

EXPLORING THE EFFECTIVENESS OF COMPUTERIZED CONCEPT-MAPPING IN IMPROVING EFL ACADEMIC WRITING

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Abstract. This presentation reports on a study that examined the effectiveness of computerized concept mapping for improving EFL pre-writing skills and overall performance on academic writing. The study utilized an experimental design of pretest, post-test, control group design that involved three groups: a control group of no treatment, an experimental group of individualized concept mapping and an experimental group of collaborative concept mapping, involving academic writing pretests and posttests. The sample included 34 students in each group enrolled in Writing IV, a course in academic writing in the English department. Participants in the study were subjected to the treatments having been pretested on writing. After the interventions, they were post tested on Version B of the academic writing test. A t-test was used to calculate mean differences. Findings showed that the individual group and the collaborative group outperformed the control group. However, collaborative concept mapping participants outperformed individual concept mapping participants. Pedagogical implications and conclusions are forwarded.

Resumen. Esta presentación informa sobre un estudio que examinó la efectividad del mapeo conceptual computarizado para mejorar las habilidades de preescritura de EFL y el rendimiento general en la escritura académica. El estudio utilizó un diseño experimental de pretest, post-test, diseño de grupo de control que involucró a tres grupos: un grupo de control de ningún tratamiento, un grupo experimental de mapeo de conceptos individualizados y un grupo experimental de mapeo de conceptos colaborativos, que incluye pretests de escritura académica y exámenes posteriores. La muestra incluyó 34 estudiantes en cada grupo inscrito en Writing IV, un curso de escritura académica en el departamento de inglés. Los participantes en el estudio fueron sometidos a los tratamientos previamente probados por escrito. Después de las intervenciones, fueron posvaluados en la versión B de la prueba de escritura académica. Se usó una prueba t para calcular las diferencias de medias. Los resultados mostraron que el grupo individual y el grupo colaborativo superaron al grupo de control. Sin embargo, los participantes del mapeo conceptual colaborativo superaron a los participantes en el mapeo de conceptos individuales. Se envían las implicaciones y conclusiones pedagógicas.

Keywords: Computerized concept mapping, academic writing, English for academic purposes (EAP)

1 Introduction

The practice of using technology to deliver coursework in higher education 'has seen a veritable explosion' (Wegner, et al., 1999). The use of technology has not only created new opportunities within the traditional classroom, but has also served to expand learning experiences beyond the popular notion of "classroom" as an interesting, attractive and indulgently interactive media of learning and/or teaching. In this context, Wegner, et al. (1999: 99) writes:

“In many instances, the change to an Internet-based delivery system has been instituted with little or no consideration of the impact on student learning”.

In this regard, Serwatka (2003) notes...

“Because of the popularity of the Internet, and, by extension, the World Wide Web, e-learning has taken a detour from its roots in correspondence courses and teleconferencing. The breadth of this detour would have been hard to predict when Web-based courses began to appear in 1993 {in the United States and over the world}... With this population in mind, the growth in demand for Internet distance learning courses is not surprising. Such courses meet the requirements of these students, allowing them to complete degrees begun years before or to take courses to enhance their employment or improve their skills.”

With the growing advancement in information technology and its applications to language learning and teaching, computerized concept-mapping (CCM) can be used to assist EFL students to modify their own concept maps and develop their language schemata expediently through the use of computerized-concept mapping tools. The rapid developments of computer technology have further enriched the cognitive processing of foreign language (FL) learning by posing easier- to-use interfaces that simplify the use of concept maps in teaching and learning.

In this way, using computerized advance organizers helps to enable EFL instructors to show a variety of content to students, which can instigate their interest in the study of content-based language learning or in advanced reading

courses (Hung, Lin & Hwang, 2010). Some researchers could prove that computerized concept-mapping can provide appropriate presentation strategies for content in the FL curriculum for students of different ages (Chu, Hwang, & Huang, 2010; Hagemans, van der Meij, and de Jong, 2013; Hwang, 2003; Smith, 2000; Sung, 2008).

In addition, CCM can offer visualized materials such as relating semantic units, word relations, word connotations, local and global information in reading texts, etc. Research indicated that use of these features related to CCM can help students to develop mental models for what they learn and augment both students' and teachers' autonomy and flexibility (Kennewell, 2005; Novak, 1990; Panjaburee, Hwang, Triampo & Shih, 2010; Xu & Moloney, 2011). According to Ausubel (2002), the role of CCM is to "provide an ideational anchor for the stable incorporation and retention of more detailed and differentiated learning materials" (p. 117).

