



University of Pittsburgh



The User Side of Personalization: How Personalization Affects the Users

Peter Brusilovsky with:

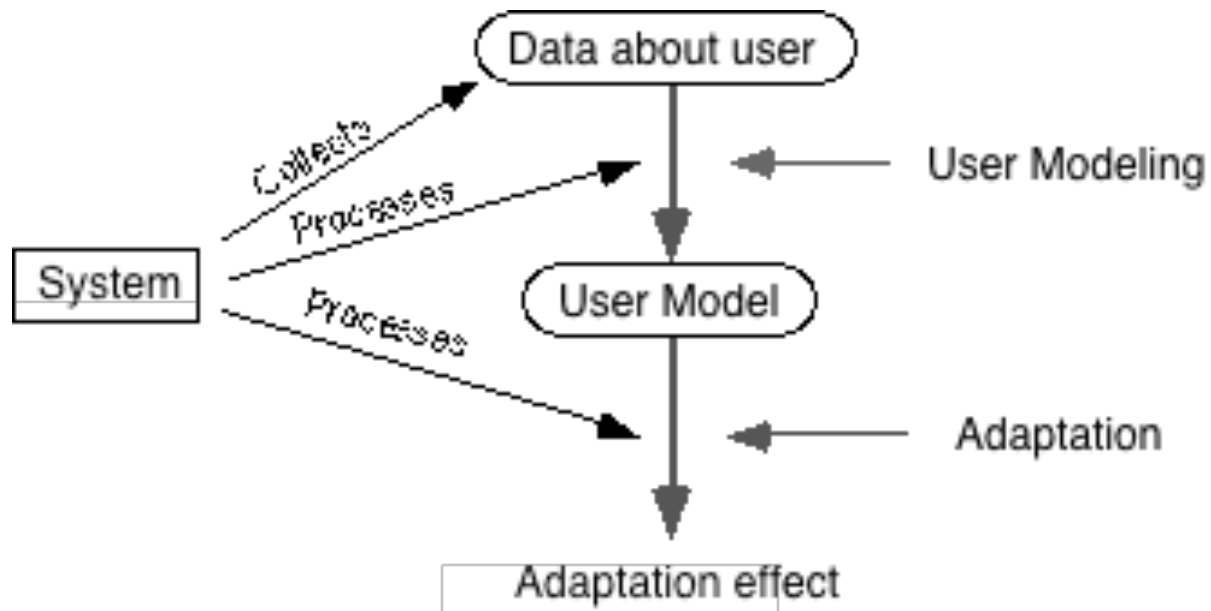
Sergey Sosnovsky, Rosta Farzan, Jaewook Ahn

School of Information Sciences,
University of Pittsburgh





User-Adaptive Systems



Classic loop user modeling - adaptation in adaptive systems



Personalized Information Access

Navigation

Search

Recommendation

Adaptive
Hypermedia

Adaptive
IR

Web
Recommenders

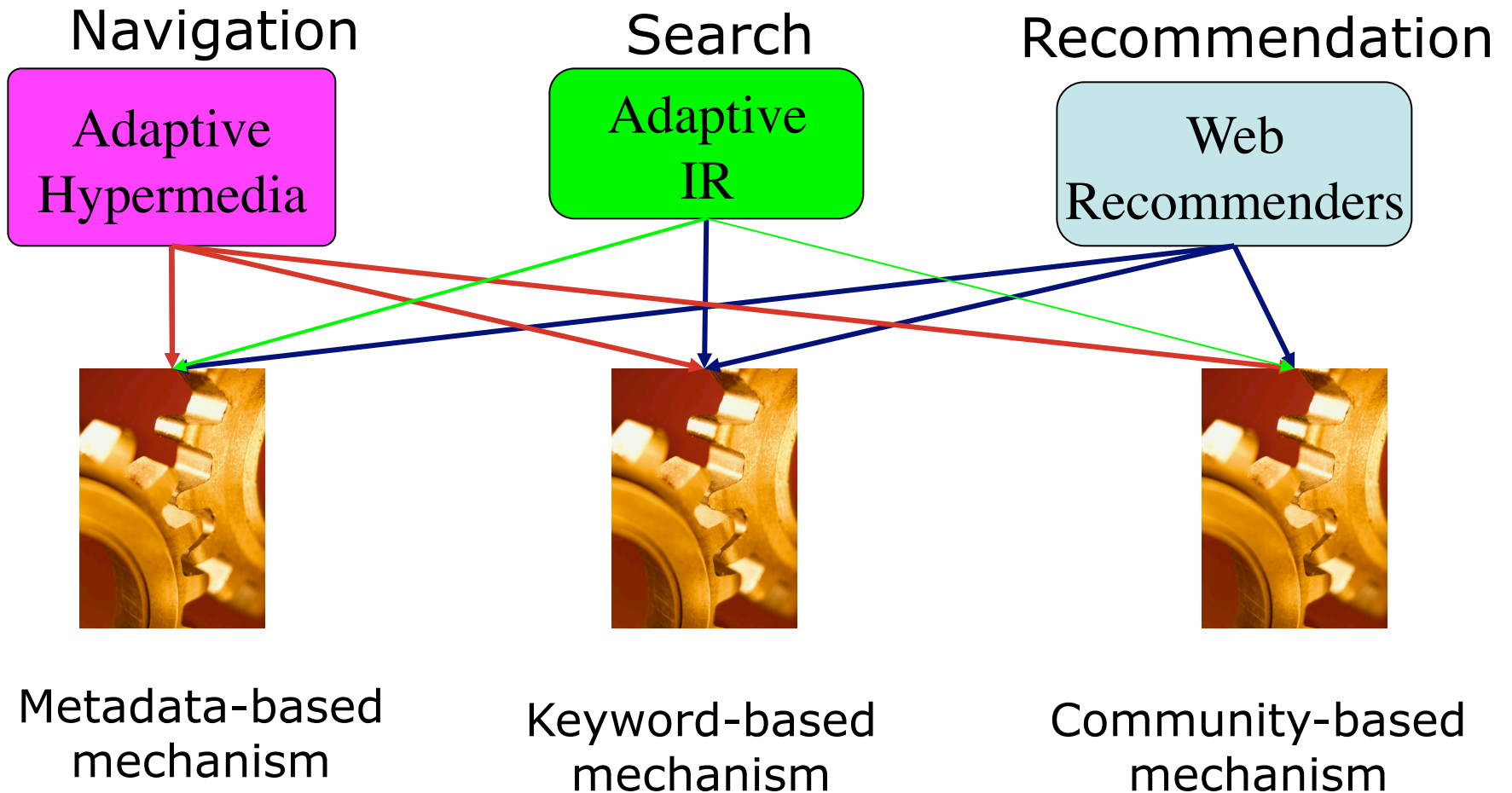


Metadata-based
mechanism

Keyword-based
mechanism

Community-based
mechanism

Adaptation Mechanisms





Adaptive Navigation Support

- System guidance is provided by manipulating links on hypertext/Web pages
- Direct guidance
- Hiding, restricting, disabling
- Generation
- Ordering
- Annotation



Adaptive Link Annotation

The screenshot shows a Netscape browser window titled "Netscape: ELM-ART: Lisp-Course". The main content area displays a tree view of the course structure:

- LISP Course
 - Lesson 1
 - Self-defined Functions
 - Further Tasks
 - AREA-OF-SQUARE (programming task solved)
 - RECTANGLE-AREA (programming task)
 - CUBOID-VOLUME-NEW (programming task)
 - WEIGHT-OF-PURCHASE (programming task)

Below the tree view, the text "RECTANGLE-AREA" is visible. To the right, there are links for "Chat Room", "LISP Constructs" (with sub-links DEFUN, FIRST, REST), and "New Functions" (with sub-link SQUARE).

