

**UNIVERSITY OF CANBERRA  
DIVISION OF COMMUNICATION AND EDUCATION**

**THE DEVELOPMENT OF ENHANCED INFORMATION  
RETRIEVAL STRATEGIES IN UNDERGRADUATES  
THROUGH THE APPLICATION OF LEARNING THEORY:  
AN EXPERIMENTAL STUDY**

by

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## ABSTRACT

In this thesis, teaching and learning issues involved in end-user information retrieval from electronic databases are examined. A two-stage model of the information retrieval process, based on information processing theory, is proposed; and a framework for the teaching of information literacy is developed.

The efficacy of cognitive psychology as a theoretical framework that enhances the understanding of a number of information retrieval issues, is discussed. These issues include: teaching strategies that can assist the development of conceptual knowledge of the information retrieval process; individual differences affecting information retrieval performance, particularly problem-solving ability; and expert and novice differences in search performance.

The researcher investigated the impact of concept-based instruction on the development of information retrieval skills through the use of a two-stage experimental study conducted with undergraduates students at the University of Canberra, Australia. Phase 1 was conducted with 254 first-year undergraduates in 1997, with a 40 minute concept-based teaching module as the independent variable. A number of research questions were proposed:

1. Will type of instruction influence acquisition of knowledge of electronic database searching?
2. Will type of instruction influence information retrieval effectiveness?
3. Are problem-solving ability and information retrieval effectiveness related?
4. Are problem-solving ability and cognitive maturity related?
5. Are there any differences in the search behaviour of more effective and less effective searchers?

Subjects completed a pre-test which measured knowledge of electronic databases, and problem-solving ability; and a post-test that measured changes

in these abilities. Subjects in the experimental treatment were taught the 40 minute concept-based module, which incorporated teaching strategies grounded in learning theory. The strategies included: the use of analogy; modelling; and the introduction of complexity. The aims of the module were to foster the development of a realistic concept of the information retrieval process; and to provide a problem-solving heuristic to guide subjects in their search strategy formulation. All subjects completed two post-tests: a survey that measured *knowledge* of search terminology and strategies; and an information retrieval assignment that measured *effectiveness* of search design and execution.

Results suggested that using a concept-based approach is significantly more effective than using a traditional, skills-demonstration approach in the teaching of information retrieval. This effectiveness was both in terms of increasing knowledge of the search process; and in terms of improving search outcomes. Further, results suggested that search strategy formulation is significantly correlated with electronic database knowledge, and problem-solving ability; and that problem-solving ability and level of cognitive maturity may be related.

Results supported the two-stage model of the information retrieval process suggested by the researcher as one possible construct of the thinking processes underlying information retrieval.

These findings led to the implementation of Phase 2 of the research in 1999. Subjects were 68 second-year undergraduate students at the University of Canberra. In this Phase, concept-based teaching techniques were used to develop four modules covering a range of information literacy skills, including: critical thinking; information retrieval strategies; evaluation of sources; and determining relevance of articles. Results confirmed that subjects taught by methods based on learning theory paradigms (the experimental treatment group), were better able to design effective searches than subjects who did not receive such instruction (the control treatment group). Further,

results suggested that these teaching methods encouraged experimental group subjects to locate material from more credible sources than did control group subjects.

These findings are of particular significance, given the increasing use of the unregulated internet environment as an information source.

Taking into account literature reviewed, and the results of Phases 1 and 2, a model of the information retrieval process is proposed.

Finally, recognising the central importance of the acquisition of information literacy to student success at university, and to productive membership of the information society, a detailed framework for the teaching of information literacy in higher education is suggested.

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