Assessment - A Partner for Curriculum Development - Useful Online Tools

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Outline

- Assessment – how did my background evolve?
- Has been applied to specific HPC course (CS 575 Supercomputing) focused on group learning
- Re-applied to new course – CS 440 Social and Ethical Issues in Computer Science
- Generates new focus on IT (Applaud SIAM for engaging CSE, now suggest new issue)
- What tools are there to help with gathering quantitative data?

Where did it begin?
1998/99 Assessment by LEAD

Background

- **Workshop in Wisconsin April 1997 to learn about assessment and make it real to the EOT-PACI (NPACI and NCSA Education Teams)**
- **NPACI started 01 October 1997**
- **EC/CSE requested assessment for 1998 project**

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NSF/EHR

National Science Foundation/Education and Human Resources Directorate

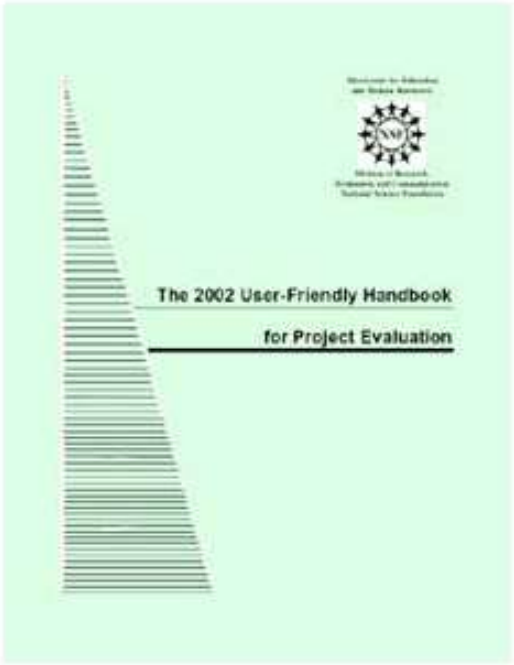
http://www.nsf.gov/pubs/2002/nsf02057/start.htm

LEAD

Assessment and Evaluation

1998 Formative for the ECCSE

http://homepages.cae.wisc.edu/~lead/pages/products/eot-paci.pdf



1. Introduction (46kb)
2. Section I - Evaluation and Types of Evaluation (55kb)
3. Section II - The Steps in Doing an Evaluation (154kb)
4. Section III - An Overview of Quantitative and Qualitative Data Collection Methods (66kb)
5. Section IV - Strategies That Address Culturally Responsive Evaluations (50kb)
6. Other Recommending Reading, Glossary, and Appendix A: Finding An Evaluator (56kb)

Entire PDF Document (379kb)

Updated NSF User-Friendly Handbook

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Evaluation & Assessment using Outside Wisdom (Foertsch/Alexander)

- U. Wisconsin LEAD for 1998/99 Ed Center evaluation by Julie Foertsch & Baine Alexander
  "Integrating High Performance Computing into the Undergraduate curriculum: How PACI and the ECCSE can Succeed"
  http://homepages.cae.wisc.edu/~lead/pages/products/eot-paci.pdf
- Follow-on Activities (Susan Millar, LEAD)
  CATS (Classroom Assessment Techniques)
  FLAG (Field-tested Learning Assessment Guide)
  SALG (Student Assessment Learning Guide)

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Grand Challenges for HPC

Stewart & Zaslavsky, SC98,
HPC=High Performance Computing

1. **Faculty system of rewards does not encourage teaching innovations**
2. **Lack of awareness of HPC technologies already used in research or teaching for different fields**
3. **Faculty & students unaware of benefits and accomplishments of HPC**
4. **HPC technologies considered too complex/inaccessible for undergraduate instruction**
5. **Sequential HPC-related curricula is absent**
6. **Curricula using very large data sets not widely available**
7. **Adjust to different learning styles when material is complex**
8. **Variety of platforms/software leads to fragmented curricula**
9. **School administration/support staff not ready for HPC**
10. **Specs of computers and networks below user expectations**

We had been thinking about this (based on April 97 LEAD Workshop in WI)

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Kris' Faculty Background

(Kris Stewart, Director, San Diego State University, California State University System)

- Numerical Analyst* led to
- Supercomputing and Undergraduate Education (SUE**) led to
- Supercomputing Teacher Enhancement Program (STEP***) led to
- Education Center on Computational Science & Engineering (EC/CSE) part of EOT-PACI (1997)