Overlaid on the bottom half of the browser window is a table of topics in Russian, with progress indicators in colored boxes:

Доступные темы					
+ 1 Общий вид формата	2 Арифметические выражения				
3 Удаление пустых строк	4 Безусловный переход на новую строку				
+ 5 Переход на новую строку	6 Выбор позиции в строке				
7 Печать пробелов	+ 8 Вывод поля				
9 Понятие MFN	10 Безусловный литерал				
11 Арифметическая функция L	12 Арифметическая функция Mf n				
13 Арифметическая функция Val	14 Арифметическая функция Rsum				
15 Арифметическая функция Rmin	16 Арифметическая функция Rmax				
17 Арифметическая функция Ravr	18 Совмещение % и #				
19 Совмещение / и #	20 Условный литерал				
21 Повторяющийся литерал	22 Вывод MFN				
23 Строковые выражения	24 Префиксный условный литерал				
25 Суффиксные литералы	26 Нуль-литералы				
27 Повторяющийся литерал с +	28 Префиксный повторяющийся литерал				
29 Установка режима вывода	30 Совмещение условных литералов и %				
31 Совмещение условных литералов с #	32 Совмещение условных литералов с /				
33 Совмещение условных литералов с C	34 Совмещение условных литералов с X				
35 Совмещение условных литералов с M	36 Режимы L,U в команде M.				
37 Режим H в команде M	38 Режим D в команде M				
39 Режим P в команде M	40 Строковая функция F				
41 Строковая функция Ref	42 Строковая функция S				
43 Программы пользователя format	44 Выражения отношения				
Enter - изучить	F4-практ	F6-учи	F8-инд.задач	F9-назад	PgDn-след.стр.
+ Хорошо изучен	Изучен	Можно изучать	Не готов		

At the bottom of the browser window, there is a copyright notice: "Copyright (C) Paul De Bra, 1994, 1995, 1996, 1997, 1998. All rights reserved."



Case I: Link Annotation in InterBook

The screenshot shows a Netscape browser window titled "Netscape: ACT-R Lesson Units". The page content is as follows:

- ACT-R Lesson Units
 - Unit 0: Interpreting Production Rules
 - Section 0.1: Production Rule Forms
 - 0.1.1 Declarative Units in ACT-R
 - 0.1.2 Production Rules in ACT-R
 - 0.1.3 Production Rule Format
 - 0.1.4 ACT-R's Condition Form
 - 0.1.5 ACT-R's Action Side

0.1.1 Declarative Units in ACT-R

In ACT-R, elements of declarative knowledge are called **chunks** or **WMEs** (for working memory elements).

Annotations 1-4 point to specific elements in the browser window:

- 1: Points to the text "chunks" in the paragraph.
- 2: Points to the red horizontal line above the section title.
- 3: Points to the section title "0.1.1 Declarative Units in ACT-R".
- 4: Points to the "ACT-R Lesson Units" header.

On the right side of the browser window, there is a table of links:

Content	?
Glossary	?
Help	?
Search	?
Hint	?

Below the table, there is a "Background:" section with a dropdown menu showing "ACT-R" and "declarative knowledge".

1. Concept role

2. Current concept state

3. Current section state

4. Linked sections state

Metadata-based mechanism



InterBook: Evaluation

- Goal: to find a value of adaptive annotation
- Electronic textbook about ClarisWorks
- 25 undergraduate teacher education students
- 2 groups: with/without adaptive annotation
- Format: exploring + testing knowledge
- Full action protocol



Experiment design

Group 1	Group 2
Database chapter WITH adaptive link annotation n= 12	Database chapter WITHOUT adaptive link annotation n=13
Spreadsheet chapter WITHOUT adaptive link annotation n=12	Spreadsheet chapter WITH adaptive link annotation n=13



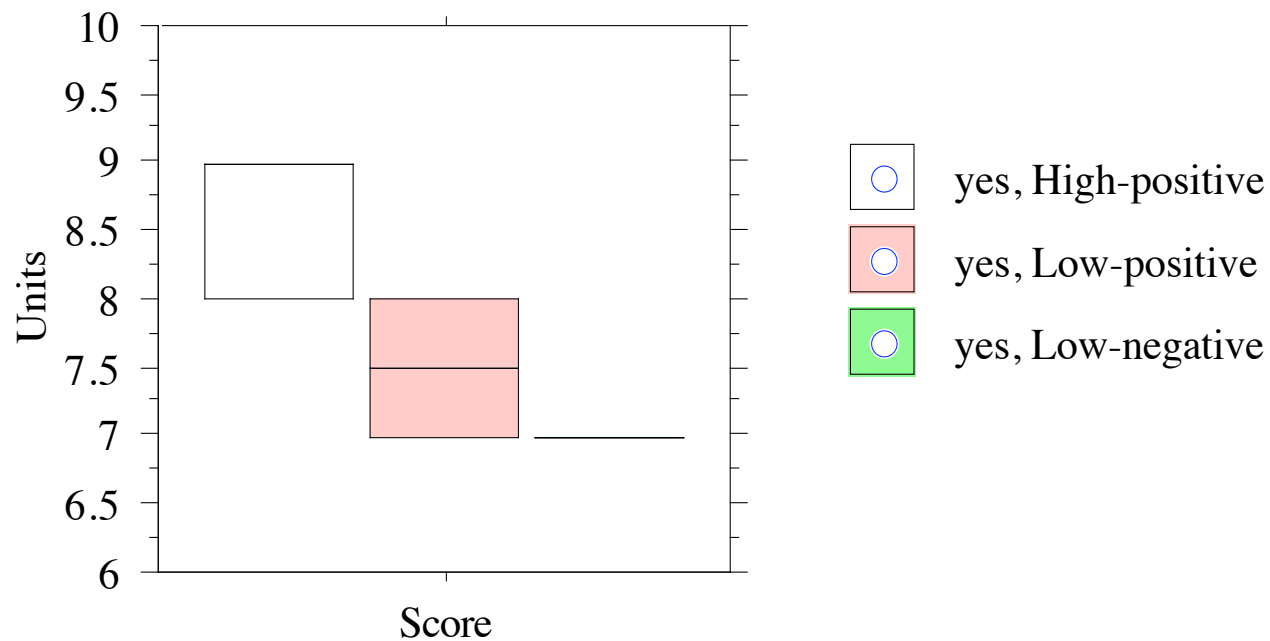
First results: Performance

Group	Test Result Database	Test Result Spreadsheet
1 ANS on database only	6.41	7.77
2 ANS on spreadsheet only	7.12	8.10

- *ANS negatively* influences users' performance on tests (?!)
- How they are using ANS?



The effect of “following green” with ANS





Case 2: KnowledgeSea II/ AnnotatEd

The screenshot displays the KnowledgeSea v2.0 web application in a Microsoft Internet Explorer browser window. The browser address bar shows the URL: <http://ir.exp.sis.pitt.edu/ks2/default.jsp>.

The main content area is titled "KnowledgeSea v2.0" and includes a "Help" link and a search bar labeled "Search in KnowledgeSea" with a "Submit" button.

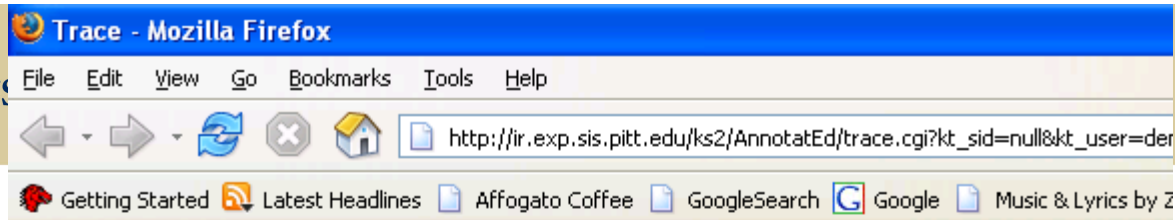
Below the search bar is a grid of 48 blue buttons, each representing a search category. The categories are arranged in 6 rows and 8 columns:

operator, loop, expression L11	operator, loop, expression	operator, expression, value L14	data, type, variable L8	data, type, variable	variable, data, type	variable, function, declaration	function variable declarati
loop, operator, statement	operator, expression, loop	language, operator, type	data, type, variable L9	data, variable, type	variable, declaration, function	function, variable, declaration	function variable declarati L18 L23
loop, statement, operator L12 L15	statement, loop, operator L16	language, statement, problem	language, problem, work	language, data, problem	memory, variable, structure	memory, function, pointer	function memon pointer
statement, compiler, loop	language, statement, compiler	language, problem, run	language, problem, scanf	memory, scanf, language	memory, pointer, structure	pointer, memory, function	pointer memon function
file, compiler, include	compiler, file, language	language, compiler, run L7	language, scanf, problem	scanf, language, memory	memory, pointer, scanf	pointer, memory, array	pointer memon array L21
file, compiler, include	file, compiler, run	language, printf, scanf	scanf, string, printf	scanf, string, character	pointer, memory, string	pointer, memory, array	pointer array, memor

On the right side of the browser window, there is a "Keywords" box containing the text: "array, pointer, string, element, memory." Below this is a "Map" grid and a "Help" link.

