and academic writing after controlling for the pre-tests (i.e. covariates). First, Table 5 shows the unad-

Table 3. Descriptive statistics, investigating the amount of mean differences between the pre-tests of both groups.

	Groups	Mean	Std. Deviation	N
Critical thinking (Pre-test)	Ex	3.700	2.263	10
	Co	3.600	1.429	10
Writing (Pre-test)	Ex	3.800	.788	10
	Co	3.750	.754	10

Table 4. Tests of between-subjects effects, investigating the critical thinking and academic writing differences between the two groups.

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Critical thinking (Pre-test)	.050	1	.050	.014	.907
Writing (Pre-test)	.013	1	.013	.021	.886

Table 5. Descriptive statistics, investigating the amount of unadjusted mean differences between the post-tests and delayed post-tests of both groups before controlling for the pre-tests (covariates).

	Group	Mean	Std. Deviation	N
Critical thinking (Post-test)	Ex	9.400	2.221	10
	Co	6.700	1.766	10
Writing (Post-test)	Ex	6.350	.625	10
	Co	5.050	1.012	10
Critical thinking (Delayed-post-test)	Ex	10.000	2.494	10
	Co	7.100	2.183	10
Writing (Delayed-Post)	Ex	6.700	.674	10
	Co	4.850	.944	10

justed mean differences between the post-tests and the delayed post-tests of both groups before controlling for the covariates (i.e. pre-tests).

As Table 5 showed, the means of the post-tests and delayed post-tests on critical thinking and academic writing in the experimental group outperformed those in the control group, which indicated that the instruction process in the experimental group might have been more effective than that in the control group.

Table 6 shows the results of multivariate tests using Wilk's Lambda to examine the effects of WebQuest-based classroom on the combination of critical thinking and academic writing.

Table 6 showed that WebQuest-based classroom and face-to-face classroom had a significant effect on critical thinking and academic writing after controlling for the pre-tests.

Table 7 indicates the tests of between-subjects effects, which examine the differences between and the influence of WebQuest-based and face-to-face classrooms on the post-test and delayed post-test scores of the participants' critical thinking and academic writing after controlling for the pre-test scores.

The results in Table 7 indicates that after controlling for the pre-tests, the WebQuest-based classroom had significant and positive impact on the post-tests and delayed post-tests of the EFL learners' critical thinking and academic writing skills.

Table 6. Multivariate test, conducting Wilk's Lambda to investigate the effect of the covariates and the independent variable on the dependent variables.

Effect	Value	F	Hypothesis df	Error df	Sig.
WebQuest-based and face-to-face classrooms	.302	7.527	4.000	13.000	.002

Table 7. Tests of between-subjects effects, investigating the impact of the independent variable on the dependent variables after controlling for the covariates.

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
CT (Post)	34.958	1	34.958	9.328	.008
Writing (Post)	8.132	1	8.132	12.227	.003
CT (Delayed-Post)	41.463	1	41.463	7.089	.017
Writing (Delayed-Post)	16.599	1	16.599	28.189	.000

Table 8. Descriptive statistics, investigating the amount of adjusted mean differences of the post-tests and delayed post-tests of both groups after controlling for the pre-tests.

Dependent Variable	Group	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Critical thinking (Post-test)	Ex	9.373	.612	8.075	10.671
	Co	6.727	.612	5.429	8.025
Writing (Post-test)	Ex	6.338	.258	5.791	6.885
	Co	5.062	.258	4.515	5.609
Critical thinking (Delayed Post-test)	Ex	9.991	.765	8.369	11.613
	Co	7.109	.765	5.487	8.731
Writing (Delayed Post-test)	Ex	6.687	.243	6.172	7.201
	Co	4.863	.243	4.349	5.378

Table 9. Pairwise comparisons, investigating the exact differences of the post-tests and delayed-post-tests of both groups after controlling for the pre-tests.

Dependent Variable	(I) Group	(J) Group	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower	Upper
Critical thinking (Post-test)	Ex	Co	2.606	.845	.007	.823	4.389
	Co	Ex	−2.606	.845	.007	−4.389	−.823
Writing (Post-test)	Ex	Co	1.264	.360	.003	.505	2.022
	Co	Ex	−1.264	.360	.003	−2.022	−.505
Critical thinking (Delayed Post-test)	Ex	Co	2.855	1.065	.016	.607	5.103
	Co	Ex	−2.855	1.065	.016	−5.103	−.607
Writing (Delayed Post-test)	Ex	Co	1.814	.349	.000	1.077	2.551
	Co	Ex	−1.814	.349	.000	−2.551	−1.077

Table 8 indicates the adjusted mean differences of the post-tests and the delayed post-tests of both groups after controlling for the pre-tests.

Table 8 indicated that the adjusted means of the post-tests and delayed post-tests on critical thinking and academic writing in the experimental group were more than those in the control group after controlling for the pre-tests.

Finally, Table 9 presents the details of the effect size of the two groups.

