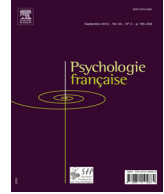




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Original article

How may multimedia and hypertext documents support deep processing for learning?

Comment les documents multimédias et hypertextes peuvent contribuer à des traitements profonds pour l'apprentissage ?

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ABSTRACT

Digital documents as multimedia and hypertext documents provides for learning multiple information formats as well as multiple tasks (e.g., reading, exploration, interactions with information). These features could foster deep processing of material by promoting relational processes between the relevant parts of information. Such processes are expected to support the construction of meanings. Nevertheless, because the cognitive system's capacities are limited, relational processing could be difficult to run. In this paper, we examined three sets of research about learning with (a) multiple representations, (b) animations and (c) hypertexts. The conclusions confirmed that these digital documents could support deep processing by requiring relational processing, but only under some circumstances (i.e., learners with high cognitive abilities and guidance principles).

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¹ Research interests: hypertext comprehension, concept mapping, prior domain knowledge, learning from animations.

² Research interests: text comprehension, document design, web accessibility.

³ Research interests: learning with hypermedia, information seeking, use of documents, HCI.

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R É S U M É

Mots clés :

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Les supports multimédia pour l'apprentissage offrent des formats de présentation des contenus et des tâches multiples (e.g., lecture, exploration, manipulation des informations). Leurs caractéristiques peuvent aider les traitements profonds des contenus en favorisant des processus relationnels entre les différentes parties des contenus. Il est attendu que de tels processus permettent la construction du sens. Néanmoins, parce que les capacités du système cognitif sont limitées, les traitements relationnels peuvent se révéler difficiles à mettre en œuvre. Dans cet article, trois types de recherche sur l'apprentissage avec des documents numériques ont été examinés : (a) apprentissage à partir des représentations multiples, (b) apprentissage à partir d'animations, et (c) apprentissage à partir d'hypertextes. Les conclusions confirment que ces documents numériques peuvent favoriser les traitements profonds des contenus par la mise en œuvre de processus relationnels, mais sous certaines conditions (i.e., apprenants porteurs d'habiletés cognitives et principes d'aide et de guidage dans les documents numériques).

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1. Introduction

Multimedia can be defined as the presentation of material using both verbal (printed or spoken text) and pictorial forms (e.g., graphs, pictures, maps, animations, videos, etc.) (Mayer, 2001). Within the educational world, there is a widespread adoption of multimedia materials. Multimedia provides access to a broad variety of representations and instructional materials. A lot of research on multimedia instructional design has been conducted over the past 20 years and still provokes vivid interest as evidenced by recent special issues (e.g., issue on motivation and emotion in multimedia, Mayer, 2014a; issue on eye tracking as a tool to study and enhance multimedia learning, van Gog & Scheiter, 2010). In this paper, we only consider multimedia designed to foster learning, that is to say, multimedia that provides information involved in the subject matter to be learnt and not decorative materials. Moreover, only learning relying on understanding is considered in this paper, excluding other types of learning, such as procedural or imitation-based learning.

Multimedia instructions are spreading thanks to technological development and offer new instructional perspectives by providing access to multiple representations, dynamic information and large information databases. Clark and Feldon (2005) pointed out myths related to beliefs about multimedia instructions. For instance, learning is better with multimedia than with other instructional media because it fosters engagement, motivation and allows discovery learning, or multiplying information formats, including dynamic and interactive aspects prompts learners to pay attention to information and to deeply process the learning material. These authors warn us about these beliefs concerning multimedia learning and stress for instance that discovery learning can be very challenging for learners. Multiplying sources of information thanks to multimedia does not seem to be a sufficient condition to trigger deep learning. Sandberg and Barnard (1997) expected that an enriched environment made of different resources would lead the students to actively construct knowledge, but their results disproved an effect of the use of different sources of information on deep learning.

To understand multimedia learning, the cognitive processes have to be examined. Multimedia learning involves selection of relevant material, organization of contents into a coherent representation, and integration of this representation into knowledge (Mayer, 2014b). This paper focuses on the construction of meanings from multimedia and addresses the following question: can multimedia support deep processing of instructional material? It attempts to understand the extent to which processes involved in the construction of meaning from multimedia documents concern deep learning.

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