



Research Article

The Effectiveness of WeCWI-Enabled Web-based Instructional Tool to Improve Writing Performance and Critical Thinking Level among Undergraduate Students

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Abstract

The complexity of the writing skill, low literacy skills, interlanguage errors, low language proficiency, lack of critical thinking, poor information literacy and second language (L2) writing anxiety, which is supported by the two-semester course performance analysis, result in the poor writing skill among one of the Malaysian universities' undergraduates. A solution focusing on literacy, language, cognitive and psychological developments is highly needed to improve learners' writing performance and critical thinking. In response to the writing needs of UiTM learners and instructors, as well as the limitations found in the existing web-based writing systems, a framework named Web-based Cognitive Writing Instruction (WeCWI) was formulated to develop a tool of web-based instruction (WBI) to facilitate the L2 writing process. This study aims to investigate the effectiveness of the WeCWI-enabled WBI tool using a blog on the writing performance and critical thinking level by conducting pre-and-post-tests using a quasi-experimental design. The duration of the study is two weeks, and a convenient sampling method was opted. Based on the analysis of two-tailed paired samples T-Test ($p > .05$), the results show that the writing performance and critical thinking of the learners improved slightly with no significant difference between the pre-test and the post-test for the writing performance and critical thinking respectively. These findings are essential to refine the WeCWI-enabled WBI tool, interface design, research procedure and instruments before carrying out the future study.

Keywords: Web-based Cognitive Writing Instruction (WeCWI), web-based instruction (WBI), writing performance, critical thinking.

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Introduction

Background

Due to the global impact of the internet, the positive outcome of web-based writing instruction, and the need for a supplementary online writing programme for university students, a framework named Web-based Cognitive Writing Instruction (WeCWI) was developed (Mah, 2015a, 2015b). WeCWI is a theoretical-and-pedagogical-based framework formulated in response to the poor writing skills of Universiti Teknologi MARA (UiTM) Penang Branch undergraduates in seven perspectives, which possesses its significance in literacy, language, as well as cognitive and psychological developments. Blogger was opted as the host of WBI due to its three simple steps with zero on-going cost to create a blog. Furthermore, the injection of web widgets exposes learners to language learning materials related to the course objectives and learning outcomes. Better outcomes in both language and cognitive developments are highly anticipated if the learners are more engaged throughout the L2 learning process.

Problem Statement

As compared to the other language skills such as listening, speaking and reading, writing is widely known as the most formidable skill to acquire and learn (Allen & Corder, 1974; Beare, 2011; Cook, 2001; Haynes, 2010; Noorzaina Idris, 2009; Noriah Ismail et al., 2005; Rohayah Nordin & Naginder Kaur Surjit Singh, 2003; Yah Awg Nik et al., 2006). Writing is also claimed as a challenging skill to be acquired by learners of English as a Second Language (ESL) (Faizah Abd Majid, 2007; Chitra Muthusamy et al., 2010) since the written words in English require a higher formality, accuracy, reflection and readers' expectations (Beare, 2011). According to Nor Aslah Adzmi et al. (2009), writing could be the contributing factor of the high failure rate in report writing results among

UiTM Industrial Design students in the past semesters. Besides, the complexity of writing skills, poor literacy skills, interlanguage errors, low language proficiency, lack of critical thinking, low information literacy and L2 writing anxiety result in poor writing skills among UiTM undergraduates (Mah & Khor, 2015).

Moreover, based on the performance analysis of BEL422 Report Writing in UiTM (Penang), most students scored B and B+, but none of them scored A+. The average score of both Civil and Electrical Engineering undergraduates is below 73, which shows a drop of 7% to the overall performance of the Electrical Engineering undergraduates (Mah, Irfan Naufal Umar, & Thomas Chow, 2013). A proper solution focusing on literacy (complexity of the writing skill and low literacy skills), language (interlanguage errors and low language proficiency), as well as cognitive (lack of critical thinking and low information literacy) and psychological (L2 writing anxiety) developments are needed to improve the students' writing performance and critical thinking; therefore, a call for WeCWI-enabled WBI tool grounded in theoretical-and-pedagogical basis using one of the most preferred web 2.0 platform, blog, was initiated to facilitate the L2 writing process.