As Table 9 indicates, the post-tests and delayed post-tests on critical thinking and academic writing in the experimental group outperformed those in the control group after controlling for the pre-tests. It could thus be suggested that the WebQuest-based classroom was a more effective instructional process in developing EFL learners' critical thinking and academic writing in comparison with the face-to-face classroom. Moreover, WebQuest-based classroom had long-term impact on both critical thinking and academic writing development. Nevertheless, face-to-face classroom had a long-term impact only on critical thinking development.

3.1.2. Critical thinking and academic writing skills

In order to examine how the learners performed on the critical thinking skills (i.e. analysis, evaluation, inference, deductive and inductive reasoning) and academic writing skills (i.e. task achievement, coherence and cohesion, lexical

Table 10. Descriptive statistics, investigating the amount of mean differences between the pre-tests of both groups' critical thinking and academic writing skills.

	Groups	Mean	Std. Deviation	N
Analysis	Ex	.700	.823	10
	Co	1.000	1.054	10
Evaluation	Ex	1.100	.737	10
	Co	1.100	.994	10
Inference	Ex	.800	1.032	10
	Co	.900	.737	10
Deductive reasoning	Ex	.900	.994	10
	Co	.900	.875	10
Inductive reasoning	Ex	1.000	.942	10
	Co	1.600	.516	10
Task achievement	Ex	3.200	.823	10
	Co	3.300	.752	10
Coherence and cohesion	Ex	3.050	.761	10
	Co	2.950	.685	10
Lexicon	Ex	4.450	.761	10
	Co	4.350	.914	10
Grammatical accuracy	Ex	4.450	1.012	10
	Co	4.250	1.034	10

resource, and grammatical range and accuracy) in pre-tests, post-tests, and delayed post-tests, one-way MANOVA and one-way MANCOVAs were run.

First, to examine the difference between the two groups' pre-tests on the five areas of critical thinking and the four areas of academic writing, a one-way MANOVA was run. Table 10 shows the results of the descriptive statistics.

As Table 10 shows, there were subtle differences between the means of the pre-tests of both groups. As it is indicated, the total mean score of the participants' sub-critical thinking skills in the experimental group was 4.5 and in the control group it was 5.5, which both were higher than the total mean score of the overall critical thinking which were 3.7 and 3.6 respectively (see Table 3). This was due to the reason that each individual question in CCTST assesses one, two, or three sub-critical thinking skills, hence, the sub-critical thinking skills score is 64 in sum, which is higher than the overall critical thinking score which is 34.

Table 11 presents the results of the one-way MANOVA.

The results in Table 11 indicates no significant differences between the two groups' pre-tests on the five areas of critical thinking and the four areas of academic writing.

Table 11. Tests of between-subjects effects, investigating the difference between the learners' pre-tests on the five areas of critical thinking and the four areas of academic writing.

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Analysis	.450	1	.450	.503	.487
Evaluation	.000	1	.000	.000	1.000
Inference	.050	1	.050	.062	.806
Deductive reasoning	.000	1	.000	.000	1.000
Inductive reasoning	1.800	1	1.800	3.115	.095
Task achievement	.050	1	.050	.080	.780
Coherence and cohesion	.050	1	.050	.095	.761
Lexicon	.050	1	.050	.071	.794
Grammatical accuracy	.200	1	.200	.191	.667

Table 12. Descriptive statistics, investigating the amount of unadjusted mean differences between the post-tests and delayed post-tests of both groups before controlling for the pre-tests.

	Groups	Mean	Std. Deviation	N
Analysis (Post-test)	Ex	3.600	1.349	10
	Co	2.800	1.229	10
Evaluation (Post-test)	Ex	3.500	1.269	10
	Co	2.400	1.173	10
Inference (Post-test)	Ex	3.300	1.059	10
	Co	1.800	.632	10
Deductive reasoning (Post-test)	Ex	3.700	1.636	10
	Co	1.700	.948	10
Inductive reasoning (Post-test)	Ex	2.700	.948	10
	Co	3.300	.674	10
Task achievement (Post-test)	Ex	5.850	.668	10
	Co	4.700	1.032	10
Coherence and cohesion (Post-test)	Ex	5.600	.906	10
	Co	4.300	.856	10
Lexicon (Post-test)	Ex	6.900	.614	10
	Co	5.450	1.116	10
Grammatical accuracy (Post-test)	Ex	7.050	.724	10
	Co	5.650	1.106	10
Analysis (Delayed post-test)	Ex	3.600	1.264	10
	Co	2.500	1.178	10
Evaluation (Delayed post-test)	Ex	3.800	1.135	10
	Co	2.300	.823	10
Inference (Delayed post-test)	Ex	2.800	1.135	10
	Co	2.100	.737	10
Deductive reasoning (Delayed post-test)	Ex	3.000	.942	10
	Co	2.000	.942	10
Inductive reasoning (Delayed post-test)	Ex	3.400	.966	10
	Co	2.300	.948	10
Task achievement (Delayed post-test)	Ex	6.150	.625	10
	Co	4.350	.914	10
Coherence and cohesion (Delayed post-test)	Ex	6.150	.783	10
	Co	4.200	.888	10
Lexicon (Delayed post-test)	Ex	7.150	.851	10
	Co	5.500	1.130	10
Grammatical accuracy (Delayed post-test)	Ex	7.200	.714	10
	Co	5.450	1.165	10

One-way MANCOVA was run to examine the difference between the two groups' post-tests on the five areas of critical thinking and the four areas of academic writing on the one hand, and to control for the pre-tests as covariates on the other hand.

