COGNITIVE CONSTRAINT IN USING LEARNING PORTALS: INVESTIGATING ITS EFFECTS IN ONCOURSE CL

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Date of Graduation: December 2006

SUPERVISORY COMMITTEE APPROVAL

Thesis Advisor / Chair ___________________ Signature ___________________ Date ___________________

Thesis Committee Member 2 Signature ___________________ Date ___________________

Thesis Committee Member 3 Signature ___________________ Date ___________________

STUDENT CONFIRMATION

Student Name ___________________ Signature ___________________ Date ___________________
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   A. Introduction to subject (Brief background of the topic and the problem space.)
   B. Importance of subject (Why is the topic of your research valuable.)
   C. Intention of the study (Intended contribution to the HCI discipline.)

III. LITERATURE REVIEW
   A. History and related research of the topic
      (A condensed literature review that will be expanded in the final thesis.)
   B. Research questions or hypotheses
      (The literature review should naturally and logically lead the reader to the research question or hypothesis.)

IV. METHODOLOGY (Including the overall research design)
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This is the outline that should be adhered to for proposing your thesis research. Under each of the sections and subsections, students should provide the necessary information. In addition to the cover page, contents, and references, the proposal should range from 1500-2000 words (double-spaced, 12 pt.).

NOTE: CONTENT OF THIS DOCUMENT WAS ONLY USED FOR FORMATTING PURPOSES.

Student Smith  12/17/2007
I. ABSTRACT

Cross-cultural web design and usability research takes as its theoretical underpinning cross-cultural communication, cultural anthropology, and cognitive science. The focus of research is to explore the cross-cultural design of online information and its impact on the social context of international users. Because empirical research continues to show evidence of cultural differences in cognition, the current study is intended to show how culture shapes the cognitive style of Web designers. Using subjects from diverse cultures, performance and preference measures will be collected online and off to identify designer cognitive styles and user preferences. The study will explore ways to measure culturally-mediated differences in how people think in different cultures when designing web sites, online information, or software.
II. INTRODUCTION

A. Introduction to subject

Recent educational research has emphasized the benefits of collaborative learning. Previous research reported on the positive effects of collaborative learning (CL) on student achievement, and the computer support of this collaborative learning has lead to the development of the area of Computer-Supported Collaborative Learning (CSCL) (Margaret, 1997). Currently, collaborative learning portals have been employed in educational institutions as one of the most effective CSCL tools.

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B. Importance of subject

To positively support a collaborative learning environment, interface usability of the learning portal is a factor to its success. If the interface is frustrating and cumbersome to use, students and instructors will simply refuse to use it. Instructors spend significant time and energy in preparing class materials, answering questions, providing feedback, and marking assignments. Similarly, students spend time to plan their schedules and work to deliver reports on time. Student collaboration depends upon timely communication. Students must be able to exchange ideas with each other easily and quickly.

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C. Intention of the study

Recent educational research has emphasized the benefits of collaborative learning. Previous research reported on the positive effects of collaborative learning (CL) on student achievement, and the computer support of this collaborative learning has lead to the development of the area of Computer-Supported Collaborative Learning (CSCL) (Margaret, 1997). Currently, collaborative learning portals have been employed in educational institutions as one of the most effective CSCL tools.
III. LITERATURE REVIEW

A. Background

In general, a portal is a categorized and personalized gateway that provides information, resources, and services. Each portal page consists of window-like areas called “portlets” or “modules” containing related information. The idea of a portal is to collect information from different sources and create a single point of access to information (Strauss, 2003; Waloszek, 2001). By integrating services and presenting portlets on the initial screen, portals reduce the need to navigate and provide a more efficient environment for task performance (Nielsen, 1999).

Collaborative Learning (CL) is defined as students working together in small, heterogeneous groups to achieve a common academic goal, such as completion of an assignment or a project (Ursula et al., 1997). At Indiana University, the OnCourse CL portal is an implementation of a new Collaborative Learning Environment for higher education. Indiana University is one of four founding partners of the Sakai community. The Sakai Project has its origins at the University of Michigan and Indiana University, where both universities independently began open source efforts to replicate and enhance the functionality of their existing course management software (CMS). Soon after MIT and Stanford joined in, along with a grant from the Mellon Foundation, they formed the Sakai Project. The Sakai Project’s primary goal is to deliver the Sakai application framework and associated CMS tools and components that are designed to work together. These components are for course management, and, as an augmentation of the original CMS model, they also support research collaboration. ("Sakai Project", 2004)
B. Research Questions and Hypotheses

Phase 1 of this study involved interviews and observations which were used to generate further hypotheses. The findings of the interviews elicit the problem involving navigation through the portals. From the observations, it is hypothesized that navigation problem is caused by users’ cognitive limitation. Based on observing novice users using OnCourse CL learning portal, this study aims to investigate effects of two types of constraints; high cognitive load, and time-pressure on navigation strategies, error patterns, and user performance. This study will also propose a new interface prototype based on the findings from usability testing.

H1: User’s navigation strategies are different in a high cognitive-load and a time-constraint situation, comparing to a normal situation.