Research Objectives

Based on the research gap, a theoretical-and-pedagogical multidisciplinary WBI framework, WeCWI, was developed targeting literacy, language, as well as cognitive and psychological developments to improve learners' writing performance and critical thinking. Several principles of theories, approaches and models extracted from language acquisition, composition studies, cognitive theories and e-learning are integrated into the instructional design to develop a WeCWI-enabled instructional tool using a blog embedded with the web widgets. Thus, this study aims to investigate the main effects of the WeCWI-enabled WBI tool on the writing

performance and the critical thinking level of the students. Specifically, the first research objective is to determine the learners' writing performance after using the WBI tool. Second, the research identifies the effect on the learners' critical thinking after using the same tool. Next, the third objective is to identify the difference in the writing performance between the pre-and-post-tests while the last objective is to find out the difference in the critical thinking level between the pre-and-post-tests.

Research Questions

Based on the four research objectives, the research seeks the answers to the following research questions:

1. What is the students' writing performance after using the WeCWI-enabled WBI tool?
2. What are the students' critical thinking levels after using the WeCWI-enabled WBI tool?
3. Is there a significant difference in the writing performance between the pre-and-post-tests?
4. Is there a significant difference in the critical thinking level between the pre-and-post-tests?

Literature Review

Web-based Cognitive Writing Instruction (WeCWI)

Web-based Cognitive Writing Instruction or WeCWI is a theoretical-and-pedagogical-based multidisciplinary framework employed in the design of the WBI tool. WeCWI is formulated as a synthesis of several principles of theories, approaches and models from four different domains of studies: language acquisition, composition studies, cognitive theories and e-learning. The injection of web 2.0, blog, into the framework complements the whole instructional process to enhance the writing performance and critical thinking level of the L2 learners.

As highlighted in the WeCWI framework, instructors can enhance their learners'

literacy development through free reading, enterprises and a guided writing approach. Free reading is a reading activity conducted voluntarily in an informal setting (Krashen, 1992). By using the WeCWI-enabled WBI tool, the web widgets offer direct access to specific online reading materials such as news, vocabulary and grammar tips. Besides, instructors can give formal instructions or "enterprises" based on the course objectives to their learners to read the targeted reading materials by answering the online writing tasks.

Additionally, WeCWI emphasizes the integration of interactive media to assist the writing steps by formulating the abstract ideas using a guided writing approach (Lan, Hung & Hsu, 2011). Learners are guided on the purpose of writing, the form of writing, and the recursive writing process by following Yan's (2005) six typical writing steps based on Badger and White's (2000) process genre approach. More functions and up-to-date reading materials are easily accessed via web widgets in an online learning environment. Since all reading materials are presented in English, more reading can boost up learners' literacy development, which will lead to better writing skills (Krashen, 1992).

Moreover, WeCWI offers a rich second language acquisition (SLA) environment via social skills developed by instructors for their learners to have discussions with them, encourage them to collaborate with their peers, as well as interact with the digital content independently. Since discussion associates closely with the interactionist model of language acquisition (Goh & Silver, 2004), the language input and output, negotiation and interactional feedback found in the conversational patterns emphasize the correctness of meaning, form and function (Goh & Silver, 2004). Based on the e-learning interaction-based model from Anderson (2004a), the online discussion via a real-time chat room and Twitter as an instructional tool allows the guidance and feedback to be transmitted synchronously

and asynchronously through computer-mediated communication (CMC).

In addition, learners can collaborate with their peers through writing tasks. This scaffolding process helps to increase their zone of proximal development (ZPD) to accomplish the tasks with lesser language errors in spelling, vocabulary and grammar. Language can be both acquired in a subconscious process as well as deliberately, as claimed by Krashen's (1992) acquisition-learning hypothesis through meaningful interactions with the learning contents via web widgets and hypertext embedded on the instructional tool.