Table 12 indicates the unadjusted mean differences between the two groups' post-tests and delayed post-tests before controlling for the pre-tests.

Table 12 indicates that the means of the post-tests and delayed post-tests on critical thinking and academic writing skills in the experimental group outperformed those in the control group, excluding inductive reasoning skill in post-tests in which the experimental group received lower scores than the control group.

Table 13 shows the results of multivariate tests using Wilk's Lambda investigating the impact of WebQuest-based classroom on the combination of critical thinking and academic writing skills.

Table 13. Multivariate test, conducting Wilk's Lambda to investigate the effect of the covariates and the independent variable on the dependent variables.

Effect	Value	F	Hypothesis df	Error df	Sig.
WebQuest-based and face-to-face classrooms	.000	1300.82	9.000	1.000	.022

As it is indicated in Table 13, WebQuest-based classroom and face-to-face classroom had significant impact on critical thinking and academic writing skills after controlling for the pre-tests.

Table 14 presents the tests of between-subjects effects examining the differences between and the impact of WebQuest-based and face-to-face classrooms on the post- and delayed post-tests of the learners' critical thinking and academic writing skills after controlling for the pre-test scores.

Table 14 reveals significant differences between the two groups' post-tests and delayed post-tests on some areas of critical thinking (i.e. analysis, evaluation, and deductive reasoning) and the four areas of academic writing in which the experimental group outperformed the control group. There were significant differences between the two groups' post-tests on inference skill and in their delayed post-tests on inductive reasoning skill, however, there were not any significant differences between the two groups' post-tests on inductive reasoning skill and their delayed post-tests on inference skill.

Table 15 shows the adjusted mean differences of the post-tests and the delayed post-tests of both groups after controlling for the pre-tests.

As Table 15 shows, the adjusted means of the post-tests and delayed post-tests on the five areas of critical thinking (except post-tests on inductive reasoning skill) and the four areas of academic writing in the experimental group outperformed those in the control group after controlling for the pre-tests.

Finally, Table 16 presents the details of the effect size of the two groups.

Table 14. Tests of between-subjects effects, investigating the impact of the post-tests and delayed post-tests on the dependent variables.

Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Analysis (Post-test)	6.239	1	6.239	7.764	.021
Evaluation (Post-test)	7.032	1	7.032	5.878	.038
Inference (Post-test)	6.518	1	6.518	5.948	.037
Deductive reasoning (Post-test)	19.110	1	19.110	9.430	.013
Inductive reasoning (Post-test)	.885	1	.885	1.241	.294
Task achievement (Post-test)	5.396	1	5.396	5.200	.049
Coherence and cohesion (Post-test)	6.834	1	6.834	7.567	.022
Lexicon (Post-test)	6.702	1	6.702	5.552	.043
Grammatical accuracy (Post-test)	5.261	1	5.261	6.653	.030
Analysis (Delayed post-test)	8.636	1	8.636	7.590	.004
Evaluation (Delayed post-test)	10.493	1	10.493	15.359	.004
Inference (Delayed post-test)	1.587	1	1.587	2.850	.126
Deductive reasoning (Delayed post-test)	5.042	1	5.042	10.300	.011
Inductive reasoning (Delayed post-test)	4.035	1	4.035	5.511	.043
Task achievement (Delayed post-test)	11.467	1	11.467	17.479	.002
Coherence and cohesion (Delayed post-test)	12.752	1	12.752	18.822	.002
Lexicon (Delayed post-test)	13.859	1	13.859	11.171	.009
Grammatical accuracy (Delayed post-test)	13.676	1	13.676	10.212	.011

Table 15. Descriptive statistics, investigating the amount of adjusted mean differences of the post-tests and delayed post-tests of both groups after controlling for the pre-tests.