At the bottom of the browser window, a list of search results is displayed, including links to various articles and FAQs:

- [R. Miles : Arrays](#)
- [R. Miles : Why We Need Arrays](#)
- [R. Miles : Array Types and Size ...](#)
- [R. Miles : More Than One Dimens ...](#)
- [S. Summit : 10.5 ``Equivalence'' ...](#)
- [S. Summit : 10.6 Arrays and Poin ...](#)
- [S. Summit : 4.1 Arrays](#)
- [S. Summit : 4.1.1 Array Initiali ...](#)
- [S. Summit : 4.1.2 Arrays of Arra ...](#)
- [P. Burden : Addresses , Pointers , ...](#)
- [D. Marshall : Pointers and Arrays...](#)
- [D. Marshall : Multidimensional arr ...](#)
- [D. Marshall : Static Initialisatio ...](#)
- [D. Marshall : Searching and Sortin ...](#)
- [D. Marshall : Initializinga Sema ...](#)
- [D. Marshall : Controlling Semaphor ...](#)
- [D. Marshall : Semaphore Operations ...](#)
- [D. Marshall : Arrays and Strings](#)
- [D. Marshall : Single and Multi-dim ...](#)
- [D. Marshall : Functions and Arrays ...](#)
- [C.Faq : Question 1.31](#)
- [C.Faq : Question 15.13](#)



Introduction to C Programming by Rob Miles, Electronic Engineering



Writing a Program

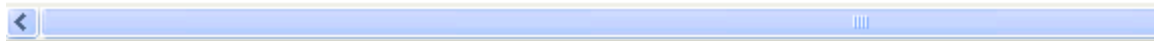
[Comments](#)

[Program Flow](#)

- [Conditional Execution - if](#)
- [Conditions and Relational Operators](#)
- [Combining Logical Operators](#)
- [Lumping Code Together](#)
- [Magic Numbers and #define](#)
- [Loops !\[\]\(e6ddc77b791299d975007937cebef274_img.jpg\)](#)
- [Breaking Out of Loops](#)
- [Going Back to the Top of a Loop](#)
- [More Complicated Decisions](#)
- [Complete Glazing Program](#)
- [Operator Shorthand](#)
- [Statements and Values](#)
- [Neater Printing !\[\]\(ab52e27d061d76db54e182891376cff5_img.jpg\)](#)

Comments

When the C compiler sees the `/*` sequence which means the start of a comment it says:





Knowledge Sea v2.0 : Cell Contents - Mozilla ...

Map

Keywords

operator , loop , expression , statement , value.

Help

Density of public annotation

		R. Miles : Conditions and Relat ...
		R. Miles : Combining Logical Op ...
		R. Miles : Operator Shorthand
		S. Summit : Chapter 7: More Oper ...
		S. Summit : 7.1 Assignment Opera ...
		S. Summit : 7.2 Increment and De ...
		P. Burden : Arithmetic - The ++ ...
		P. Burden : Arithmetic - Assignm ...
		P. Burden : Arithmetic - Evaluat ...
		P. Burden : Arithmetic - Summary ...
		P. Burden : Loops and Conditions ...
		P. Burden : Loops and Conditions ...
		D. Marshall : Bitwise Operators