However, research suffers paucity as regards the applications of CCM to EFL writing classes. Previous research is also short of investigating the effects of CCM on EFL college academic writers' performance. Therefore, this study seeks to explore the effects of using two approaches to using CCM treatments in improving the performance of EFL students in an advanced academic writing course (Writing 4: English for Academic Purposes). The research question underlying this study summarizes the problem of the study as follows: What are the effects of individualized computerized concept mapping and collaborative computerized concept-mapping versus no treatment on writers' performance in the EAP course?

2 Literature Review

An examining look into the writing course books commercially produced for essay writing instruction in the world market reflects the position that instructional materials in second or foreign language teaching have changed after the above model (Tribble, 1997), thus providing a strong rationale to challenge the traditional views on the nature of academic writing (Mayer, 1990). This is a strongly voiced dictum in the research literature; for according to Clenton (2004),

"Employing the process approach within English for Academic Purposes demanded a shift of attention in the case of which, feedback revealed weaknesses with the traditional methods and approaches to student-teacher relationship".

Zamel (1985) elucidated how teachers of writing tended to spend disproportionately huge amounts of time identifying and/or correcting surface level features of students' writings rather than realizing that larger meaning-related problems have been largely ignored consciously or unconsciously. Allright (1988) has had a position in this context. He maintains that with teachers tending to offer a model of instruction as traditionally employed where a model sentence or paragraph or essay is provided to the students and they imitate it in place of non-native students' original productions.

This substitutes their own ideas no matter how badly they are scribbled, no matter how faulty their language is couched, thereby, militating the students' need for autonomy and guidance in developing responsibility for creating their writing, editing, correcting, and proofreading their own writings.

Writing is a social act. Even when writers are English as a Foreign Language (EFL) students in a language classroom context, their texts always reflect their ability to solve a rhetoric problem, and their awareness of their own communicative goals, of the reader, and of the writing context. (Atkinson, 2003). Therefore, Barton and Hamilton (2004) state that:

"...literacy is better seen as a communicative technology involved in the production and reproduction of shared meaning or knowledge. It is the social practices sustaining these meanings that determine the consequent skills associated with literacy."

Arguments that credit literacy as a prime causal factor underlying social change are thus over-simplistic. Rather, literacy is just one factor in a nexus which includes social and political institutions.

In their model of the writing process, Grabe and Kaplan (1996) argue that such a model of writing or similar ones works towards integrating the 'three major concerns for a theory of writing: the writer's cognitive processes, the

linguistic and textual resources which instantiate the writing task, and the contextual factors which strongly shape the nature of writing'(p.229).

Research and literature available on writing, and especially the EAP literature, tends to imply that the process approach is correct, despite its shortcomings and highly demanding nature, especially for non-native speakers of the language, in emphasizing the recursiveness and cyclical nature of writing instruction where 'writers are constantly planning (prewriting) and revising (re-writing) as they compose (write) (Hayes and Flower, 1981: 367). In this context, the stage of planning for writing as where outlining and preliminary techniques of generating ideas like brainstorming in free-writes, clustering, concept-maps, etc., is a unitary stage that stands on its own as a distinctive thinking process recursively utilized by composers during composition (Zamel, 1982: 206).

In the process approach to writing learning and instruction, writing tends to lend itself to re-writing in attempts to find the most apt and commensurate form of the composer's arguments and notions as to anticipate the readers' expectations. Maimon, et al. adeptly describe successful pieces of writing as "pieces not written, but are re-written" (1982:61). Zamel, 1983a; 1983b), furthermore, suggests that the skills of writing transcend over languages from native to non-native languages; or, in other words, transfer of learning or training has an effect on the process of writing; good writers in their native languages are more potentially good writers in their learned foreign languages. Davies (1988) suggests that writing is, realistically speaking, not a process nor a product; writing should be thought of as both a combination of process and product. Davies (1988) defines the genre approach as follows: A genre comprises a class of communicative events, the members of which share some set of communicative purposes...This rationale shapes the schematic structure of discourse and influences and constrains the choice of content and style (p.58).

