Chapter 13

Memory, Cognition, and Multimedia: Role of the Importance of Organizing Knowledge in Memory with Hypermedia Help and Online Co–Understanding Systems

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ABSTRACT

This chapter presents, in the light of the most recent work, the main results of a research conducted by Dorsaf Ben Ismail (2011) as part of her thesis, which aims to elaborate and validate experimentally some means as hypertext to understand a scientific text in foreign language L2 (French) describing a complex area of human biology: the physiological regulation phenomena and an assessment tool pre and post-test for knowledge constructed in the form of conceptual graphics. According Graesser, Leon and Otero (2002), scientific texts readers are generally unable to develop a clear mental picture, correct and coherent with such field, and thus to understand the texts that describe this field. The results of this research allowed doing some advanced steps in the relationship between representation of knowledge in memory, comprehension of scientific text and systems that help in comprehension in multilingual context. These advanced steps are considered very useful in the era of globalization and the widespread use of the Internet and social networks (Mueller-Frank, 2013).

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INTRODUCTION

The development of systems and multimedia tools, the rapid spread of their implementation in schools, the enthusiasm they generate, lead to think about the use and usefulness of these systems and in particular their effects on the learning and teaching.

It is generally considered today that learning would be facilitated by ICTE and more particularly by the hypertext and multimedia tools. According Heutte (2008), if this seems to be the case of expert adult readers, the widespread of using of these digital resources worth to be considered. Since “an important enabler of reading comprehension is reading engagement,” (Baker et al., 2011, p. 200) information and communication technologies (ICTs) can have a significant effect on comprehension in content area reading. Wright, Fugett and Caputa (2011) found that children preferred reading when the material was presented electronically using e-books on the iPad (Kim, 2013). Among sources often cited, few of them refer to studies that respect the methodological principles based on experimental research and very little work has brought evidence to the effectiveness of these tools in learning, particularly in understanding and text production and the construction of knowledge.

This chapter presents the main results of a research conducted with Tunisian students by Dorsaf Ben Ismail (2011) as part of her thesis. The purpose of this research is to design and validate experimentally multimedia tools to understand a scientific text in language L2 (French) describing a complex field of human biology: physiological regulation phenomena. Research on understanding of scientific texts are based on numerous studies that have shown that the understanding activity must relate the information in the text with the reader’s knowledge stored in long term memory and activated during reading. Text comprehension with complex and unfamiliar fields of students is not in favor of this activation. The conceptual background of these students is generally inadequate and comes into conflict with implied scientific principals or some statements in the texts. For this reason, students generally have great difficulty in making inferences needed to build the consistent representation of the semantic content of the text (Best Row Ozuru, & McNamara, 2005). Salehi, Jahandar and Khodabandehlou (2013) showed that “Learners who struggle with comprehension possess inefficient strategies and use them inflexibly. They are usually unaware of what good comprehenders do and need to be shown how and when to apply a small repertoire of comprehension strategies” (p. 242). The language used in content area texts is advanced, and many elementary and secondary students do not possess “the requisite knowledge, skills, and disposition to read and comprehend” such material (Kim et al., 2013, p.235).

According Graesser, Leon and Otero (2002), scientific texts readers are often unable to develop a clear mental picture, correct and coherent of such field, and thus to understand the texts that describe this field. Dwyer, Hogan and Stewart (2010) consider that the use of good organization strategies in reading help the readers constructing their own memories and also make the encoding process easier. According to Ellis (2004), “Visual illustrations can help EFL students with comprehension. Teachers can also utilize graphic organizers to help students make connections between key ideas. Concept Maps have been highly recommended and widely used in first language (L1) as well as second language (L2) instruction by language teachers. Concept mapping as a learning strategy changes the learning direction from teacher-based to student-based by activating the learner in learning process”.

Slotte and Lonka (1999), consider that “since scientific knowledge is fairly non linear and web-like, concepts should be learned as organized networks of related information, not as lists of facts (…). Therefore, students need to challenge the science text they read by struggling with it and trying to make