personal positive annotation

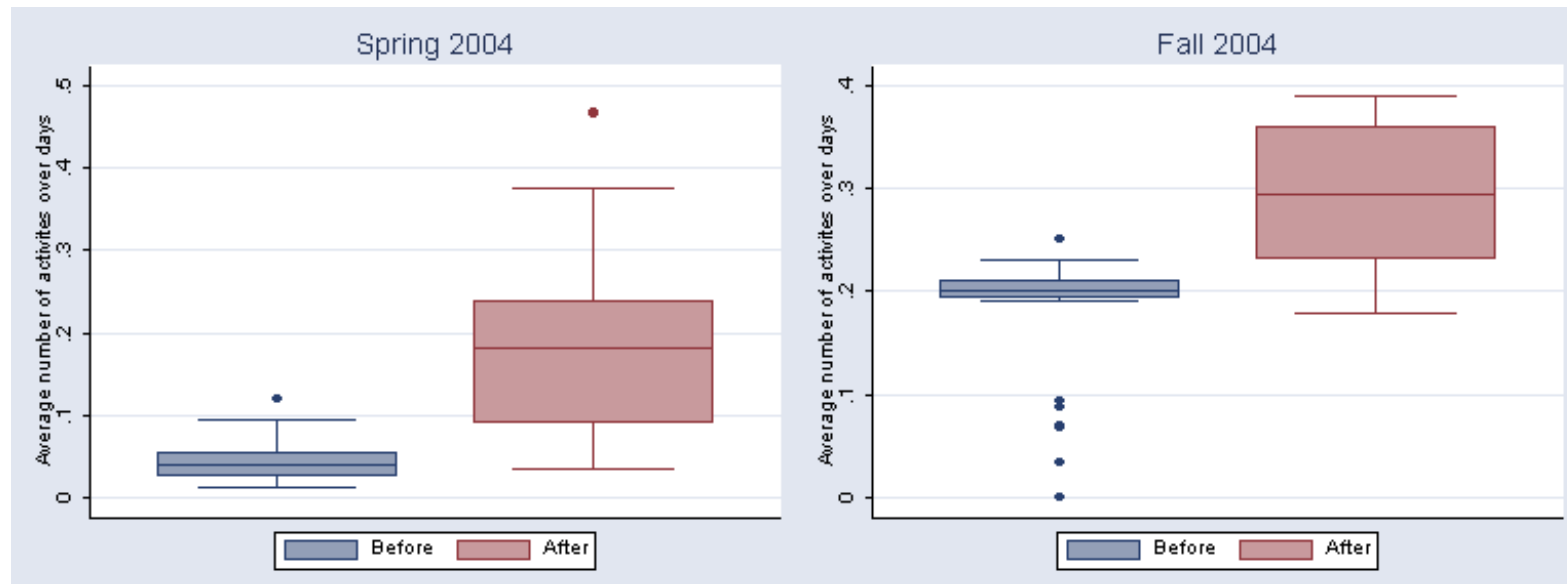
Overall positive temperature

general annotation

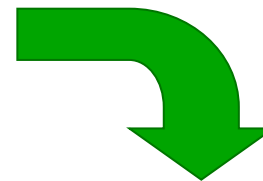
personal negative annotation

Overall negative temperature

The Impact of Annotations on Visits



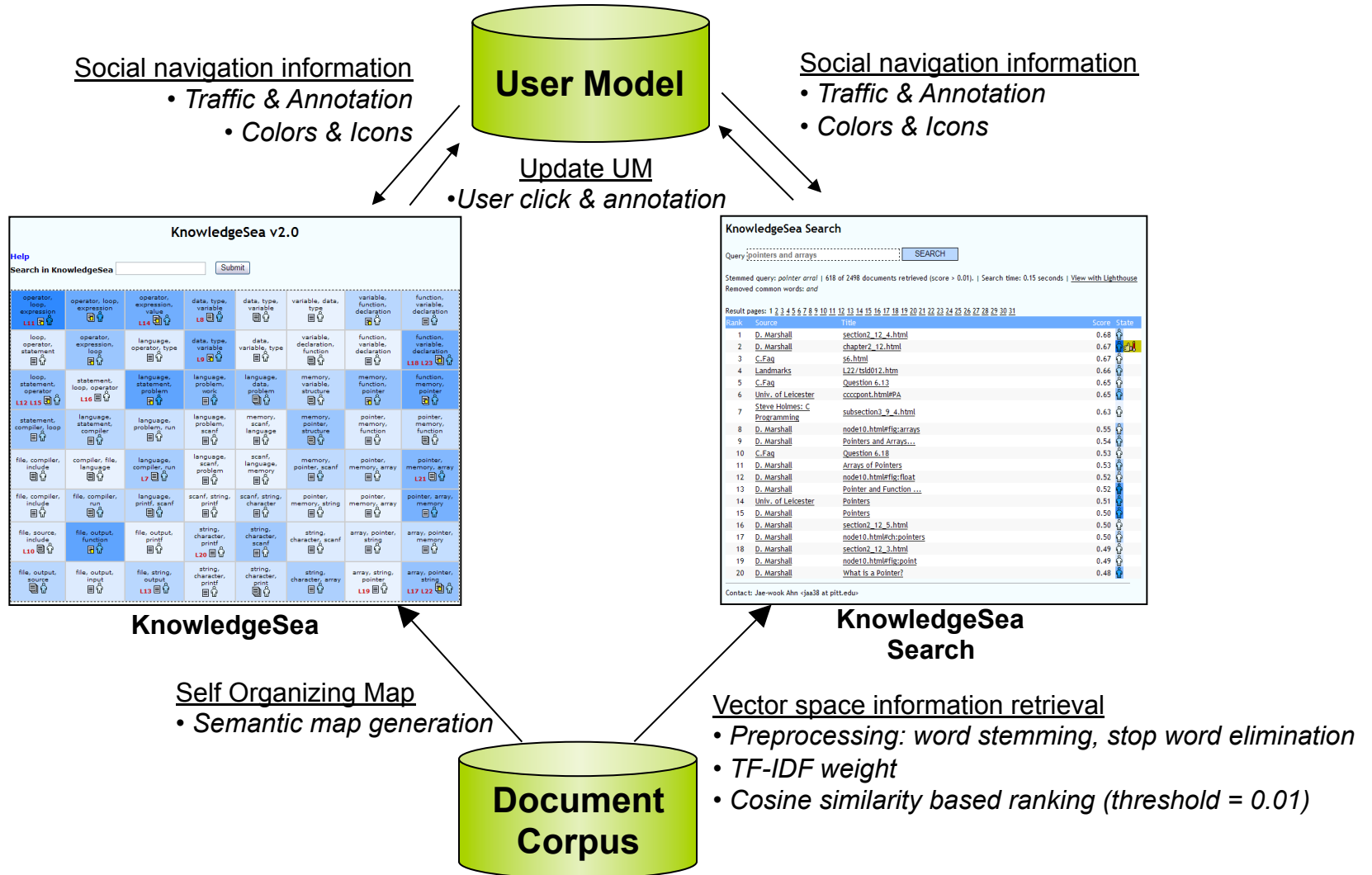
Tutorial pages are getting significantly more visitors after being annotated



Annotation based navigation support guides the students to the useful pages



Search and Navigation in KSII





Ranking and Annotation in Search

KnowledgeSea Search

Query:

Stemmed query: *dynam alloc memori* | 370 of 2498 documents retrieved (score > 0.01). | Search time: 0.10 seconds | [View with Lighthouse](#)

Removed common words: of

Result pages: [1](#) [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#)

Rank	Source	Title	Score	State
1	S. Summit	Chapter 11: Memory A ...	0.62	
2	S. Summit	11.2 Freeing Memory	0.48	
3	C.Faq	s7.html	0.45	
4	R. Miles	Memory	0.42	
5	R. Miles	c13.html	0.40	
6	S. Summit	11.4 Pointer Safety	0.37	
7	R. Miles	free	0.35	
8	R. Miles	malloc	0.34	
9	D. Marshall	section2_21_8.html	0.30	
10	C.Faq	Question 19.23	0.29	

Document with high traffic (higher rank) (points to rank 6)

Document with positive annotation (higher rank) (points to rank 9)

Similarity score (points to Score column)

General annotation (points to State column)

Question (points to question mark icon)

Praise (points to thumbs up icon)

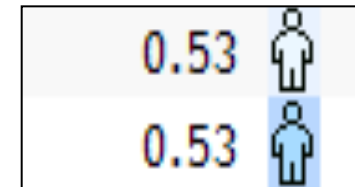
Negative (points to thumbs down icon)

Positive (points to thumbs up icon)



Annotations in Search Results

- Traffic
 - More group traffic
 - Darker background color
 - More user traffic than others
 - Human-like icon
 - Darker foreground color
- Annotation
 - More annotations
 - Darker background color
 - General, Praise, Question
 - Sticky notes, Thumbs-up, Question-mark
 - Positive or Negative
 - Red or Blue thermometer



Example of Social Traffic



Example of Social Annotations



Case 3: Overnavigation in SQL-Guide

- Two versions of SQLGuide:
 - Topic-based
 - Topic-based+Concept-Based

QuizGuide: Topic-based Adaptive Navigation for Quizzes - Mozilla Firefox

File Edit View History Bookmarks Tools Help

SELECT-FROM
Arithmetic Expressions
SELECT-FROM-WHERE
Pattern Matching
Multiple Table Queries
ORDER-BY
Set Operations
Aggregate Functions
GROUP-BY and HAVING
Sub-Queries

Question:
Based on the tables below, write the SQL query that will return the names of all actors who have acted in a movie that was released in the year 2000.

Task:
Find all the names of actors whose movies were released in the year 2000.

Enter your answer here.

Table Name	Schema & Sample Data (click to expand)
actor(+)	actor_id first_name last_name last_name_l
address(+)	address_id address address2 di
category(+)	category_id name last_update
city(+)	city_id city country_id last_upd
country(+)	country_id country last_update

QuizGuide: Topic-based Adaptive Navigation for Quizzes - Mozilla Firefox

File Edit View History Bookmarks Tools Help

SELECT-FROM
Arithmetic Expressions
SELECT-FROM-WHERE
Pattern Matching
Multiple Table Queries
ORDER-BY
Set Operations
Aggregate Functions
GROUP-BY and HAVING
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Based on the tables below, write the SQL query that will return the names of all actors who have acted in a movie that was released in the year 2000.

Task:
Find all the names of actors whose movies were released in the year 2000.

Enter your answer here.

Table Name	Schema & Sample Data (click to expand)
actor(+)	actor_id first_name last_name last_name_l
address(+)	address_id address address2 di
category(+)	category_id name last_update
city(+)	city_id city country_id last_upd
country(+)	country_id country last_update



QuizGuide: C Questions with ANS

QuizGuide. Adaptive quiz recommender. - Microsoft Internet Explorer

File Edit View Favorites Tools Help Address <http://www.sis.pitt.edu/~ir/qplus/bin/qguide> Go

Back Forward Stop Home Search Favorites Media Print Copy Paste cfti

Quiz Guide

Adaptive Navigation for Self-Assessment Quizzes

- variables
- constants (define)
 - Quiz1
 - Quiz2
- loops (while)
 - Quiz1
 - Quiz2
- increment decrement
- compound assignments
 - Quiz1
- logical expressions
 - Quiz1
- loops (do while)
 - Quiz1
 - Quiz2
- conditionals (if else)
- conditional operator
 - Quiz1

Question 5

```
main ()
{
    int i = 10;
    int s = 0;
    do {
        i--;
        s += i;
    } while (3 < i);
}
```

What is the final value of S

S =

Submit

List of annotated links to all quizzes available for a student in the current course

Questions of the current quiz, served by QuizPACK



QuizGuide: Adaptive Annotations

- Target-arrow abstraction:

- Number of arrows – level of knowledge for the specific topic (from 0 to 3). *Individual, event-based adaptation.*



- Color Intensity – learning goal (current, prerequisite for current, not-relevant, not-ready). *Group, time-based adaptation.*



- Topic–quiz organization:

loops (while)
Quiz1
Quiz2

increment decrement

compound assignments
Quiz1

logical expressions
Quiz1

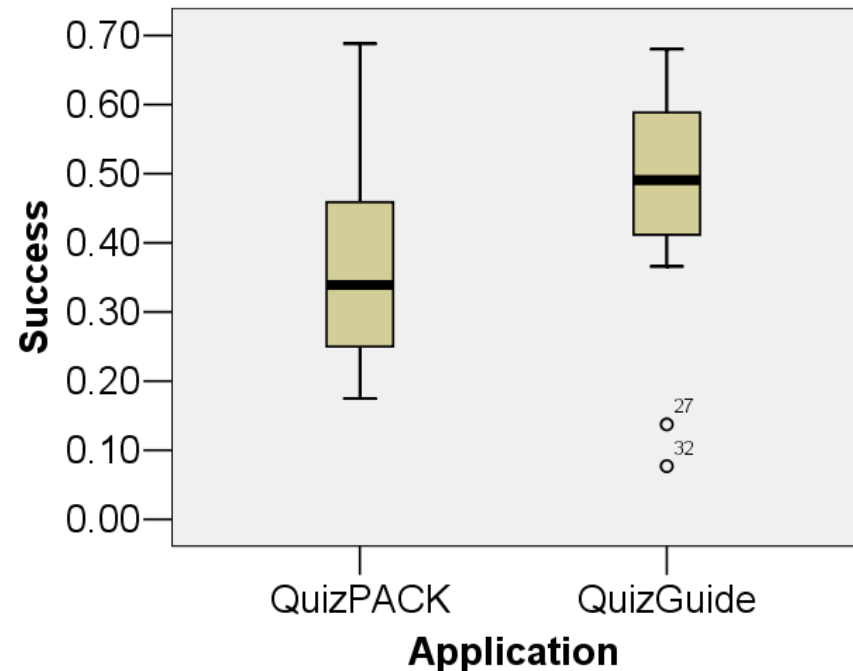
loops (do while)
Quiz1
Quiz2

conditionals (if else)