Dependent Variable	WebQuest	Mean	Std. Error	95% Confidence Interval	
				Lower Bound	Upper Bound
Analysis (Post-test)	Ex	3.874	.314	3.163	4.584
	Co	2.526	.314	1.816	3.237
Evaluation (Post-test)	Ex	3.665	.383	2.798	4.532
	Co	2.235	.383	1.368	3.102
Inference (Post-test)	Ex	3.239	.367	2.409	4.069
	Co	1.861	.367	1.031	2.691
Deductive reasoning (Post-test)	Ex	3.879	.499	2.751	5.008
	Co	1.521	.499	.392	2.649
Inductive reasoning (Post-test)	Ex	2.746	.296	2.077	3.416
	Co	3.254	.296	2.584	3.923
Task achievement (Post-test)	Ex	5.902	.357	5.094	6.709
	Co	4.648	.357	3.841	5.456
Coherence and cohesion (Post-test)	Ex	5.655	.333	4.902	6.408
	Co	4.245	.333	3.492	4.998
Lexicon (Post-test)	Ex	6.873	.385	6.003	7.744
	Co	5.477	.385	4.606	6.347
Grammatical accuracy (Post-test)	Ex	6.969	.312	6.264	7.674
	Co	5.731	.312	5.026	6.436
Analysis (Delayed post-test)	Ex	3.843	.374	2.997	4.688
	Co	2.257	.374	1.412	3.103
Evaluation (Delayed post-test)	Ex	3.924	.290	3.269	4.579
	Co	2.176	.290	1.521	2.831
Inference (Delayed post-test)	Ex	2.790	.261	2.198	3.381
	Co	2.110	.261	1.519	2.702
Deductive reasoning (Delayed post-test)	Ex	3.106	.245	2.551	3.660
	Co	1.894	.245	1.340	2.449
Inductive reasoning (Delayed post-test)	Ex	3.392	.300	2.714	4.070
	Co	2.308	.300	1.630	2.986
Task achievement (Delayed post-test)	Ex	6.164	.284	5.522	6.806
	Co	4.336	.284	3.694	4.978
Coherence and cohesion (Delayed post-test)	Ex	6.138	.288	5.486	6.791
	Co	4.212	.288	3.559	4.864
Lexicon (Delayed post-test)	Ex	7.329	.390	6.446	8.212
	Co	5.321	.390	4.438	6.204
Grammatical accuracy (Delayed post-test)	Ex	7.323	.406	6.405	8.240
	Co	5.327	.406	4.410	6.245

As Table 16 reveals, there were significant differences between the two groups' post-tests and delayed post-tests on the five areas of critical thinking and the four areas of academic writing after removing the effects of the covariates (i.e. pre-tests), and that the experimental group outperformed the control group. Nevertheless, no significant differences were found between the two groups' post-tests on inductive reasoning skill and their delayed post-tests on inference skill. It is argued that the WebQuest-based classroom is a more effective instruction process in developing EFL learners' critical thinking and academic writing skills in comparison with the face-to-face classroom.

3.2. The qualitative analysis

The second research question in the present study addressed the EFL learners' attitudes and perceptions towards the impact of WebQuest-based classroom on their critical thinking and academic writing skills. The purpose of this qualitative

Table 16. Pairwise comparisons, investigating the exact differences of the post-tests and delayed-post-tests of both groups after controlling for the pre-tests.

Dependent Variable	(I) WebQuest	(J) WebQuest	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval for Difference	
						Lower Bound	Upper Bound
Analysis (Post-test)	Ex	Co	1.348	.484	.021	.254	2.442
	Co	Ex	−1.348	.484	.021	−2.442	−.254
Evaluation (Post-test)	Ex	Co	1.431	.590	.038	.096	2.766
	Co	Ex	−1.431	.590	.038	−2.766	−.096
Inference (Post-test)	Ex	Co	1.377	.565	.037	.100	2.655
	Co	Ex	−1.377	.565	.037	−2.655	−.100
Deductive reasoning (Post-test)	Ex	Co	2.359	.768	.013	.621	4.096
	Co	Ex	−2.359	.768	.013	−4.096	−.621
Inductive reasoning (Post-test)	Ex	Co	−.508	.456	.294	−1.538	.523
	Co	Ex	.508	.456	.294	−.523	1.538
Task achievement (Post-test)	Ex	Co	1.253	.550	.049	.010	2.497
	Co	Ex	−1.253	.550	.049	−2.497	−.010
Coherence and cohesion (Post-test)	Ex	Co	1.410	.513	.022	.251	2.570
	Co	Ex	−1.410	.513	.022	−2.570	−.251
Lexicon (Post-test)	Ex	Co	1.397	.593	.043	.056	2.738
	Co	Ex	−1.397	.593	.043	−2.738	−.056
Grammatical accuracy (Post-test)	Ex	Co	1.238	.480	.030	.152	2.323
	Co	Ex	−1.238	.480	.030	−2.323	−.152
Analysis (Delayed post-test)	Ex	Co	1.586	.576	.022	.284	2.887
	Co	Ex	−1.586	.576	.022	−2.887	−.284
Evaluation (Delayed post-test)	Ex	Co	1.748	.446	.004	.739	2.757
	Co	Ex	−1.748	.446	.004	−2.757	−.739
Inference (Delayed post-test)	Ex	Co	.680	.403	.126	−.231	1.590
	Co	Ex	−.680	.403	.126	−1.590	.231
Deductive reasoning (Delayed post-test)	Ex	Co	1.212	.378	.011	.358	2.066
	Co	Ex	−1.212	.378	.011	−2.066	−.358
Inductive reasoning (Delayed post-test)	Ex	Co	1.084	.462	.043	.039	2.128
	Co	Ex	−1.084	.462	.043	−2.128	−.039
Task achievement (Delayed post-test)	Ex	Co	1.827	.437	.002	.838	2.816
	Co	Ex	−1.827	.437	.002	−2.816	−.838
Coherence and cohesion (Delayed post-test)	Ex	Co	1.927	.444	.002	.922	2.931
	Co	Ex	−1.927	.444	.002	−2.931	−.922
Lexicon (Delayed post-test)	Ex	Co	2.009	.601	.009	.649	3.368
	Co	Ex	−2.009	.601	.009	−3.368	−.649
Grammatical accuracy (Delayed post-test)	Ex	Co	1.995	.624	.011	.583	3.408
	Co	Ex	−1.995	.624	.011	−3.408	−.583