Furthermore, the use of the internet for language learning develops L2 learners' critical thinking (Faizah Mohamad, 2007). WeCWI enhances learners' cognitive development through the process of reading, discussion and writing in an online learning environment. Based on Bruce and Davidson's (1996) inquiry model, the writing tasks presented on the blog posts focus on information exploration through questioning. Learners must read, analyse, evaluate and reflect the search results to search for the answers concerning the writing tasks. The reading process helps learners generate new ideas, connect to the existing knowledge, draw conclusions, validate inferences, and finally resolve the problems (Krashen, 1992).

Besides reading, the online discussion also promotes the "cognitive presence" highlighted in the community of the inquiry model (Garrison, Anderson, & Archer, 2000), which stimulates various cognitive processes and critical thinking skills when seeking solutions. If the answers are typed as comments on the blogs, the relationships of the ideas can be visualized—better solutions can be generated, and most importantly, learners' information literacy and critical thinking can be improved.

WeCWI-Enabled WBI Tool

A blog was applied as the WBI tool of WeCWI in the study, which is a website hosted by Blogger. It is developed by the Blogger team based on a highly customizable HTML template. Technically, a blog generates dated text entries or posts on a specific topic in a reverse chronological order. Blogger is selected since the blog owner can modify its interface design through the on-screen layout editing feature. Additionally, it is supportive of many third-party web widgets.

A web widget is a stand-alone multimedia application developed by a web publisher that may appear in a combination of text, graphic, audio and video. It is a chunk of customizable codes created in JavaScript, HTML, Cascading Style Sheets (CSS), or Adobe Flash format, which can be installed by copying and pasting them during the blog editing mode. The web widgets can be effortlessly embedded by copying the given chunk of codes (HTML or JavaScript) and pasting them in the box named "Add a Gadget" in the on-screen layout editing platform. It can also be edited and removed by clicking on "Edit" in the bottom right corner of the box. With its customizable layout editing, the blog interface can be embedded with the web widgets or the hypertext, sharing the identical features at the fixed positions.

Five zones are commonly found in a blog: header, page, post, sidebar and footer. Several web widgets are theoretically located in three different zones: page, sidebar and footer. The header contains the blog title and the menu to access different pages and posts. The pages contain the menus of Setup, and Step 1 to Step 6, while the post labelled as Tasks contains modules, questions, comments, home and post feed subscription. Before the treatment, Setup allows learners to identify the critical steps, submit the forms, sign up the required online accounts, and complete the tasks based on the learning schedule. Each zone has different sections, and each section has its purpose that comes with different features, as shown in Table 1.

Table 1: Purposes and Features of the Sections in Different Zones of WeCWI-Enabled WBI Tool

Zone	Section	Publishers	Features	
Header	Blog Title	Blogger	It displays the title of the blog. Learners can identify the right blog he/she is using.	
	Menu		It allows learners to access different pages and posts. Learners can access the Setup, Step 1-6, and Evaluation menus directly by a single click.	
Page	Setup	Google Docs: WeCWI-Enabled WBI Tool Manual	Learners download, read and identify the overall concept and usage of the blog.	
		Google Docs: Consent Form	Learners fill up and submit the online consent form.	
		Sign Up: Chatroll, Twitter, Nabble Forum, and Box.net (Hyperlinks)	Learners sign up the accounts of Chatroll, Twitter, Nabble Forum and Box.net, which are required to be used in specific tasks.	
		Google Calendar: Learning Schedule	Learners can monitor their progress to complete their tasks on time.	
	Step 1	YouTube Playlist	YouTube Playlist	Learners watch the selected streaming video clips from YouTube.
		SlideShare Presentation Pack	SlideShare Presentation Pack	Learners read the selected online presentation slides.
		Scribd Collection	Scribd Collection	Learners read the selected online articles.
		Twitter Search	Twitter Search	Learners read the messages from Twitter on report writing.
		OneLook Dictionary Search	OneLook Dictionary Search	Learners search dictionaries to identify the word or phrase's meaning.
	Step 2	Scribd Collection	Scribd Collection	Learners read the selected online articles.
		SlideShare	SlideShare	Learners read the selected online presentation slides.
	Step 3	Sweet Search	Sweet Search	Learners search for online information.
		Google Gadget: Google Scholar	Google Gadget: Google Scholar	Learners search for online scholarly articles.
		Online Reference Lookup Box	Online Reference Lookup Box	Learners search for online references.
		Google Gadget: Yahoo! Answers	Google Gadget: Yahoo! Answers	Learners search available answers to clarify their questions.
	Step 4	Nabble Forum	Nabble Forum	Learners sign up as members to publish their comments according to different topics in the forum. The instructor gives feedback in the same forum.
	Step 5	Box.net	Box.net	Learners sign up as members to upload their reports to the server. The instructor downloads their reports from the server and reads the reports in a soft copy.
	Step 6	Google Gadget: Im	Google Gadget: Im	Learners translate words or phrases from

