Cognitive Style and Hypermedia Learning:
A Multi-Perspective Study

Catherine Hui Min Lee
BCom, BSc(Hons)

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I declare that this thesis is my account of my research and contains as its main content work which has not previously been submitted for a degree at any tertiary education institution.

(Catherine Hui Min Lee)
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PUBLICATION DERIVED FROM THIS RESEARCH


ABSTRACT

The massive growth of information communication technologies (ICTs) has revolutionized students’ learning in higher education through the advancement of educational technologies. Technologies such as hypermedia learning systems have become widespread and offer significant contributions to improving the delivery of learning and teaching materials. One attribute of hypermedia in facilitating learning is the way it parallels how the human brain and memory works, particularly the way information is encoded and retrieved (Jonassen, 1988; 1991). The effectiveness of hypermedia systems as learning tools has been confirmed by numerous researchers (e.g. Buchanan, 2000; Ford & Chen, 2001; Fullerton, 2000; Guthrie, 2010; Lee & Boling, 2008; Thomas & McKay, 2010) who demonstrated their compatibility with cognitive processes due to variations in the way students perceive, understand and learn from complex information sources. In other words, a key factor in the development of hypermedia learning systems is their dependency on students’ cognitive style since they relate to users’ information processing habits and the representation of individual users’ typical modes of perceiving, thinking, remembering and problem solving. Specifically, Witkin, Moore, Goodenough, and Cox’s (1977) classification - field dependent and independent learners - is adapted in this study to identify the key factors that affect students’ cognitive style in educational environments supported by hypermedia systems.

Nevertheless, with the continuous development of hypermedia learning systems, there is still much to explore and learn about students’ cognitive styles and their effect on learning from cross-disciplinary perspectives. Hence, this thesis aims to answer two
broad questions: (i) What are the factors that affect cognitive style? (ii) Does cognitive style change over time? To address these questions, four groups of factors were explored and tested in two locations (Australia and Malaysia) and over two time periods (Semester 1 and Semester 2, 2008): (i) student demographics; (ii) learning dimensions (nonlinear learning, learner control, multiple tools); (iii) culture dimensions (power distance, uncertainty avoidance, individualism/collectivism, masculinity/femininity, long/short term orientation); and (iv) evaluation of units (content delivery).

The methodological design was a case study using a survey instrument. The study was conducted over two semesters in Australian and Malaysian universities. Both statistical and descriptive analyses were used to enrich the interpretive process of the complex dimensions and increase the relevance of the findings. The statistical analyses consisted of sample size determination, hypotheses testing and application of advanced statistical modelling methods (multiple linear regressions, tree-based regressions and linear mixed effects models) to extract the maximum information from the data. The results indicate that unit evaluation, which included questions related to students’ perceived satisfaction with the delivery of the unit material, was the primary variable to determine students’ cognitive style. The other variables determining cognitive style, to a lesser extent, were learning dimensions (particularly nonlinear learning and learner control) and culture (particularly power distance, long term orientation and individualism). It was found that neither demographics nor time affects cognitive style.

The outcomes of this study have important practical implications for educators and institutions. It is recommended that unit evaluations should be conducted at both the beginning and the end of each semester. By administering a survey that asks students
about their preferred delivery of material at the beginning of the semester, their cognitive style could be identified. The results would therefore be valuable information for tutors and lecturers who could adjust their delivery style accordingly. The students’ responses at the end of the semester would provide valuable feedback to tutors and lecturers.

This research drew on the perspectives of education, information systems, cognitive psychology and culture. The study incorporated multiple factors with detailed case studies and used extensive quantitative analyses to ensure the validity and reliability of the research findings. The findings in this study will contribute to the ongoing research on cognitive style and hypermedia learning systems.
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