analysis was to explain, refine, and clarify the quantitative findings (i.e. the reason that the WebQuest-based classroom developed the EFL learners' critical thinking and academic writing skills to a greater extent). To this end, the learners in the WebQuest-based classroom were interviewed to describe and explain about their learning experience. In addition, the researcher/instructor kept journals during the course to reflect on the learners' learning experience, so that to contribute to the qualitative findings. Having analysed the transcribed interviews and the researcher/instructor journals through thematic analysis some themes emerged, the results of which are presented in Table 17.

The findings generally indicated positive perceptions and attitudes of the learners towards the impact of WebQuest-based classroom on critical thinking and academic writing skills, which further corroborated the quantitative findings.

Table 17. Themes of the EFL learners' attitudes and perceptions towards the impact of Web-Quest-based classroom on critical thinking and academic writing skills.

Themes
The contents of educational videos and other e-learning materialsand the way they are structured in the WebQuest
The possibility of choosing what and how to learn in the active learning environment of the WebQuest-based classroom
The amount of time and effort to learn the content of the videos and other e-learning materials
The discussions in the classroom about the videos and other e-learning materials
The positive feelings to participate in class activities which meet different proficiency levels

Based on the findings, the EFL learners' typical approaches to studying in the WebQuest-based classroom was that they viewed and studied the videos and other e-learning materials related to critical thinking and academic writing skills prior to the class-time in order to be prepared, prepared the first draft of their writing tasks accordingly, and then during the class-time they cooperatively practised and discussed critical thinking and academic writing skills and made modifications to their writing assignments, if needed. They reported that the educational videos and other e-learning materials developed their critical thinking and academic writing skills, since they were provided with every detail in that respect. For instance, L8 stated:

> The videos and materials are quite helpful. I become familiarised with every detail of academic writing task 1 and task 2, and I know how to think when I write.

The abundant and relevant online materials provided the learners the opportunities to read a substantial amount of useful resources about critical thinking and academic writing skills before their writing, which subsequently developed their academic writing skills.

The learners reported that the way the videos and materials were organised in the WebQuest was very easy to followand that it guided them step by step to understand the content in a logical sequence. As L2 reported:

> I study and understand the content of the materials by myself, since they are in a logical order. So, I do not skip the prespecified steps because I know that they are arranged thoughtfully. For instance, I first follow the steps related to critical thinking and then those related to academic writing, so when I write I know how to think to develop my writing.

The WebQuest simplified the Web-browsing processes and directed the learners' Internet experiences. As a result, the learners could directly develop their critical thinking and academic writing skills rather than develop their Web-searching skills and completed the required tasks appropriately.

The learners thought they were more autonomous and active in selecting what and how to learn. Although the learners should have learned all about the videos and materials, which were organised on the WebQuest, a few of the materials were quite easy and/or repetitious for some of the learners, so they would

cursorily read or watch those parts. However, they would spend much time on those parts that they deemed them difficult and/or very important. As L7 stated:

> One of the educational videos was quite necessary for me to watch several times, since I had difficulty in that regard. But I watched one of the videos just one time because it had redundant information for me, so I only noted down the necessary information.

This autonomous learning process provided the learners the opportunities to read the materials based on their own needs and priorities, so that they could develop their required critical thinking and academic writing skills accordingly.

They reported that WebQuest-based classroom provided them enough time to view the videos and other Web-based materials before the class-time and that it was the most important part of such learning experience. They reported that if they miss something important during the class-time, they review the materials in depth in the WebQuest after the class. For instance, L4 said:

> I have enough time to view the videos and read the materialsand reflect deeply about them before the class-time.

The WebQuest in the present study allowed the learners to read the content sufficiently and do their tasks without being restricted by space and time. The WebQuest allowed the learners to read the content and do the tasks at an emotionally relaxed situation (e.g. home) and at their own pace which helped them think more deeply on the tasks.

The learners reported that the discussions in the classroom about the videos and other e-learning materials enhanced their understanding. They reported that they learned quite a lot from their classmates, because they shared their different understandings of some of the materials with them. As L1 reported:

> I view the videos and peruse the materials several times at home and write down some notes that I think are difficult, and then mention them in the class. This learning process is quite useful for me because my classmates have different ideas and I can learn them all in the classroom discussions.

The classroom discussions helped the learners share their different and useful ideas and suggestions that could subsequently help other learners develop their skills.

Moreover, the learners had positive feelings to take part in the classroom activities. They thought they were more confident to interact with their classmates since they could view and study the videos and materials before the class-time as many times as they needed. For instance, L10 stated:

> This learning process is very useful for me because I can view the videos and read the materials at my own pace. I think in comparison with some of my classmates I need more time to understand the materials deeply, and it is really great that I have enough time in this learning process. As I learn all about the materials of the session I feel emotionally relaxed in the classroom, so I take part in the discussions a lot.