		Translator	their mother tongue to the target language.
		Google Gadget: Longman Dictionary	Learners identify the word's meanings.
		Google Gadget: Merriam-Webster's Dictionary and Thesaurus	Learners identify the word's meanings and synonyms.
		Google Gadget: WhiteSmoke Grammar Checker	Learners check the grammar accuracy of their writing, sentence by sentence.
		Google Gadget: Answer.com Search	Learners find answers from multiple sources.
Post	Tasks	Blogger: Writing Modules	Learners need to complete the tasks in modules listed in numbers from 01 to 08.
		Blogger: Question	Learners must go through the steps (1-6) as specified in the task before answering the question.
		Blogger: Comments	Learners answer the tasks individually by clicking the Comments. The instructor annotates the comments via Reply below each comment. All submitted comments are moderated and published in the following week to avoid plagiarism.
		Blogger: Home	Click Home to return to the task.
		Blogger: Post Feed Subscription	Post feed can be subscribed via this link.
Sidebar	News	Google Gadget: BCC World News	Users can access daily global news.
		Feedzilla: Malaysia News	Users can access Malaysia's daily news.
Sidebar	Vocabulary	The Free Dictionary: Word of the Day	Users can identify daily words' meanings, synonyms and their usage.
	Grammar	Google Gadget: Grammar-Monster.com Daily Tips	Users can identify the common grammatical mistakes.
Sidebar	Synchronous Discussion	Chatroll	Learners have real-time communication between users and instructors or users and other users.
Sidebar	Asynchronous Discussion	Twitter Profile	Learners read the instructor's message from the instructor's Twitter profile.
Footer	Attribution	Creative Commons Attribution-NonCommercial-NoDerivs 3.0	Learners are informed about the site's attribution.
	Help	Answer.com: Answer Tips	Learners double-click any word on the AnswerTips-enabled page and read the definitions and fast facts in small bubbles.

Web widgets are used in a relatively straightforward way to design instructional activities to increase the interactive

features of the blog. The web widgets are embedded on the blog in the form of on-screen applications, which have turned the

blog content into a dynamic L2 learning environment for writing instructional purposes. The web widgets come in many shapes, sizes and functions, which can enhance the web browsing experiences for instructors and learners when visiting the blog.

As mentioned by Wilson et al. (2007), web widgets share three values for meaningful language learning purposes. First, the abundant existing educational web widgets and their ease of installation offer an enriched learning environment with a new functionality. Second, more collaborative web widgets are made available with multiple sharing methods. Lastly, web widgets provide a very attractive and interactive user interface, which may improve user engagement among its content, learners and instructor.

Writing Performance

Writing is a performance (Greenblatt, 2007), while in linguistics, "performance" is referred to as the linguistic behaviour of an individual, such as the ability to write a particular language (Performance, 2014). "Writing performance" in this study is a measurement of English proficiency in writing among L2 learners through essay writing. The essay is examined based on an analytic evaluation scoring guideline, namely ESL Composition Profile created by Jacobs, Zinkgraf, Wormuth, Hartfiel, & Hughey (1981). It examines ESL composition in five different aspects: content, organisation, vocabulary, language use and mechanics. Two argumentative essays are written to measure learners' writing performance before and after receiving the treatment during the pre-test and post-test based on the topic recommended by Fleming (2012) that engages writers' opinions on agreeing or disagreeing with a debatable issue.