QuizGuide: Success Rate

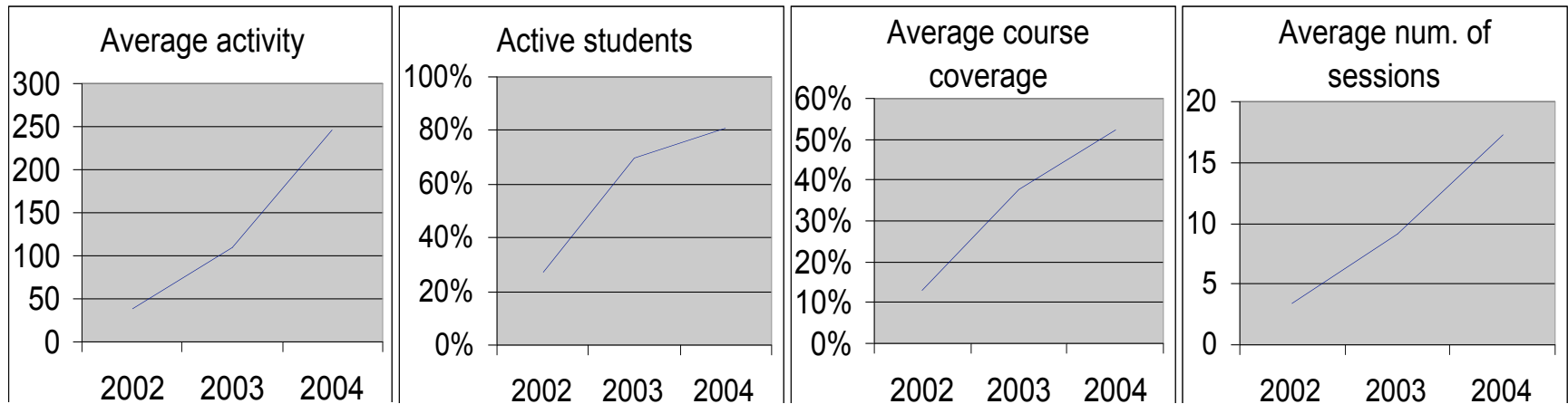
- Arrive in time: Much higher chance to solve the problem
- One-way ANOVA shows that mean success value for QuizGuide is significantly larger than the one for QuizPACK:
 $F(1, 43) = 5.07$
(p-value = 0.03).





QuizGuide: Motivation

- Adaptive navigation support increased student's activity and persistence of using the system



- Within the same class QuizGuide sessions were much longer than QuizPACK sessions: 24 vs. 14 question attempts at average.
- Average Knowledge Gain for the class rose from 5.1 to 6.5



SQL Knowledge Tester

- SQL-KnoT delivers online SQL problems, checks student's answers and provides a corrective feedback
- Every problem is dynamically generated using a template and a set of databases
- All problems have been assigned to 1 of the course topics and indexed with concepts from the SQL ontology

The screenshot shows a web browser window titled "Knowledge Tree - SELECT-FROM-WHERE (4) - Mozilla Firefox". The interface includes a navigation menu on the left with various SQL topics. The main content area displays a question and a table of data.

Question:
Based on the tables below, write the required SQL expression.
Task:
Find all the names of actors whose last name is "ALLEN" or "CAGE".

Enter your answer here.

Table Name	Schema & Sample Data (click +/- to show/hide sample data)												
actor(-)	actor_id first_name last_name last_update												
	<table border="1"><thead><tr><th>actor_id</th><th>first_name</th><th>last_name</th><th>last_update</th></tr></thead><tbody><tr><td>1</td><td>PENELOPE</td><td>GUINNESS</td><td>2006-02-15 04:34:33.0</td></tr><tr><td>2</td><td>NICK</td><td>WAHLBERG</td><td>2006-02-15 04:34:33.0</td></tr></tbody></table>	actor_id	first_name	last_name	last_update	1	PENELOPE	GUINNESS	2006-02-15 04:34:33.0	2	NICK	WAHLBERG	2006-02-15 04:34:33.0
actor_id	first_name	last_name	last_update										
1	PENELOPE	GUINNESS	2006-02-15 04:34:33.0										
2	NICK	WAHLBERG	2006-02-15 04:34:33.0										
address(+)	address_id address address2 district city_id postal_code phone last_update												
category(+)	category_id name last_update												
city(+)	city_id city country_id last_update												
country(+)	country_id country last_update												
customer(+)	customer_id store_id first_name last_name email address_id active create_date last_update												



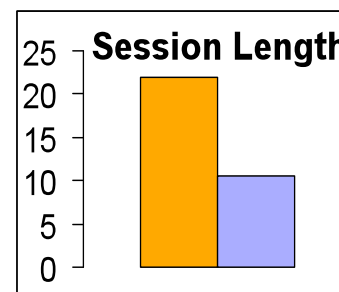
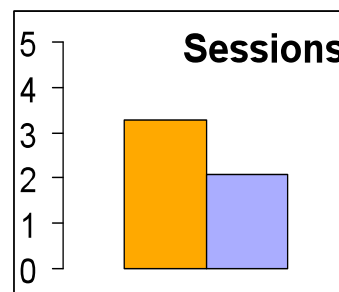
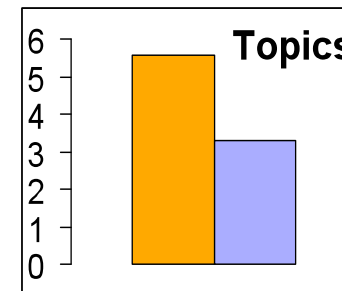
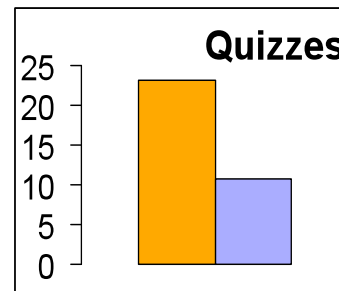
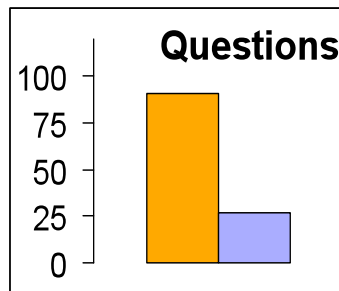
Study Design

- Two Database Courses (Fall 2007):
 - Undergraduate (36 students)
 - Graduate (38 students)
- Each course divided into two groups:
 - Topic-based navigation
 - Topic-based + Concept-Based Navigation
- All students had access to the same set of SQL-KnoT problems available in adaptive (QuizGuide) and in non-adaptive mode (Portal)



It works! Again! Like magic...

- Total number of attempts made by all students: in adaptive mode (4081), in non-adaptive mode (1218)
- Students in general were much more willing to access the adaptive version of the system, explored more content with it and to stayed with it longer:



■ Adaptive
■ Non-adaptive

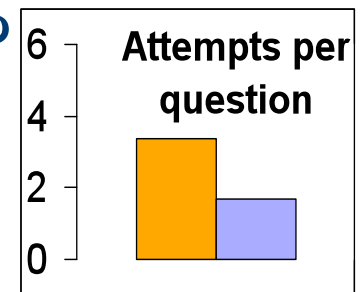


Concept-based ANS: Added Value?