The provision of this collaborative discussions not only developed the learners' critical thinking and academic writing skills to a great extentbut also motivated them to work more seriously on their assigned tasks.

Overall, the EFL learners' perceptions towards the impact of WebQuest-based classroom on their critical thinking and academic writing skills were positive, nevertheless the only difficulty which they reported was with the low-speed Internet connection.

4. Discussion

The present study aimed at exploring the impact of WebQuest-based classroom and face-to-face classroom on EFL learners' critical thinking and academic writing skills. The required data were collected and analysed adopting a sequential explanatory mixed-methods approach. The quantitative findings first indicated that WebQuest-based classroom was more effective and efficient than the face-to-face classroom in developing the learners' critical thinking skills (except inductive reasoning skill in post-test and inference skillin delayed post-test) both in the short and long term. The learners in the present study only scored 3.7 and 3.6 in average in the CCTST pre-tests and 9.4 and 6.7 in average in the CCTST post-tests for the experimental and control groups respectively. As a result, the learners in both groups were considered weak in terms of critical thinking as Facione and Fcione (1993) argue that CCTST scores of ≤ 12 indicate fundamental weaknesses in critical thinking skills. However, the learners in the present study managed to move forward from the current ability which is quite welcoming and shows progress though limited. According to socio-cultural theory of mind proposed by Vygotsky (1978), any changes in the learners' current capabilities is considered as development. In addition, the EFL learners in the present context are regarded as originally weak critical thinkers, as found by the present researcher (the second author) in the previous studies (e.g. Soodmand Afshar & Rahimi, 2014; Soodmand Afshar, Rahimi, & Rahimi, 2014). Investigating 100 EFL learners' critical thinking in the aforementioned studies, it was indicated that the EFL learners' CCTST score did not exceed 12, which further paved the way for finding an effective and efficient way to develop the EFL learners' critical thinking skills. The findings of the present study revealed that WebQuest-based classroom developed the critical thinking skills of these EFL learners, who are considered as weak critical thinkers, more effectively and efficiently.

The findings could be due to the structural differences of the WebQuest-based classroom and the face-to-face classroom, as in the WebQuest-based classroom the learners had more time to reflect on the learning activities before the class-time. During the class-time, the learners in the WebQuest-based classroom had enough opportunities to interact with their peers and the researcher/instructor about the contents of the videos and other Web-based materials and use the class-time for more applied learning, and the researcher/instructor, as a

result of increased learner-teacher interaction, had more opportunities to assess and facilitate the learners' learning process in each session. Another strength of the WebQuest-based classroom in the present study might be due to the use of WebQuest active learning strategy which structured the learning materials based on the five essential elements of Introduction, Process, Task, Evaluation, and Conclusion, and provided the learners with useful websites and instructional videos in order not to use more time searching through the large database of the Internet.

The findings of the study corroborate those of Aydin (2015), Sen and Neufeld (2006), and Vidoni and Maddux (2002) who found that WebQuest-based instruction developed learners' critical thinking skills. In a similar vein, Zheng et al. (2008) regards WebQuests as an educational tool for constructivist learning (see also Barros & Carvalho, 2007) that further incorporate critical thinking. A possible reason for the findings of the present study in this regard could be due to the distinctive feature of WebQuests in providing the learners with in-depth understanding of the content, which is achieved through applying critical thinking and other higher-order thinking skills. The skilfulness feature of critical thinking is thought to be developed only if it is embedded in contexts that provide reliable information (Weinstein, 2000). In the WebQuest-based classroom the learners were provided with reliable sources to develop their critical thinking skills, and that the WebQuest prevented them from straying into inappropriate contents on the Internet.

In a similar vein, Crawford and Brown (2002), March (1997), and Polly and Ausband (2009) propose that WebQuests could provide an instructional environment to develop higher-order thinking skills, which could further support the findings of the present study. A possible reason for the aforementioned findings of the study might be particularly related to the enquiry-oriented activities of WebQuests (Dodge, 2001) that involve and develop the learners' higher-order thinking skills in general and critical thinking skills in particular. Furthermore, Gülbahar, Madran, and Kalelioglu (2010) maintain that WebQuests engage learners in problem solving, judgment, synthesis, and analysis of information, which are all regarded as higher-order thinking skills. In the present study, the EFL learners in the WebQuest-based classroom were involved in the enquiry-oriented activities on the one hand and they were provided with websites and videos related to critical thinking in the five areas of analysis, evaluation, inference, and deductive and inductive reasoning on the other hand, which could subsequently develop their critical thinking skills to a great extent.