As named by Fleming (2012), ESL Composition Profile is used to rate the essays in five weighted traits: content, organization, vocabulary, language use and mechanics. Each trait is broken down into four sub-traits, which is a four-level proficiency scale arranged from the highest

score on top to the lowest at the bottom. Since ESL Composition Profile is a weighted rubric, content constitutes the highest scores (30) followed by language use (25). Organization and vocabulary share the same maximum scores (20), while the lowest is mechanics (5). The sub-traits are labelled based on the scales such as "excellent to very good", "good to average", "fair to poor" and "very poor". Each scale has a set of typical descriptors; each descriptor has a set of criteria as references for the examiners to distinguish the sub-traits at different levels.

Critical Thinking

"Critical thinking" in this study refers to the learner's cognitive abilities in seven dimensions as defined by a critical thinking rubric created by Washington State University Critical Thinking Project, namely WSU Critical Thinking Rubric (Kelly-Riley et al., 2001). It covers seven key areas of critical thinking that include problem identification, the establishment of a clear perspective on the issue, the recognition of alternative perspectives, context identification, evidence identification and evaluation, the recognition of fundamental assumptions implicit or stated by the representation of an issue, and the assessment of the implications and potential conclusions. This rubric has sustained cumulative inter-rater reliability of 80% in formal studies (Kelly-Riley et al., 2001).

WSU Critical Thinking Rubric is an analytical rubric that breaks down critical thinking into seven dimensions, unlike most of the holistic rubrics that combine different kinds of thinking into a single category. Analytical rubrics are recommended to be used as a student progress diagnostic tool to reflect upon and revise their teaching methods, instructional performance and assessments (Peirce, 2006). By combining the holistic scoring methodology with the expert-rater methodology, WSU Critical Thinking Rubric utilizes a six-point scale for evaluation that specifies the highest (Substantially Developed) and the lowest (Scant) levels of

performances and three intervening levels between them (Kelly-Riley et al., 2001).

Methodology

Population and Sampling

Due to the homogeneity factor, the samples consisted of two groups of diploma students from the Chemical Engineering Faculty who had registered for the English proficiency course, namely Preparatory Course for Malaysian University English Test (MUET). Two groups of students taught by two senior English lecturers were involved in this study. Both instructors were females and almost similar in terms of age, qualifications, seniority, teaching experience and department. By using the convenient sampling method, two intact groups (25 students) were selected and exposed to the treatment.

Treatment of Study

Both instructors were guided on how to use the blogs before explaining to the students in the language laboratories prior to the treatment. Six tasks have been identified by the instructors to be completed by the students within the six lessons in two weeks due to the viability of the course learning outcomes and level of difficulty. During the first lesson in the following week, a post-test was carried out using the same format of essay writing. Again, the students' essays were collected and examined by the same raters based on the similar scoring rubrics for the writing performance and critical thinking.

Research Procedures and Instruments

Three research instruments were used, pre-test and post-test, ESL Composition Profile and WSU Critical Thinking Rubric, during the two-week study. The research participants' writing performance and critical thinking level were measured by using the ESL Composition Profile and WSU Critical Thinking Rubric in the pre-test before the treatment and post-test after the treatment. Their SPM English results were

recorded and divided into two groups: upper proficiency (A+, A, A-, B+, B) and lower proficiency (C+, C, D, E, G).

As a formal procedure of research ethics fulfilment, the students were given a consent letter with a consent form to be endorsed in the first lesson. A pre-test was conducted to each group of students in the form of essay writing after getting the informed consent from the students. They were instructed to write their essays on the provided answer sheets limited to 60 minutes of duration. Later, the students' essays were collected for grading by two independent raters using ESL Composition Profile and WSU Critical Thinking Rubric.