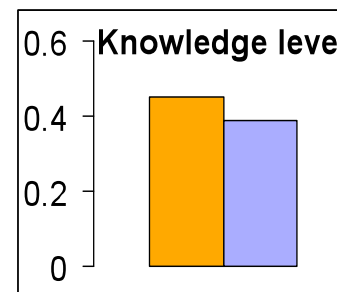
- Did concept-based adaptation increase the magnitude of the motivational effect?
 - No significant difference in the average numbers of attempts, problems answered, topics explored
 - No significant difference in the session length

- Was there any other observable difference?

- Average number of attempts per question



- Resulting Knowledge Level (averaged across all concepts)

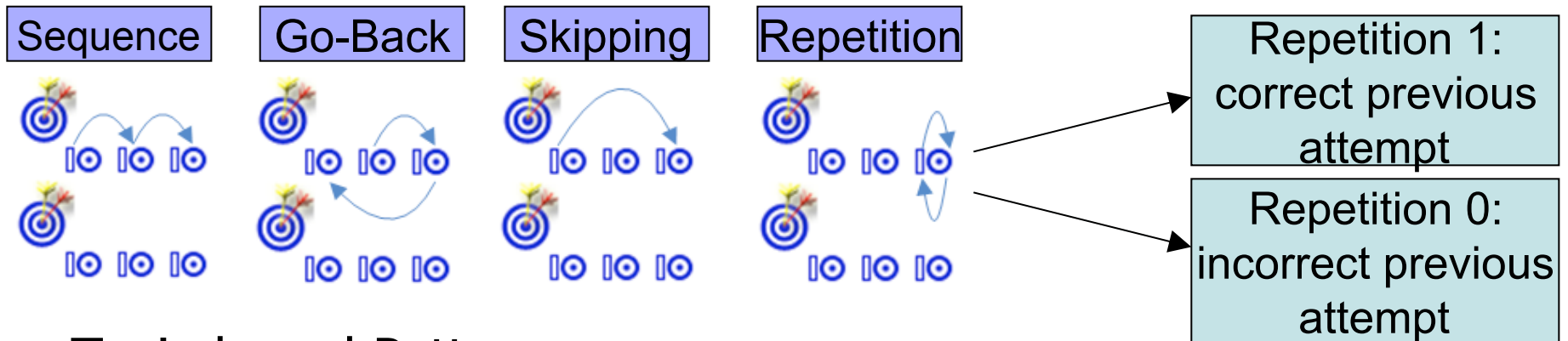


- Combined
- Topic-based

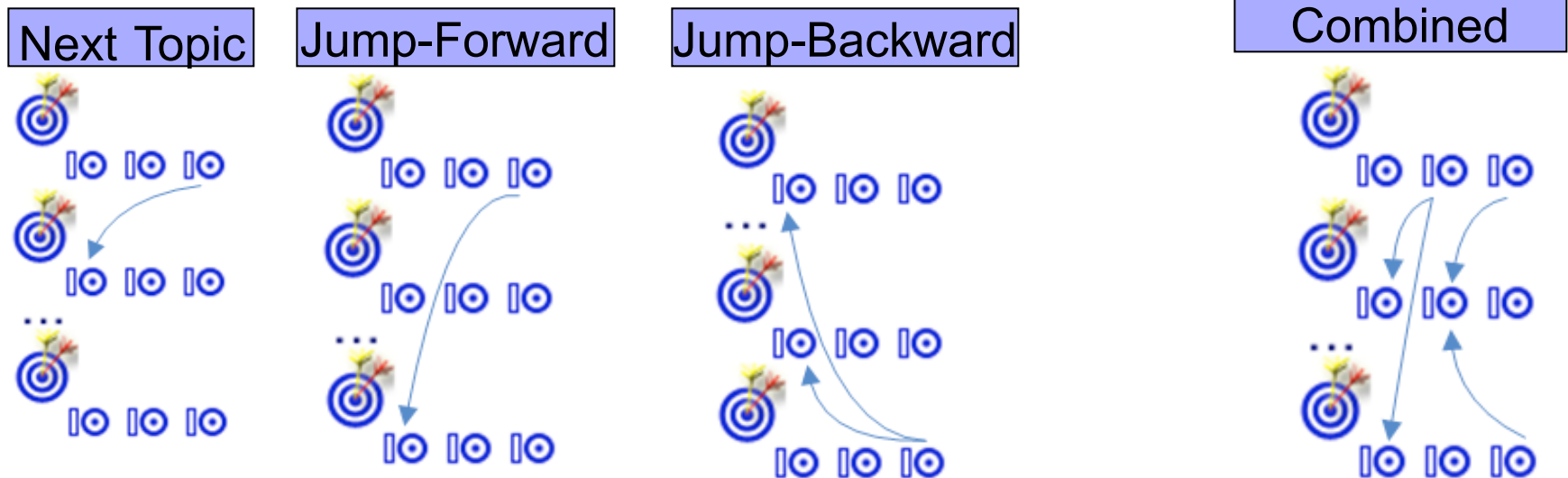


Pattern Analysis

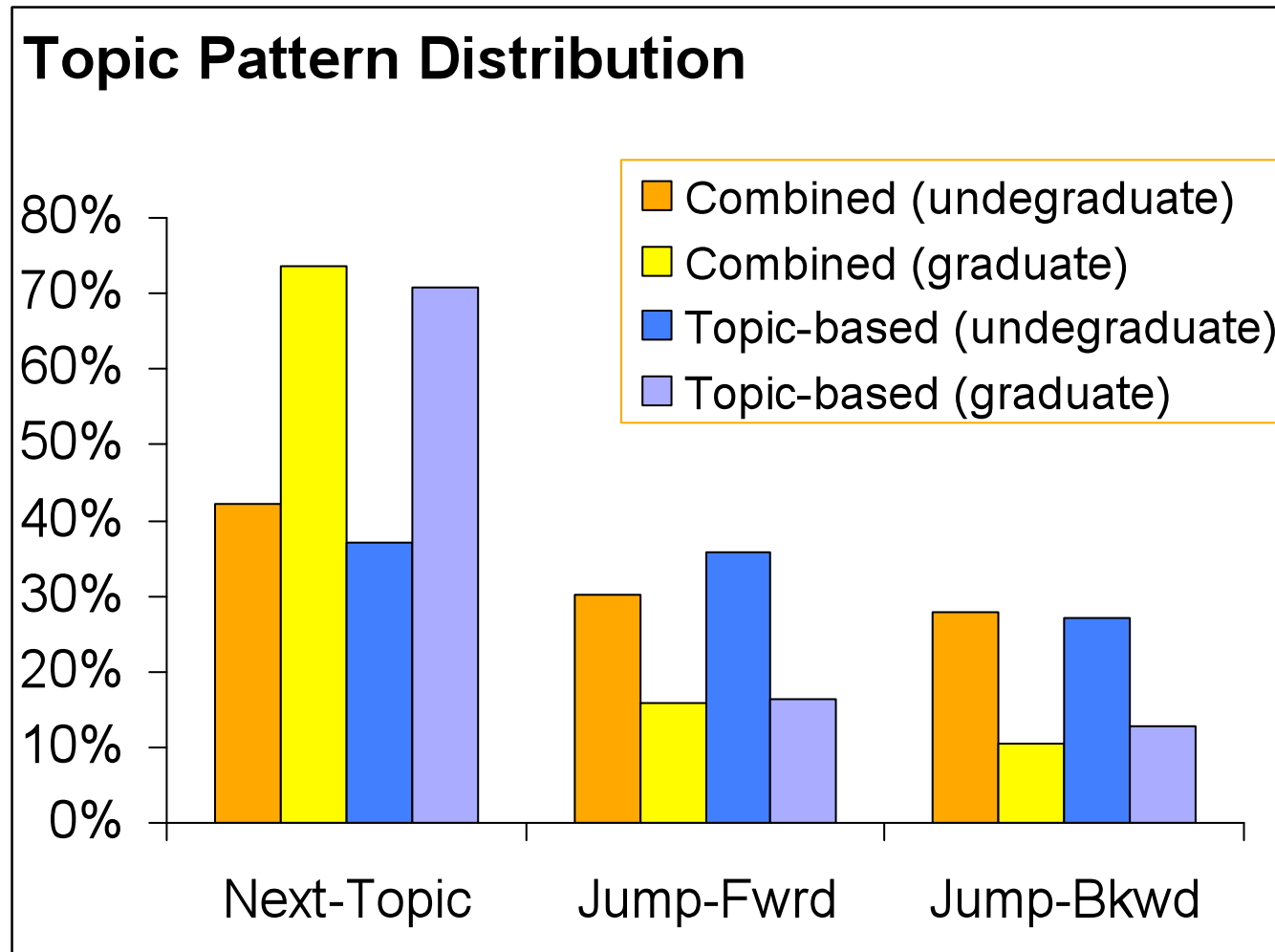
- Question-based Patterns:



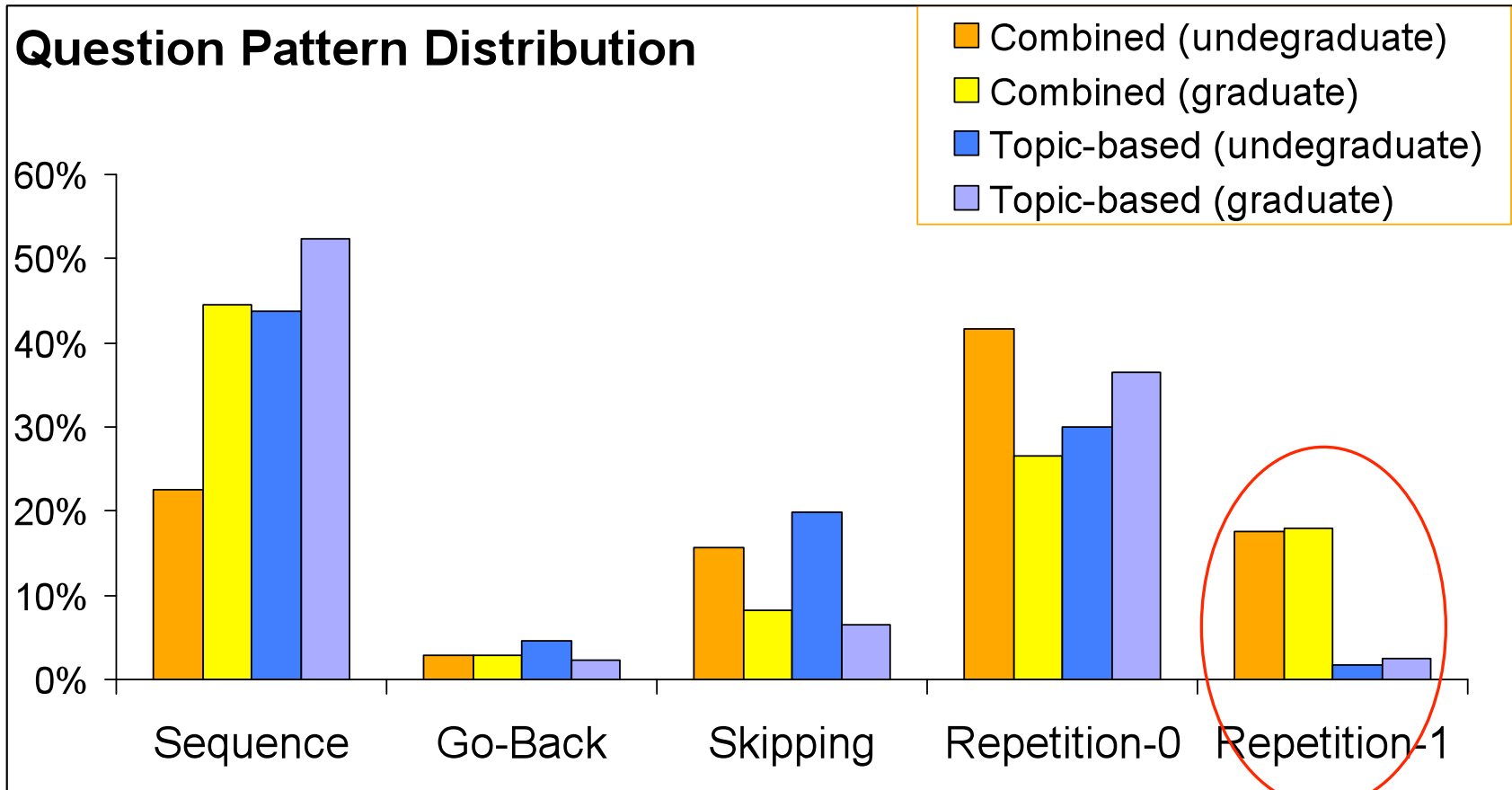
- Topic-based Patterns:



Pattern Analysis (2)



Pattern Analysis (3)



Discussion

- Difference in the ratio of Repetition1 pattern explains:
 - difference in the average number of attempts per question
 - difference in the cumulative resulting knowledge level
- Students repeat the same question again and again:
 - They “get addicted“ to the concept-based icons
 - Is it a good thing for us?
 - YES – they react to the navigational cues, they work more
 - NO – we expect them to concentrate on those questions where they have smaller progress instead of drilling in the same question




Case 4: CourseAgent

SIS CourseAgent - Adaptive Online Course Recommendation System - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

Getting Started Latest Headlines Google Google Scholar Inbox SSLVPN



 **CourseAgent**
Adaptive Online Course Recommendation System





Control Panel Schedules Career Scope Course Catalog Faculties Register

Rosta 's CourseAgent Help Log off

Spring 2007 List Visualize

Schedule of spring 2007

[Taken Courses](#),
 [Planned Courses](#),
 [Currently Taken Courses](#),
  Recommend by Advisor,
  Degree of Relevance to Career Goals

CRN	Course No	Title	Duration	Day	Time	Location	Instructor	Workload	Relevance	Action
16688	INFSCI 2120	Information and Coding Theory	semester	Tue/Thu	11:00-12:15	IS 502	Paul Munro			
16682	INFSCI 2130	Decision Analysis and Decision Support Systems	semester	Tuesday	6:00-8:50	CL 206	Marek Druzdzal			
196666	INFSCI 2140	Information Storage and Retrieval	semester	Tuesday	6:00-8:50	IS 411	Unknown			
19684	INFSCI 2210	Information Ethics	semester	Monday	3:00-5:50	IS 501	Toni Carbo			Plan It
19667	INFSCI 2300	Human Information Processing	semester	Thursday	3:00-5:50	IS 406	Unknown			Plan It
16698	INFSCI 2460	Spatial Reasoning for GIS	semester	Wednesday	6:00-8:50	IS 405	Michael Lewis			Plan It
16668	INFSCI 2470	Interactive Systems Design	semester	Tuesday	6:00-8:50	IS 406	Peter Brusilovsky			Evaluate It

Done



Course Schedule

Spring 2006 List

Click to see the schedule

CourseAgent
Adaptive Online Course Recommendation System

Control Panel Schedules Career Scope Course Catalog Faculties Register

Rosta's CourseAgent Help Log off

Schedule of spring 2006

Taken Courses, Planned Courses, Currently Taken Courses, Recommend by Advisor, Degree of Relevance to Career Goals

CRN	Course No	Title	Day	Time	Location	Instructor	Workload	Relevance	Action
1692	TELCOM 2940	PRACTICUM	sat			Richard Thompson			Plan It
16084	INESCI 2120	INFORMATION AND CODING THEORY	tue	6:00-8:50 P	302 CL	Paul Munro	🔧🔧	👍👍👍	Plan It
16077	INESCI 2130	DECISION ANALYSIS AND DECISION SUPPORT SYSTEMS	wed	6:00-8:50	411 1S	Marek Druzdzel	🔧🔧	👍👍👍	Plan It
16088	LIS 2194	ETHICS IN THE INFORMATION SOCIETY	mon	3:00-5:50 P	403 1S	Toni Carbo			Plan It
16099	INESCI 2350	HUMAN FACTORS IN SYSTEMS	thu	6:00-8:50 P	411 1S	Michael Lewis	🔧🔧	👍👍👍	Register It
16056	INESCI 2470	INTERACTIVE SYSTEM DESIGN	wed	6:00-8:50 P	405 1S	Peter Brusilovsky	🔧🔧	👍👍👍	Evaluate It
16079	INESCI 2511	INFORMATION SYSTEMS ANALYSIS, DESIGN, AND EVALUATION	tue	6:00-8:50 P	411 1S	Glenn Bay	🔧		Plan It
16011	INESCI 2610	DATA STRUCTURES	thu	3:00-5:50 P	501 1S	Roger Ffynn	🔧🔧	👍👍👍	Plan It
16118	INESCI 2611	ALGORITHM DESIGN	tue	3:00-5:50 P	406 1S	Hassan Karimi	🔧		Plan It
16065	INESCI 2720	GEOGRAPHIC INFORMATION SYSTEMS	thu	6:00-8:50 P	405 1S	Hassan Karimi	🔧🔧	👍👍👍	Plan It