Moreover, the sources on the WebQuest enabled the learners to construct their own opinions and ideas about the information presented. They did not rely on others, such as textbook authors, to interpret the information. Therefore, this responsibility of thinking processes (Weinstein, 2000) in the context of WebQuest developed the learners' critical thinking skills to a greater extent. In addition, the interdisciplinary feature of WebQuests (Dodge, 1997) allowed the

learners to think about issues in complex, nonlinear, multifaceted, and more realistic ways, and facilitated their subjective judgement (Weinstein, 2000) in this regard, which subsequently fostered critical thinking skills. Similarly, as the students acted autonomously within the boundaries of the WebQuest, due to their control over the content and their interest in this regard, they could adequately get, retain, and use the presented information (e.g. Sankaran, Sankaran, & Bui, 2000). This autonomous action in the context of WebQuest could subsequently develop the students' understanding and skills to critically evaluate the developed criteria, which is regarded as another influential consideration for critical thinking development (Weinstein, 2000). Additionally, the learners in the WebQuest-based classroom could adopt and develop their critical thinking skills by self-, peer-, and/or teacher-correcting of the criteria and the procedural norms employed to characterise their analysis, evaluation, inference, and deductive and inductive reasoning (Weinstein, 2000). Finally, the ability of the Web-Quest to contextualise the learning processes and to introduce a variety of situations and viewpoints enabled the learners to apply and develop their critical thinking skills in different contextual settings (Weinstein, 2000).

However, the learners in the WebQuest-based classroom had lower scores than the face-to-face classroom in the inductive reasoning skill. This might be due to the reason that the learners in the WebQuest-based classroom had access to WebQuest as the main source of information before attending the class, sothey approached the course content in general and deductively which possibly accounted for their deductive orientation and consequent lower scores in inductive reasoning. In addition, the resources were prescribed by the researcher/ instructor to prevent the learners from visiting inappropriate websites and misinformation. Starr (2000), in this line, argues that the main focus of WebQuests is on using information rather than looking for it.

In addition, the quantitative findings of the present study indicated that Web-Quest-based classroom was more effective and efficient than the face-to-face classroom in developing the learners' academic writing skills both in the short and long term. The findings of the study in this regard are in agreement with those of Termsinsawadi (2009) and Lee (2013) who argue that learners' writing skills in the WebQuest-based instruction class significantly and positively improve and outperform those in the traditional instruction class. In the current study, this might be attributed to the way the writing input was provided in the two instruction methods. In the face-to-face writing instruction, the writing input comprised printed materials which was presented mainly by the researcher/instructor in the classroom. However, in the WebQuest-based classroom, the writing input comprised the Web-materials which was presented on the WebQuest. The learners spent a substantial amount of time to surf and read an abundance of relevant online materials about the academic writing topics on the WebQuest and then did their academic writing tasks accordingly. This process of reading to writing in the WebQuest-based classroom is supported by

Krashen (1985), who argues that rich and comprehensive reading input lead to better writing performance. Additionally, the findings might be due to the authenticity of the tasks which is a prominent feature of the WebQuests that motivates the learners to be actively engaged in the learning process (Termsinsawadi, 2009). In other words, the online materials offered on the WebQuest could be characterised as the language input that has got 'linguistic complexity, quality, quantity, variety, genuineness, and relevance' (Doughty & Long, 2002. para. 3).

Another reason behind such findings could be due to the higher-level thinking skills activated through the authentic tasks and activities in the WebQuest-based instruction (Lee, 2013). With regard to the findings, it could be argued that the development of higher-level thinking skills might have been the results of applying the WebQuest-based classroom, which could further contribute to the academic writing skills. Moreover, critical thinking skills, regarded as higher-level thinking skills, which was another main feature of the study to be included and developed via the WebQuest-based classroom, might have also influenced the academic writing skills positively. In addition, the follow-up class discussions between the learners and the researcher/instructor and among the learners themselves about the critical thinking skills (i.e. analysis, evaluation, inference, deductive and inductive reasoning) and academic writing skills (i.e. task achievement, coherence and cohesion, lexical resource, and grammatical range and accuracy) used in the WebQuest and applied in the learners' academic writing tasks could have enriched the quality of the learners' academic writing skills to a greater extent.

In the present study, the WebQuest-based classroom provided the learners with sufficient information about academic writing skills, so they could properly and confidently plan their writing, use the gathered information to support the main ideas in their writing, and write some drafts first and then revise and edit with appropriate task achievement, coherence and cohesion, lexis, and grammatical structures. Among other priorities of the WebQuest-based classroom over the face-to-face classroom were that the learners were more motivated to learn, it covered all the materials in a shorter period of time, and encouraged a more student-centred course by providing the learners with various Web-based resources to work independently.

The qualitative findings in the present study indicated that EFL learners had positive perceptions towards the impact of the WebQuest-based classroom on their critical thinking and academic writing skills. The learners' satisfaction and positive perspectives in the WebQuest-based classroom might be mainly due to the student-centred feature of the WebQuest-based classroom in which they could view the instructional videos and read the resources as many times as they need to be prepared for the class-time. Moreover, out of class activities, enquiry-based activities, and the particular application of formative assessment for evaluation i.e. giving and receiving feedback in the process of learning might be the

other main characteristics of the WebQuest-based classroom over the face-to-face classroom.