Pre-Test and Post-Test

The pre-test and post-test consist of different essay writing questions adapted from 50 argumentative essay topics, which are recommended by the Academy of Language Studies (2009). The tests engage the writer's critical thinking to express his or her opinion on agreeing or disagreeing with an issue. After completing the six tasks within two weeks, two different sets of argumentative essay questions of comparable difficulty were given during the pre-test and the post-test to the students. Based on the MUET writing test specification, the length of the essay is not less than 350 words, and students were given one hour to complete the essays in the pre-test and post-test.

The instructor was the one who administered and monitored the progress during the pre-test and post-test to prevent the Hawthorne or observer effect. The evaluation of the essays in the pre-test and post-test was based on analytic rubrics applied to determine the students' writing performance and critical thinking level. Both analytic scoring instruments were used by two independent examiners who were senior English lecturers with more than 20 years of experience in the ESL context.

Findings and Discussion

Table 2: Results of Writing Performance and Critical Thinking Level

Results		M	N	SD	Improvement (%)
Pre-test	Writing Performance	70.36	59	9.90	-
	Critical Thinking	20.91		10.00	
Post-test	Writing Performance	71.47		4.10	1.57
	Critical Thinking	21.58		3.82	3.20

Table 3: Results of Two-Tailed Paired Samples T-Test Based on Pre-Test and Post-Test Results

Results		N	Paired Differences		T	df	p
			M	SD			
Pre-test- Post-test	Writing Performance	59	1.10	8.19	1.03	58	0.306
	Critical Thinking		0.68	3.21	1.62	58	0.110

As shown in Table 2, both writing performance and critical thinking improved slightly, as much as 1.57% and 3.20%, respectively. These improvements can be justified based on the treatment from two different perspectives: WeCWI-enabled instructional tool and web widgets. However, since the students had a limited exposure in two weeks by only answering six selected tasks from three modules, the difference between the pre-test and the post-test for the writing performance and critical thinking based on the analysis of two-tailed paired samples T-Test as depicted in Table 3 are not significant ($p > .05$), which $p = .31$ and $p = .11$ respectively.

Learners' literacy development was enhanced through the instructional tasks and media found on the WeCWI-enabled instructional tool focussing on free reading, enterprises and a guided writing approach. The integrated interactive media facilitates the writing steps for the learners to formulate and construct their abstract ideas. They were able to identify the purpose and the form of writing through the recursive writing process via Yan's (2005) six typical writing steps (Preparing, Modelling and Reinforcing, Planning, Joint Constructing, Independent Constructing

and Revising) while completing the online tasks. The "Preparation" step helps to activate the learners' schemata through anticipating the structural features of the genre. Next, in the "Modelling and Reinforcing" step, comparisons were made by the learners with other texts, which could reinforce what they had learned about a specific genre. Their schemata could be triggered about the selected topic during the "Planning" stage, which developed their topics' interest through experience. "Joint Constructing" supports the learners' independent composing process. The final draft provides a model for learners to refer to when working on the individual report. Later, learners composed their essays based on their topics independently in the "Independent Constructing" stage. Lastly, learners had their reports ready in the end after editing and revising in the "Revising" step.

Along with the beneficial pedagogical writing steps, the WeCWI-enabled instructional tool also offers a rich environment for language development via social skills for the learners to have discussions with their instructors, collaborate with their peers, as well as interact with the digital content independently. Besides, learners' cognitive

development was achieved indirectly through the process of reading, discussion and writing using interactive web widgets. For examples, Google Gadgets offer updated news and articles for the free reading purpose; online dictionaries widgets allow learners to identify the meaning of unfamiliar words. Chat rooms and social media help in problem-solving, provision and confirmation of new ideas, as well as clarification of thinking.

Conclusion

This pilot study is useful to determine the feasibility of the study protocol prior to administering the actual study on a larger scale. This also includes the appropriateness of the treatment and the instruments used for the targeted outcome measure. After conducting the pilot study, all steps and procedures for conducting the actual study will be remained unchanged. However, the subjects of the actual study will undergo a longer duration of intervention. They need to practise more through writing tasks and lessons offered based on the writing modules to achieve a more significant improvement in both the writing performance and critical thinking. Besides, alterations on the treatment should be considered by reducing the number of web widgets on the blog to prevent cognitive overload.

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