

Li, R. & Liu, M. (2007). Understanding the effects of databases as cognitive tools in a problem-based multimedia learning environment. *Journal of Interactive Learning Research*, 18(3), 345-363.

Abstract

The purpose of this study is to examine the potential of using computer databases as cognitive tools to share learners' cognitive load and facilitate learning in a multimedia problem-based learning (PBL) environment designed for sixth graders. Two research questions were: 1) Can the computer database tool share sixth-graders' cognitive load? and 2) Can the computer database tool improve sixth-graders' performance? Three treatment conditions were used: a customized computer database tool for the PBL environment under investigation, a customized paper-based database tool for the PBL environment under investigation, and no database. The findings showed that sixth-graders in the computer database groups received positive and higher instructional efficiency scores than students in both the paper-based database and no-database groups. The computer database groups also scored significantly higher on the achievement test than the other two groups. These results suggested that the computer database tool reduced students' extraneous cognitive load and increased students' germane cognitive load, and thus shared students' cognitive load more effectively. The computer database tool also improved students' achievement scores. The paper-based database tool did not function as effectively and did not contribute significantly to students' learning. Future research is needed to confirm the results and to further investigate the effects of standard databases to support learning.

(Keywords: cognitive tools, computer databases, problem-based learning, multimedia, cognitive load)

