

**Table 5 - Sample of Research Involving Hypermedia/Hypertext: Chapter 3 - Research on Online Learning**

Topic: Hypermedia/Hypertext	Author	Description/Procedures	Results	Instructional Strategies/Activities Suggested by Study
Cognitive Load and Hypertext	Niederhauser, Reynolds, Salmen & Skolmoski (2000)	<ul style="list-style-type: none"> <li>▪ Regression analysis</li> <li>▪ 46 undergraduate students in two sections of educational computing class</li> <li>▪ Hypertext, hierarchical interface with topical map and compare and contrast features</li> <li>▪ Examined how flexibility in learner-determined navigational paths influenced recall and learning.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Reading comprehension, background knowledge and reading time correlated positively with learning from hypertext</li> <li>▪ Using topic map had a slight benefit for learners</li> <li>▪ Use of compare and contrast feature (criss-crossing topics) had strong negative relationship to learning</li> <li>▪ Students who tended to employ systematic, sequential reading strategies to hypertext (left to right, top to bottom) learned more than those who criss-crossed content.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Consider cognitive load issues when developing hypertext-based materials</li> <li>▪ Consider presenting information in sequential, left to right, top to bottom manner to reduce cognitive load</li> </ul>
Learning with Hypertext	Jacobson, Maouri, Mishra & Kolar (1996)	<ul style="list-style-type: none"> <li>▪ Quantitative experimental study</li> <li>▪ 69 undergraduate students</li> <li>▪ Used thematic hypertext system based on cognitive flexibility theory for two weeks</li> <li>▪ Subjects assigned to hypertext treatments that varied in amount of guided support and learner control</li> <li>▪ Analyzed results on knowledge synthesis and problem solving tests as well as beliefs and attitudes about learning</li> </ul>	<ul style="list-style-type: none"> <li>▪ Students who had more complex beliefs about learning performed at a significantly higher level on a knowledge synthesis task than those with simpler beliefs about learning</li> <li>▪ Without significant guidance and increased learner control, students scored higher on short answer tests than those who used a thematic hypertext system with additional guidance</li> </ul>	<ul style="list-style-type: none"> <li>▪ Students need explicit scaffolding and modeling in case based thematic hypertext environments/</li> <li>▪ Providing flexible access and user control is not enough and may encourage more surface processing of content</li> <li>▪ Students require additional support that provides guidance on structural features of cases that contain abstract themes</li> <li>▪ Instructors should be aware that students' beliefs about learning impact their performance using thematic case-based hypertext materials</li> </ul>

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Prior Knowledge and Goal Strength in the Use of Hypertext	Last, O'Donnell & Kelly (2001)	<ul style="list-style-type: none"> <li>▪ Qualitative interviewing and trace paths of navigation through hypertext system on educational measurement</li> <li>▪ 12 undergraduate students in educational psychology</li> <li>▪ Participants were assigned to high or low prior knowledge groups and further assigned to tasks with strong or weak academic goals</li> <li>▪ Analysis examined cognitive and affective reactions to hypertext exploration and navigational paths through content.</li> </ul>	<ul style="list-style-type: none"> <li>▪ Low prior knowledge students navigated through material methodically while high prior knowledge students jumped around to attempt to fill in knowledge gaps</li> <li>▪ Students with low prior knowledge and strong goals demonstrated most inefficient navigational strategies and higher levels of anxiety</li> <li>▪ Students with low prior knowledge desired additional navigational supports such as maps or markings for reviewed content</li> </ul>	<ul style="list-style-type: none"> <li>▪ Consider student goals and level of prior knowledge in hypertext learning tasks.</li> <li>▪ Providing alternate navigational paths and aids may assist those with low prior knowledge of content in hypertext systems</li> <li>▪ Be cautious with assigning students with low prior knowledge demanding tasks in a hypertext environment</li> <li>▪ Provide opportunities for students to impose own structure on information.</li> </ul>
Effects of number of links and nodes in Hypermedia	Zhu (2001)	<ul style="list-style-type: none"> <li>▪ Experimental study examining differences in varying the number of links and nodes on information searching, learning and attitude</li> <li>▪ 104 undergraduate and graduate students</li> <li>▪ Randomly assigned to four treatment groups with combination of larger and smaller nodes and more or fewer links</li> </ul>	<ul style="list-style-type: none"> <li>▪ Students in the fewer-link condition performed significantly better in learning task than those under more-link condition</li> <li>▪ No significant differences between groups were found on information searching task</li> <li>▪ Students in fewer link condition higher scores on multiple choice and written tests</li> <li>▪ Students in the fewer link condition expressed a more positive attitude toward the system than those in the more link condition</li> </ul>	<ul style="list-style-type: none"> <li>▪ Use fewer links in hypermedia programs for learning or provide filters for multiple links</li> <li>▪ A relationship between the number of links and nodes and disorientation may exist when using hypermedia systems for learning and locating information.</li> <li>▪ Presenting simple information in smaller nodes may help recall of information</li> <li>▪ Moving back and forth between links and main nodes of information may cause disruption in the reading process and impact learning</li> </ul>

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Topic: Hypermedia/Hypertext	Author	Description/Procedures	Results	Instructional Strategies/Activities Suggested by Study
Individual Differences and Hypermedia Navigation	Ford & Chen (2000)	<ul style="list-style-type: none"> <li>▪ Experimental study examining learning gains and correlational attributes of navigation and cognitive style</li> <li>▪ 65 graduate students in information and library management</li> <li>▪ Used hypermedia system to learn how to design a Web page</li> <li>▪ Examined cognitive style, prior experience, navigation patterns, levels of depth in hypermedia hierarchy of information</li> </ul>	<ul style="list-style-type: none"> <li>▪ Field independent learners demonstrated low use of map feature, while field dependent learners showed high level of use</li> <li>▪ Field independent learners showed high use of index and back/forward buttons while field dependent learners showed low level use of this feature</li> <li>▪ Field independent learners spent a greater proportion of their time studying higher levels in subject hierarchy, while field dependent learners spent less time</li> <li>▪ Field independent learners spent a lower proportion of time exploring detailed techniques while field dependent learners made greater use of this feature</li> <li>▪ No differences in learning gains were found between field independent/dependent learners</li> <li>▪ Those with higher level of prior knowledge spent more time in detailed levels of subject hierarchy</li> </ul>	<ul style="list-style-type: none"> <li>▪ Be aware that some relationship between cognitive style and navigation in hypermedia systems may exist</li> <li>▪ Learners with higher levels of prior knowledge seem to spend more time in detailed levels of hypermedia systems</li> <li>▪ Learners who are more analytic, preferring to structure their own learning demonstrating field independence may use specific hypermedia features (such as maps, index, back and forward buttons) and examine detail more than those who process information more globally and are considered field dependent</li> </ul>

**References:**

Ford, N., & Chen, S. Y. (2000). Individual differences, hypermedia navigation and learning: An empirical study. *Journal of Educational Multimedia and Hypermedia*, 9(4), 281-311.

Jacobson, M., Maouri, C., Mishra, P., & Kolar, C. (1996). Learning with hypertext learning environments: Theory, design and research. *Journal of Educational Multimedia and Hypermedia*, 5(3/4), 239-281.

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Zhu, E. (1998). Hypermedia interface design: the effects of number of links and granularity of nodes. *Journal of Educational Multimedia and Hypermedia*, 8(3), 331-358.