This background knowledge or schemata build the reservoir of ideas which is made use of in the pre-writing stage by writers; it is examinations that writers in attempting their essays find it impossible to use or have access to readily available databases or information resources as it could be when the learner is situated at home or in the library; this is linked closely to the genre approach which associates process to product; the following figure illustrates the relationship between prior knowledge as manifested in previous experience and previously read or listened to texts as utilized in generating ideas in the prewriting, idea-generating steps which may include freewrites, concept-mapping, listing, clustering, chunking, and such brainstorming mechanisms:

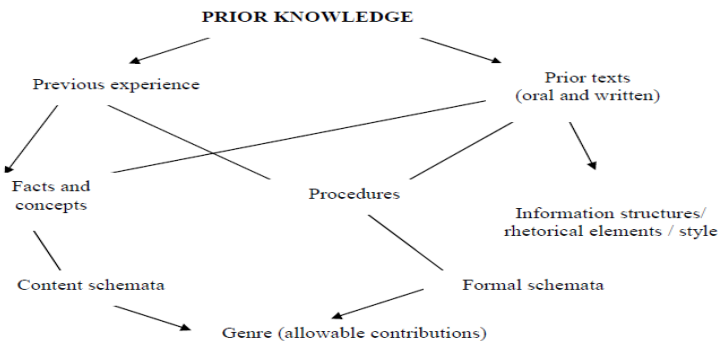


Figure 1. Schemata in writing (Swales, 1990, p. 84)

The literature available on writing pedagogy as succinctly reviewed so far indicates a dichotomy between process-based instruction and genre-based instruction into writing; this is quite misleading for "... the materials used by many teachers of English as a foreign language have been developed much more pragmatically than the research literature might lead one to believe. Rather than depending on a single theoretical position, authors and publishers tend to draw on aspects of the theory that look as if they will be useful" (Tribble, 2003:10).

Townshend (1997) and Bax (2000) elaborated that in such a case, technology is most useful and adds to the experience if it can contribute something which is not already available; therefore, Information and Communications Technology (ICT) is in a good position to do this through concept mapping for connecting language and content in EFL learning.

3 Method

3.1 Participants and Procedures

This study was implemented over a two-class period for 16 weeks. Seventy-five senior students at a southern university located in the South of Saudi Arabia were selected as by convenience as the participants in this study. The students were assigned to three groups: a control group of no treatment, an experimental group of individualized concept mapping and an experimental group of collaborative concept mapping. To investigate the effects of different computerized concept maps on writing performance, all participants went through all three treatments (no-mapping, individual computerized mapping, and cooperative computerized mapping). From week 2 to week 16, the researcher assigned the writing instruction about the syllabus of academic writing to three equally competent teachers who incorporated individualized CCM strategies for the experimental group 1, collaborative CCM strategies for the experimental group 2 and no treatment but the conventional writing course. In the first and second treatments, participants followed the same CCM strategies, but in treatment one, the first group worked individually while in the second group, they worked collaboratively; these strategies were as follows:

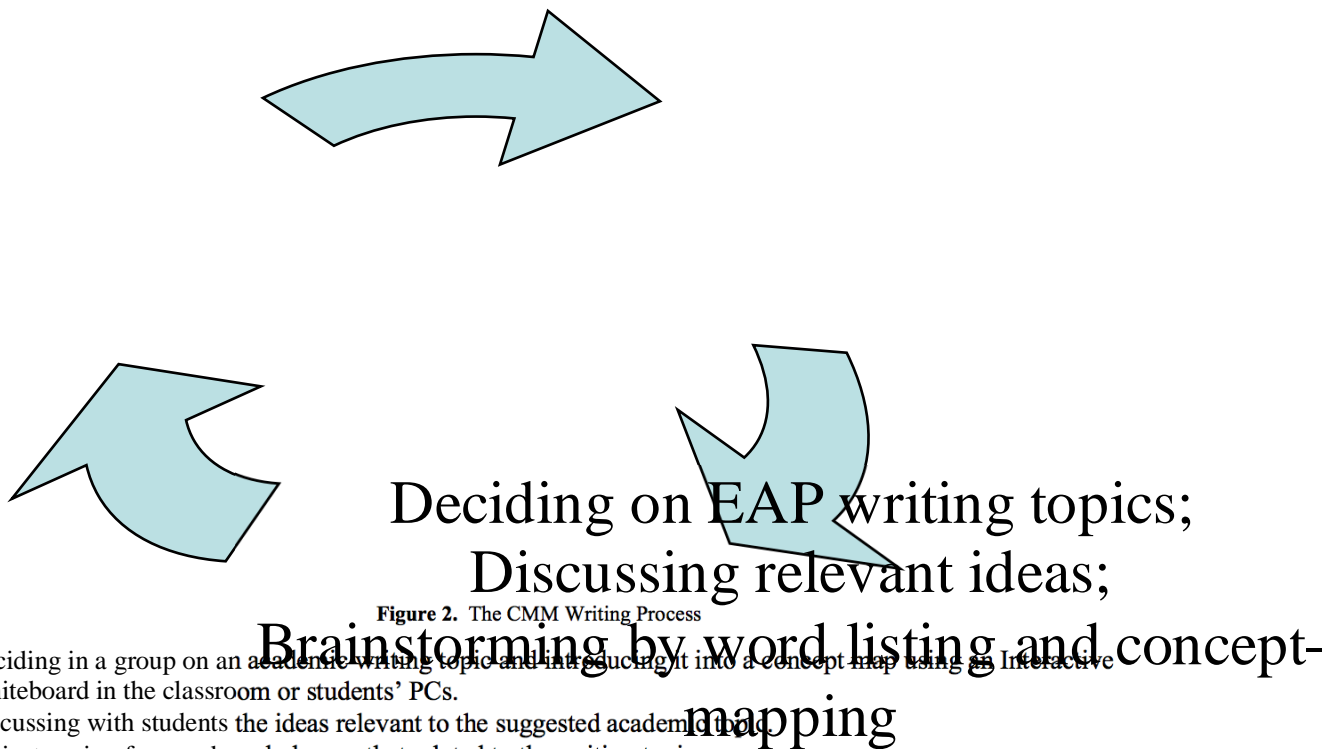


Figure 2. The CMM Writing Process

- Deciding in a group on an academic writing topic and introducing it into a concept map using an Interactive Whiteboard in the classroom or students' PCs.
- Discussing with students the ideas relevant to the suggested academic topic.
- Brainstorming for words and phrases that related to the writing topic.
- Drawing and relating shapes that connect these words or phrases to the main topic in relevant and appropriate relationships using the Insert functions of Shapes and SmartArt of Microsoft Office.
- Branching for subtopics and sub-relationships in the diagrams and shapes to produce information on the EAP writing topics.
- Finalizing the concept map to organize an EAP essay writing project.
- Using the computerized writing concept map as a guide for paragraph and whole essay writing, as a visual representation of the main ideas and supporting sentences.

3.2 Materials and Instruction

The aim of the EAP writing course had been to help students to develop the academic writing skills, including a five paragraph writing structure, academic terminology, punctuation, spelling, and grammar. The writing instruction continued for 16 weeks where the researcher and instructors chose 10 topics for the writing assignments in class and outside of the classroom based on the syllabus. EAP writing topics were introduced each week while students were guided to develop a short guided writing paragraph, relative vocabulary, idioms, and phrases. The length of each

composition was required to be at least 2500-3000 words. Each project had to be completed during the two-hour class classes per week.

4 Results

To explore the effects of the two computerized concept mapping treatments on the writing performance of the learners of EFL, an ANOVA statistical test was conducted where the mapping treatments was a within-subjects factor. To measure the learners' baseline writing scores on the pretest, a baseline academic writing test was conducted in the first week (N = 90, M = 28.94, SD = 2.78).

Descriptive statistics for the three research groups' mean scores on the writing assignments were: no-mapping, NM, (M = 29.36, SD = 2.97), individual-mapping, ICM, (M = 34.04, SD = 3.16), and cooperative-mapping, CCM, (M = 34.00, SD = 3.72). Findings for descriptive statistics show that the mean scores for the three treatments are nearly proximate as summarized in Table 1 below.

Group	N	No mapping		Individualized CM		Collaborative CM	
		M	SD	M	SD	M	SD
NM	25	27.50	3.40	31.50	1.98	32.67	4.17
ICM	25	29.70	2.29	34.53	3.19	35.20	3.62
CCM	25	30.87	2.03	36.10	2.30	34.13	2.94
Total	75	29.36	2.97	34.04	3.16	34.00	3.72

Table 1: Descriptive statistics for the three research groups.

To produce comparisons between the three treatments, an ANOVA statistical test was run, the findings of which are summarized in Table 2 below:

Source	SD	Df	MS	F	P
<i>Within subjects</i>	1306.76	2	653.38	73.96	.00*
<i>Between subjects</i>	506.96	2	253.48	28.69	.00*
Mapping treatments*Writing scores	96.79	4	24.26	2.69	.03*
Error	2276.61	27	8.31		

* $p < .05$.

