Concept Maps: Theory, Methodology, Technology
Proc. of the Second Int. Conference on Concept Mapping
San José, Costa Rica, 2006

THE EFFECTS OF 'CONCEPT MAPPING' ON SECOND LANGUAGE LEARNERS' COMPREHENSION OF INFORMATIVE TEXT

Amirreza Vakilifard & Françoise Armand, Université de Montréal, Canada
Agnès Baron, Université du Québec à Montréal, Canada
Email: amirreza.vakilifard@umontreal.ca

Abstract. Numerous empirical studies in first language education have highlighted the positive effects of concept mapping as an instructional strategy for text comprehension (Chang et al., 2002). However, in the context of second language, such research has remained limited. The present study aims at observing the effects of an instructional sequence, based on the most effective approaches tested in first languages, on informative text comprehension in French as a second language. Within the framework of this pilot research, the adult French second language learners of an advanced level from the language school of the 'Université du Québec à Montréal' were subject to a weekly intervention over a 4 week period, while a control group equivalent followed the traditional approach (explanation of new words and expressions, discussion of the key concepts). Before reading an informative text, participants in the experimental group were invited to collaboratively replace the labels in a Fill-in Concept Map. Then, after reading the text, the participants were asked to correct it individually. Over the course of the 4 weeks, we used the instructional strategy of the progressive devolution concept map, which is an approach to scaffold fading. The results obtained with comprehension questionnaires on the reading text specific to each meeting indicated that the experimental group obtained a better performance than the group that had used the traditional approach.

1 Introduction

In our global village, as economies around the world increasingly interact with and affect each other, the mastery of at least a second language (L2), particularly in its written form, has become more and more important. How can we hope "to improve the quality of life" (Grabe and Stoller, 2002) and "to obtain social recognition" (Giasson, 2003), if we do not functionally master the written language? In this context, making it possible for second language learners to improve their comprehension of texts in L2 constitutes an important challenge for language teachers.

2 Text Comprehension

If the ability to process information is an essential skill for the reader, there remains yet another challenge that is still more imposing, especially in educational and academic circles. This challenge is to understand and to be able to build new and meaningful knowledge, restructuring it from the information present in an informative text. According to Fayol and his colleagues (1992), to understand a text is to build a coherent representation of the ideas contained in the text by connecting them to the reader's own experience. To this end, the reader must determine the relations between the successive sentences and those which connect the various parts of the text.
It should be noted here that comprehension in L2 resembles L1 comprehension in several ways. However, because of differences in processing and linguistics (Grabe and Stoler, 2002), comprehension in the two languages is also somewhat distinct.

The interactive-constructive view of comprehension implies that the text itself can be a problem. Certain informative texts can consist of a technical, specific and difficult vocabulary, complex concepts and principles, and particular organizational structures (Graesser et al., 2002). This brings us to an essential question: how can we improve the teaching of reading informative texts so that adult students learning in L2 gain better comprehension?

3 Concept mapping

The specific characteristics of comprehension of informative texts, that is to say the structuring and presentation of information in this kind of texts, led the literacy experts to propose the concept map strategy of teaching to prepare students to exceed these difficulties.

A concept map is a graphic representation which not only transmits basic information, but also presents the relationships, the structures or the characteristics which are not observable in the linear provisions of a text. Thus the map makes it possible to memorize, re-use and retrieve information more easily in the long run, allowing the representation of ideas, of the relationships between these ideas, and of the way in which the reader perceives these

interrelationships. The use of the concept maps in the field of the comprehension of a text is based on the theory of the multiple intelligences (Gardner, 2004), and based on the fact that a map could offer, as a possible alternative, a secondary path towards the comprehension of the same content.

4 Effects of the concept map

The critical analysis of research on concept maps confirms the idea that they are an effective cognitive tool in the field of education, in particular in the context of L1 (Horton et al., 1993). The majority of the studies and experiments done on the subject have focused on the learning of scientific texts (Chang et al., 2002). Saadani and Bertrand- Grastaldy (2000) stress that "there is still a real concern in evaluating the concept maps, whether to judge their usefulness in learning, teaching or research, or to find the best format of representation according to the context of use". In particular, because of the specificity of L2 learners (more limited knowledge of the vocabulary and syntax), to date, studies of the effects of the concept maps according to the format and the period of use (in the stages of both pre and post-reading) on comprehension in L2 are lacking.

Within the framework of this research, our objective is the development, the design and the implementation of reading activities, including the concept maps, in a teaching sequence in order to support the comprehension of informative texts within the context of an L2 class.

5 Implementation of the strategy

The subjects participating in this evaluative pilot study over its four week duration are 18 students. They are selected from the adult students of various mother tongues learning French as a second language at the language school of the Université du Québec à Montréal. They are assigned to either an experimental group (9) or a control group (9). The experimental informative texts taught to the two groups of pupils are identical. The content of the informative texts took varied forms.