Planned to take (can be registered)

Already taken (can be evaluated)

Degree of relevance to students' career goal

Marginally relevant
Relevant
Very Relevant

Difficulty level of the course

Low , Medium , High



Course Rating in CourseAgent

Course Evaluation

INFSCI 2120 - INFORMATION AND CODING THEORY

1. Workload of the course:

1 2 3

Low Average High

2. How relevant is this course to each of your career goals:

Career Goal	1	2	3	4	5
College Professor	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Digital Libraries Professional	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Graphical User Interface (GUI) Programmer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Research in Industry	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web Application Developer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web Designer	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Web Master	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
	Irrelevant	Marginally Relevant	Relevant	Very Relevant	Essential

Comments

Save



Under-Contribution Problem

- Do it for yourself
 - Encouraging participation by turning the rating activity into important and meaningful activity
 - Personal gain depends on contribution to the community
- CourseAgent
 - Career Scope
 - Presenting progress towards each career goal
 - Only evaluated courses contribute to the progress



Career Planning

Progress (Taken, Planned, Recommended)

+College Professor



+Digital Libraries Professional



-Graphical User Interface (GUI) Programmer



Taken Courses

Course Number	Course Title	My Rating	Action
INFSCI 2120	INFORMATION AND CODING THEORY		Evaluate It!
INFSCI 2300	HUMAN INFORMATION PROCESSING	★★★★☆	Evaluated
INFSCI 2470	INTERACTIVE SYSTEM DESIGN		Evaluate It!
INFSCI 2610	DATA STRUCTURES	★★★★☆	Evaluated
LIS 2000	UNDERSTANDING INFORMATION	★★★★☆	Evaluated

Planned Courses

Course Number	Course Title	Community Rating	Action
INFSCI 2000	Intro to Information Science	★★★★☆	Registered
INFSCI 2020	MATHEMATICAL FOUNDATIONS FOR INFORMATION SCIENCE	★★★★☆	Registered
INFSCI 2140	INFORMATION STORAGE AND RETRIEVAL	★★★★☆	View Study Plan
INFSCI 2160	DATA MINING	★★★★☆	View Study Plan

Recommended Courses

Course Number	Course Title	Community Rating	Action
INFSCI 2510	INFORMATION SYSTEMS	★★★★☆	Add to Study Plan
INFSCI 2550	CLIENT-SERVER AND WORKSTATION SYSTEMS	★★★★☆	Add to Study Plan



Results

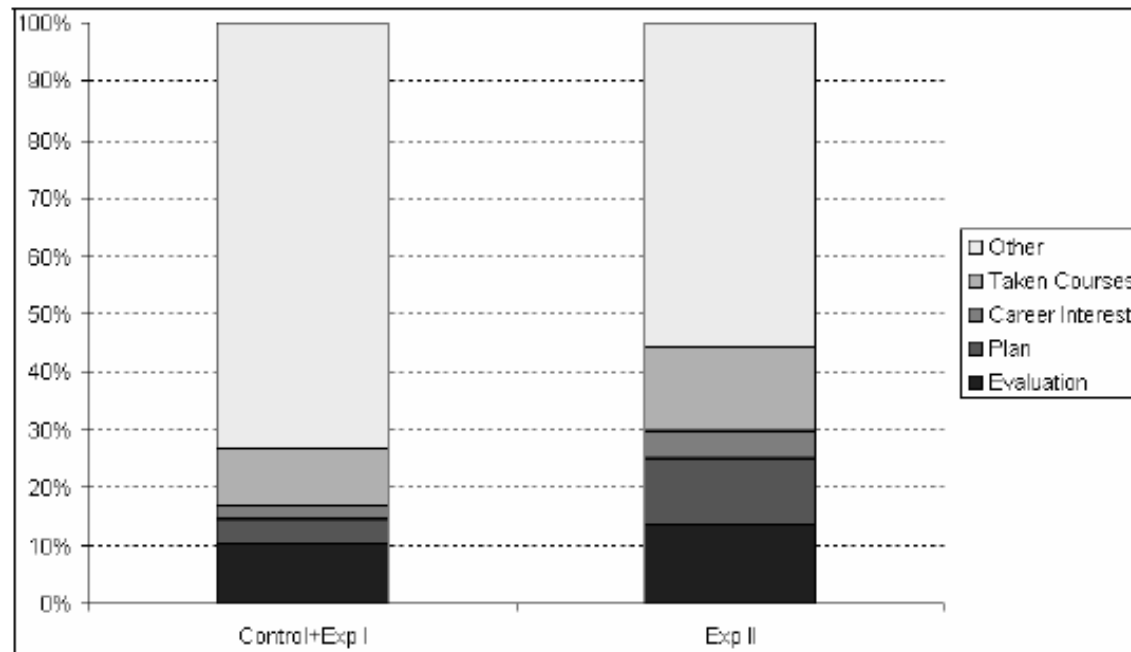
- Contribution of experimental users who did not use Career Scope is close to control group
- Significant different between contribution of experimental group II and control group + experimental group I

	# of students	Ave. # of added courses	Ave. # of planned courses	Ave. # of added career interests	Ave. # of saved evaluation
Control Group	11	5	2	0.91	4.55
Experimental group I	4	2.25	1.5	1.25	3.75
Control + Experimental I	15	4.27	1.87	1	4.33
Experimental group II	5	8.8	7	3	8.2



Analysis of Activities of each group

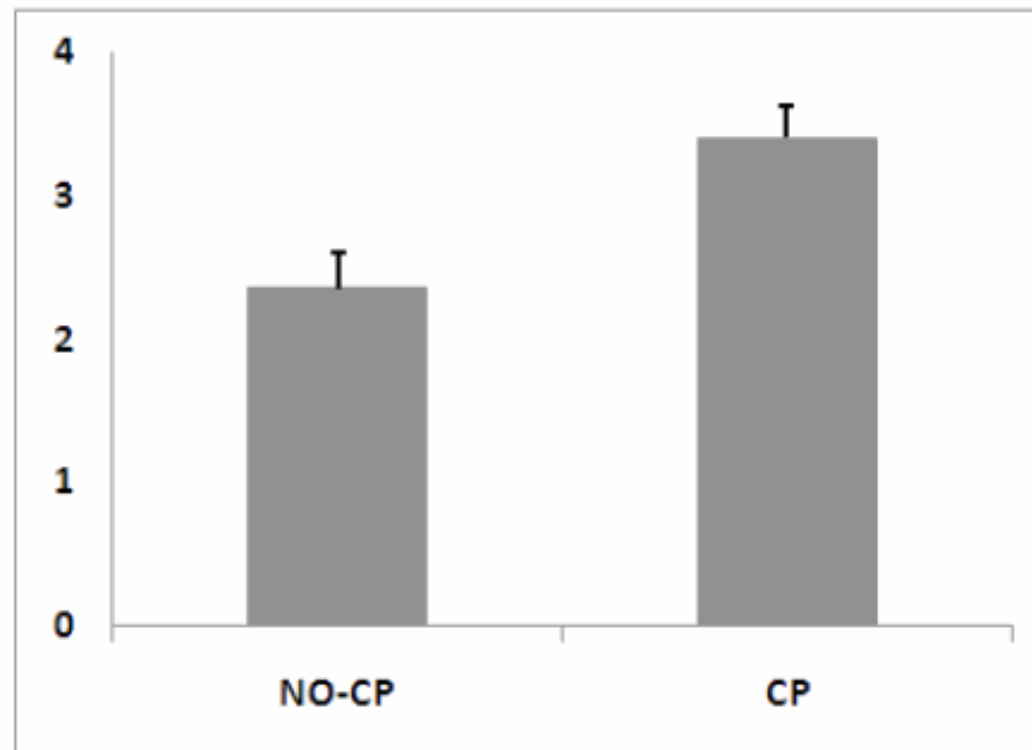
- Experimental group II spent a higher fraction of their time on activities useful to the community





A Probe for Overmotivation

- Career Progress implicitly encourages students to over-rate taken courses





Summary

- It is important to study how your recommender systems are used
 - Log studies vs. eye tracking studies
- Do users follow the recommendations?
- Does recommendation provoke suboptimal behavior?
- What is the back side of user engagement technology?