Table 2: ANOVA for Posttest scores.

Findings demonstrate that the simple main effects of the two mapping treatments were significant for the individualized mapping treatment ($F = 28.38, p < .00$), and for the collaborative mapping group ($F = 34.82, p < .00$) respectively, whereas it was insignificant for the no treatment group ($F = 20.10, p \leq .00$). These findings can be interpreted in a way that shows that the treatments of computerized mapping either with individualized learning or in collaborative learning groups resulted in different writing performances for each group of learners. As a consequence, a Tukey (Φ) multiple comparison test of the adjusted means of the experimental groups was conducted to compare the effects of the mapping treatments, the results of which are summarized in Table 3 below:

	X₁ 43.1	X₂ 43.7	X₃ 67.93
X₁ 43.1	0	0.6 F = .56	24.83 F = 22.99
X₂ 43.7	0	0	24.44 F=22.44
X₃ 67.93	0	0	0

Table 3: ANOVA for Posttest scores.

The table shows that the experimental group of collaborative computerized concept mapping, which received training on the computerized concept mapping strategies in group work, has done on the posttest much better than the other two groups of no treatment and individualized computerized mapping where F between X1 and X3 = 22.99 and between X2 and X3 = 22.44. This result verifies the hypothesis that there are significant differences between the mean scores of students receiving training on collaborative computerized mapping strategies in cooperative group work and students receiving training on either individualized CM strategies or no mapping strategies on the posttest.

5 Discussion and Conclusion

In the present study, it was found out that the use of computerized concept mapping as a pre-writing planning strategy had demonstrated clearly the effects of these strategies on the writing performance of EFL learners than did the no-mapping treatment. Furthermore, collaborative computerized concept mapping was revealed to be even more effective than individualized computerized concept mapping or the no mapping treatment. These results therefore support the previous findings of other researchers (Chu, Hwang, & Huang, 2010; Hagemans, van der Meij, and de Jong, 2013; Hwang, 2003; Kennewell, 2005; Novak, 1990; Panjaburee, Hwang, Triampo & Shih, 2010; Xu & Moloney, 2011; Smith, 2000; Sung, 2008).

In conclusion, computerized concept mapping can be a powerful pedagogical tool for producing and classifying ideas in a logical and hierarchical way, especially proven to be effective in the prewriting phase. The use of computerized concept mapping strategies can help EAP writers to work efficiently in generating ideas for their paragraphs and essays. In this regard, this study findings commensurate with the findings from the Chai study (2006) show that writing performance is significantly related to the pre-writing plan, regardless of what writing level or type of writing course the learners take, since this phase takes the most time (about 70% or more of the writing time goes to the pre-writing stage). The pre-writing stage is a getting-ready-to-write phase, during which EFL learners work to generate the pertinent data relevant to the writing task, while they proceed to set their writing goals, and start working on the assigned writing topics. More importantly, writers at this phase are required to envision and shape the flow of ideas which they generate by using concept maps over the computer into structured key contents. Concept maps then help to change their mentally conceived images into some graphic visualization which works to show whole interrelationships and connect advance organizers of the content ideas for the writing topics and assignments (Ausubel, 2002; Chu, Hwang, & Huang, 2010; Hagemans, van der Meij, and de Jong, 2013; Hwang, 2003; Swales, 1990; Smith, 2000; Sung, 2008).

Furthermore, the mapping process can assist EAP learners to facilitate and activate top down and bottom up cognitive processing of information, as well as augment the recall and memory processes. Therefore, computerized concept mapping helps EAP writers to integrate and adapt their ideas by organizing the writing assignment content with their mental constructs or schemata. Therefore, EAP writers in advanced writing courses need computerized concept maps, especially when they work on collaborative academic writing assignments to produce their ideas, align them with their writing purposes and organize their topic and supporting sentences. When using computerized concept mapping strategies in academic writing, CCM can help improve the learners' ability to effectively organize their conceptual structures of the topics they write on since computerized maps can surpass the potentials of traditional paper-based concept maps and they are easy to generate using the tool bar of Office in a dramatically faster way. Consequently, when the computerized concept mapping strategies are used as pre-writing strategies, EAP writing performance of EFL college learners improves more than in the treatment of no-mapping for academic writing.

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