The findings of the study in this regard are in line with those of Aydin (2015), Hung (2015), March (1997), and Gülbahar et al. (2010) who found positive attitudes and perceptions of the learners towards the WebQuest instruction class, the results also supported by the findings of Zheng et al. (2005). Furthermore, findings of some studies have indicated that not only adult EFL learners (as in the present study) but also the learners in all grades preferred WebQuest-based instruction to traditional teaching methods (Abbitt & Ophus, 2008). In line with the findings of the study in this regard, Termsinsawadi (2009) indicates that learners enjoy using the WebQuests, which they believe is due to the authenticity of the tasks in the WebQuest-learning context. Therefore, when learners are highly engaged in the authentic activities of the WebQuest-based classroom and have positive attitudes and perceptions, they try to actively involve themselves in exploring, discussing, questioning, and constructing the learning processes and outcomes, which could further promote their higher-order thinking skills. Another possible reason for this result (i.e. learners' positive perceptions towards the WebQuest-based classroom) could be related to the structure of WebQuest-based classroom which made the content (i.e. critical thinking and academic writing skills) more interesting for the learners. First, the topic was introduced to the learners, next the task which they needed to accomplish, then the useful links to relevant websites and videos which they were required to follow, study, and accomplish step by step, and after that they were evaluated based on what they had learned. Another possible reason was that the learners' understandings were checked and assessed each session while they were involved in cooperative activities. Moreover, the findings in this regard might be attributed to the learners' preferences towards enquiry-based activities or technology-based activities.

5. Conclusion

The findings of the current study suggest that conducting a WebQuest-based classroom contribute to EFL teachers to develop EFL learners' critical thinking and academic writing skills more effectively and efficiently both in the short and long term. The EFL teachers can create WebQuests to provide the learners with instructional videos, authentic and collaborative learning activities, and authentic assessment and constructivist learning to not only develop their critical thinking and academic writing skills but also appropriately cover all the learning materials in a reasonable amount of time. It also behoves the EFL teachers to develop a situation in the WebQuest-based classroom that stimulates the learners to think critically, solve problems, and construct knowledge that is most meaningful to them, and do not create a prescriptive learning situation, which is common in the traditional face-to-face classrooms. EFL teachers are further recommended to sufficiently scaffold the learners, in the WebQuest-based

classroom on the one hand, and encourage them to take more responsibility of their own learning on the other hand.

The EFL learners are recommended to autonomously surf the instructional resources and develop their critical thinking and academic writing skills in the WebQuest. The findings could be also fruitful for the learners with minimal English language proficiency by having their own time and space to surf the different resources in the WebQuest and think more deeply about the different areas of critical thinking and academic writing. Moreover, it behoves EFL educators to acknowledge the use of WebQuest-based classroom and how it develops EFL learners' critical thinking and academic writing skills.

However, due to some limitations, the present study might provide suggestions for future research. In this study we recruited a small number of EFL learners (10 learners in each class) due to the limited availability of the participants taking part in the study and the complexities involved in academic writing which is both demanding and time-consuming, however, we could enhance the accuracy of the findings. Moreover, as the participants in this study were originally weak critical thinkers (Soodmand Afshar & Rahimi, 2014), the findings of this study might not be generalised to EFL and/or English as a second language (ESL) learners having higher critical thinking skills. Therefore, it is recommended that this study be replicated while recruiting EFL and/or ESL learners with moderate or high critical thinking skills to see if the same instructional procedures could enhance their critical thinking skills. It is further recommended that this study be replicated with a large sample size for a longer time to see if the WebQuest-based classroom could develop the weak EFL learners/critical thinkers' critical thinking skills to more than the CCTST score of 12, which was found to show fundamental weaknesses in critical thinking skills (Facione & Fcione, 1993). Similarly, as the participants were all at the same proficiency level, further research could be carried out by a larger sample size or on the learners with different proficiency level.

In addition, due to the reason mentioned in the procedure section, we did not interview the learners in the control group to explore their perceptions towards the impact of the face-to-face classroom on their critical thinking and academic writing skills, which might be regarded as a limitation of the study. The other EFL researchers might replicate the same study and explore and compare the EFL learners' perceptions towards the impact of both WebQuest-based and face-to-face classrooms on their critical thinking and academic writing skills.

In addition, future research could be carried out on different language skills (along with critical thinking skills) particularly reading comprehension in which the effects of WebQuests on schematic and systemic knowledge of the learners could be explored. It is assumed that activating background knowledge through engaging learners in pre-reading activities will contribute to their comprehension more in top-down processing. Further research could possibly investigate

the contribution of WebQuests to the learners' performance of different reading strategies, such as inferencingand main idea, across various proficiency levels.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Appendix

Interview questions, investigating EFL learners' attitudes and perceptions towards WebQuest-based classroom.

1. What was something specific that you enjoyed about this learning experience?
2. What were some specific concerns or difficulties that you had during this learning experience?
3. What were your typical approaches to studying and the average effort you put into each lesson?
4. Did you observe any changes in your or others' attitudes towards this learning experience? What are some specific examples? How did they hap-pen, and why?