H2: User’s error patterns are different in a high cognitive-load and a time-constraint situation, comparing to a normal situation.
IV. METHODOLOGY

A. Participants

The total number of subjects in this study is 35 subjects; 5 subjects for Phase 1 and 30 subjects for Phase 2. 30 subjects will be randomly divided into 3 groups, 10 subjects for each group. Each subject will do a usability testing with think-aloud protocol. Since the user base of OnCourse CL learning portals are IUPUI students, this study draws its subjects from IUPUI’s diverse student body. No individual shall be excluded from participation on the basis of gender, race, color, national origin, religion, creed, disability, veteran’s status, sexual orientation, or age, except that minors are excluded from the study to simplify the design. This is justified because most learning portals are designed to be used by college students and because the study focuses on human performance, not subject variables or individual differences.

B. Treatment

In the second phase, users will perform a usability testing tasks with think aloud technique. To measure user performance on products, users will be asked to perform tasks and the test will be timed. Also, problems participants encountered during performing the tasks will be recorded to be an input for developing new prototype in Phase 3. Post-test questionnaire will be used to obtain user demographic data, computer experience, Internet experience, and OnCourse CL experience. Post-test interview will be used to acquire additional qualitative data about user experience in using OnCourse CL. Participants will be allowed to browse through the interface they performed tasks on to recall encountered problems and to give their opinions.

Interview: Participants of interview sessions were 3 undergraduate students, 1
graduate student, and 1 faculty of IUPUI. First, the participants were asked to fill out the pre-test questionnaire acquiring demographic data and general experience in using computer, Internet, and OnCourse CL. After that, participant was interviews about his/her experience using OnCourse CL.

Experiment: Subjects will be asked to perform tasks on OnCourse CL using Internet Explorer on a Windows operating system. There will be totally 5 tasks in this experiment. The tasks used will be focusing on navigation. The first will be the control group. The second and the third group will complete the tasks given high cognitive-load constraint and time-constraint respectively. For the high cognitive-load constraint, the subjects will be asked to remember 8 items while performing the task (rehearsal is allowed as necessary). For time-constraint, they will have limited time to complete the tasks and they will be asked to complete as many tasks as possible.
V. REFERENCES


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ITiCSE '97 working group on CMC in collaborative educational settings.
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APPENDICES

Appendix A - Pre-test Questionnaire (for Phase1)

Subject No.  _____________________  Date:  ___________________

General Information

1. Age
   - 18-25
   - 26-35
   - 36-45
   - 46-55
   - 56-65

2. Gender
   - Male
   - Female

3. Occupation
   - Undergraduate student
     Please specify:  □ 1st year  □ 2nd year  □ 3rd year  □ 4th year
   - Graduate student
   - Faculty member
   - Other (please specify) ______________________

Computer and Internet Experience

What kind of operating system do you use?  □ Microsoft Windows  □ Apple Macintosh OS
What kind of Web browser do you use?  □ Internet Explorer  □ Mozilla Firefox  □ Opera
   □ Other (please specify) ______________________

How long have you been using computers (years)? ________________
How many hours each day do you use a computer? ________________
How long have you been using the Internet (years)? ________________
How many hours each day do you use the Internet? ________________

OnCourse CL Experience

How long have you been using OnCourse (years)? ________________
How many times each day do you access OnCourse? ________________
How long do you spend each time on OnCourse (minutes)? ________________
Where do you usually access OnCourse from? (check all that apply)
   □ Home  □ Computer Lab  □ Work place  □ Other (please specify) ________________

1. I deeply appreciate your cooperation in the email service testing and will follow-up with a formal letter of thanks.
2. Are there any questions?
3. So, let’s get started.
Appendix B - Task Record Sheet (for Phase 2)

Subject No. _________________   Date: _______________

<table>
<thead>
<tr>
<th>Task 1</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task completed: Yes or No</td>
</tr>
<tr>
<td></td>
<td>Comments on observed behavior.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task 2</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task completed: Yes or No</td>
</tr>
<tr>
<td></td>
<td>Comments on observed behavior.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Task 3</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Task completed: Yes or No</td>
</tr>
<tr>
<td></td>
<td>Comments on observed behavior.</td>
</tr>
</tbody>
</table>

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## Appendix C - Task Sheet (for Phase 2)

Subject No. _________________   Date: _______________

<table>
<thead>
<tr>
<th>TASK NO.</th>
<th>TASK DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Your instructors always inform students before class time about what to prepare to class. Check if there are any announcements from any of your classes today.</td>
</tr>
<tr>
<td>2</td>
<td>The instructor of IN INFO PRAC 001282 announces that the lecture note is ready for downloading from Resources tool. Download it to your desktop.</td>
</tr>
<tr>
<td>3</td>
<td>There is a file called “FinalProject_ProgressReport.doc” on the desktop. You would like to submit this file to your IN INFO PRAC 001282 instructor to show him the progress of your final project. In this class’s Drop Box, create a new folder called “Final Project”, and then submit the progress report into this folder.</td>
</tr>
<tr>
<td>4</td>
<td>For the same class, you organized files for your midterm project by moving them into the same folder. However, there is still one file in your Drop Box that has not been moved. So, move the file “MidtermReport_Comment.doc” to “Midterm Project” folder.</td>
</tr>
<tr>
<td>5</td>
<td>Your teammate wants to set up a group meeting on Wednesday, June 21st, 2006 at 2pm. Check your schedule to see if you are available at that time.</td>
</tr>
</tbody>
</table>

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Appendix D - Post-Test Interview Session Form (for Phase2)

Subject No. _________________   Date: _______________

1. What did you positively feel about OnCourse CL?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

2. What did negatively feel about OnCourse CL?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

3. What were the biggest problems you found on the previous test?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

4. Do you have any comments or suggestions that you feel will help develop the better
interface of OnCourse CL?

_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________
_____________________________________________________________________

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