6 Measuring instruments

The measuring instrument was a questionnaire composed of 10 items: 5 explicit textual questions (ETQ) which required the students to locate the answer given explicitly in the text, and 5 implicit textual questions (ITQ) which require an understanding of the relationships between the parts of the text. These questions are presented in the form of close-ended (2 + 2) and open-ended (3 + 3) questions which respectively measured the availability and the accessibility of knowledge after the reading of each text. The 4 close-ended questions were built according to the model of the multiple choices questions. The students were to select only one good answer among a choice of 3 or 4 possible answers. The scores allotted to the questions increased according to the order respectively following CETQ, CITQ, OETQ and OITQ. The maximum mark that a student could obtain in a questionnaire was 100 and in total, for four sessions, was 400 (4 * 100).

Moreover, another part of the data was collected by means of an auto-evaluation questionnaire which questioned the students on their perceptions in relation to the difficulty of the texts and the effectiveness of the strategies of teaching (vocabulary versus concept map) used by the professor in the two groups.

7 Development of the experiment

In April 2006, we built the concept maps of the informative texts by means of the Cmap software. We then removed the labels of concept and links so that, during the course of research in May, the members of the experimental group would have the task of replacing the labels, with pencil on paper, in a way that makes structural sense.
A training session took place to sufficiently familiarize the students with the strategy of concept mapping. This stage made it possible to demonstrate the strategy explicitly. Then the students were met with 4 times. In each meeting, the members of the experimental group were invited, before the reading, to collaborate to fill in each of the blank ovals or links of the concept map with an answer from the list of the deleted concepts and links, which enabled them to activate their background knowledge. The task of collaboration encouraged students to articulate their thoughts and work out the meaning of concepts (van Boxtel et al., 2002). After the reading, they were asked to review and correct it individually. At the end of the course, they received a complete feedback report including the correction of their map by the professor.

Over the course of the four meetings, the concept map with progressive devolution (scaffold fading approach) was used. As the experiment progressed, the teacher increased the removal of the concepts integrated into the map (10 - 25 - 40 - 55%), the students having been assigned to restore as much of the map as possible.
The control group, for its part, followed the traditional approach and had the benefit of activities aiming to explain the key concepts and the new expressions from the text. For this, a questionnaire was distributed to them. Before the reading, they had to collaborate to choose the right answer to multiple choice questions and, after the reading, were asked to correct it individually. At the end of the course, a feedback report and explanations were provided by the professor. The total time (50 minutes) devoted to the stages of pre, during and post-reading is identical for the two groups.

At the end of the four consecutive meetings, the subjects of each group had 30 minutes to answer the comprehension proof relating to each text. Once this was finished, they completed the auto-evaluation questionnaire.

8 Results

According to our hypothesis, the application of the strategy of a concept map built by a professor should improve the comprehension of informative texts. Indeed, the experimental group (M = 75.2) demonstrated better performance in comprehension tasks than the group having used the traditional approach (M = 54.6). The results of the auto-evaluation questionnaire indicate that almost all the members of the experimental group pointed out that the use of the concept map led them to better understand the text by presenting first of all, the organization and the structure of the texts, and then, by identifying the principal ideas present in the texts. It also facilitated the learning of the vocabulary by taking again the most important concepts and the existing relationships between them.

9 Conclusion and Further Research

The results of this study, though carried out using a small number of subjects, indicate that the subjects of the experimental group obtain higher scores on the comprehension questions than those of the control group. This tends to highlight the effectiveness of an approach that integrates the concept map, with progressive devolution, as a tool for the teaching of comprehension in a second language. The next stage will consist of continuing this research with larger groups of second language student subjects, and will include varying the procedures of implementation of the concept maps, as well as the levels of the students concerned (from beginner to advanced).

10 References

Chang, K., Chen, I. & Sung, Y. (2002). The effect of concept mapping to enhance text comprehension and summarization. *The Journal of Experimental Education*, 71(1), 5 - 23.

Fayol, M., Gombert, J.-E., Lecocq, P., Sprenger-Charolles, L. & Zagar, D. (1992). *Psychologie cognitive de la lecture*. Paris: Presses Universitaires de France.

Gardner, D. (2004). Vocabulary input through extensive reading: A comparison of words found in children's narrative and expository reading materials. *Applied Linguistics*, 25(1), 1-37.

Giasson, J. (2003). *La lecture : de la théorie à la pratique*. 2e édition. Boucherville: Gaëtan Morin.

Grabe, W. & Stoller, F. (2002). *Teaching and researching Reading*. London: Pearson Education Longman.

Greasser, A. C., León, J. A. & Otero, J. (2002). Introduction to the Psychology of Science Text Comprehension; In J. Otero, J.A. León, et A.C. Graesser (Eds); *The Psychology of Science Text Comprehension* (1-18). Mahwah, NJ: Erlbaum.

Horton, P. B., McConney, A. A., Gallo, M., Woods, A. L., Senn, G. J., & Hamelin, D. (1993). An investigation of the effectiveness of concept mapping as an instructional tool. *Science Education*, 77(1), 95-111.

Saadani, L. & Bertrand-Gastaldy, S. (2000). *Cartes conceptuelles et thésaurus : essai de comparaison entre deux modèles de représentation issus de différentes traditions disciplinaires*. Canadian Association for Information Sciences, Procedings of the 28th Annual Conference.

van Boxtel, C.,van der Linden, J., Roelofs, E. & Erkens, G. (2002). Collaborative concept mapping: provoking and supporting meaningful discourse. *Theory Into Practice*, 41(1), 40 - 46.