* MS/CS SDSU 1979, JPL 1981, PhD UNM 1987, SDSU 1984
** SDSC (1991); UCES (DoEnergy 1994)
*** Smithsonian Research Collection (1996)

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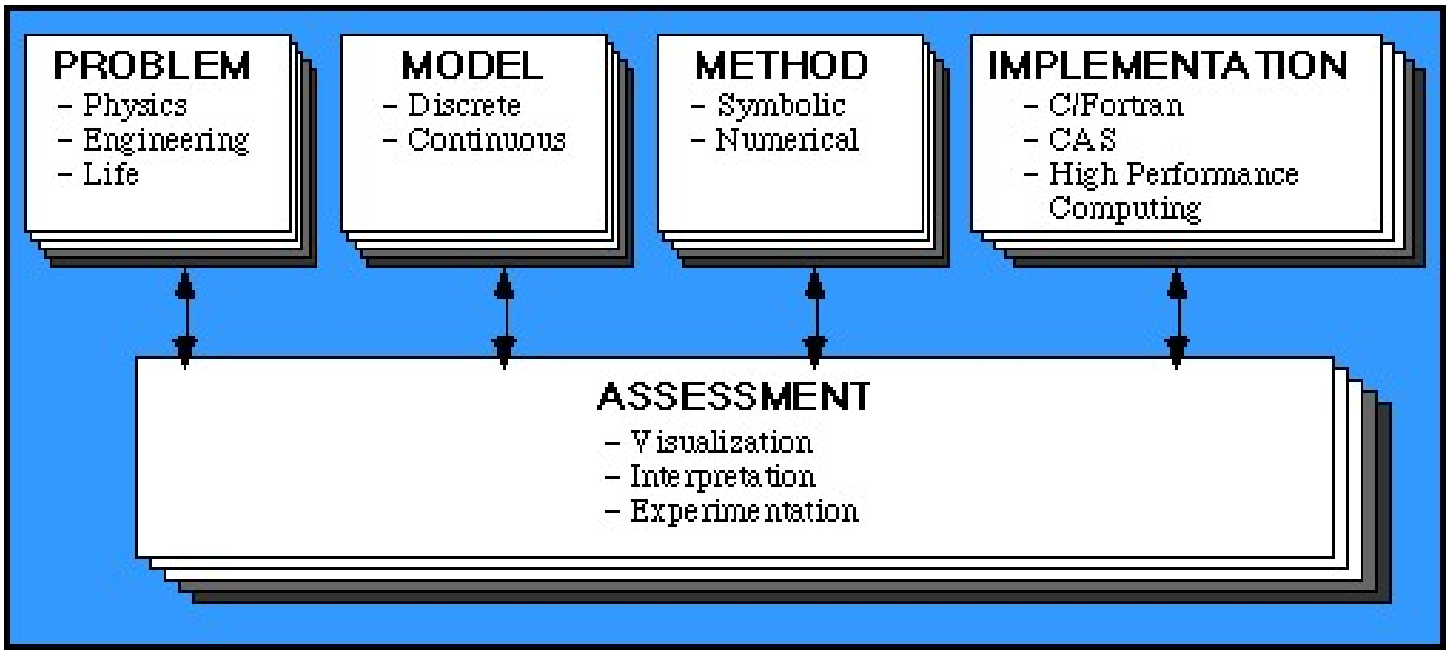
UCES Paradigm

UCES = Undergrad Computational Science & Engineering
thanks Tom Marchioro and the "crew", 1994

My previous exposure to "assessment"
How well does numerical approximation match the original problem?



Along comes SDSC, NPACI and EOT-PACI

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Mission of EOT-PACI

The mission of EOT-PACI is to develop human resources through the innovative use of emerging information technologies to understand and solve problems. Watch for possible activities to

Visualize Education in 2005.

www.eot.org

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1998/99 Assessment by LEAD

Assessment as a Collaboration

Background

- **Workshop in Wisconsin April 1997 to learn about assessment and make it real**
- **NPACI starts 01 October 1997**
- **EC/CSE requested assessment for 1998 project**

Preparation SDSU Campus Visit/B.Alexander & J.Foertsch

- **Discussions at SC98- Supercomputing Fall98 Orlando**
- **Email to SDSU faculty gather attitudes**

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Building the Community of Faculty

- These challenges are people-centric, not technology-centric and of interest to the broad academic community
- Systemic Change requires understanding the system and working within it
- Empower faculty (find the time), ensuring recognition (from chair/dean) and support (student assistants)

Interviews on SDSU Campus

LEAD applying info from email surveys (Spr 99)

Faculty skepticism:

- Convincing evidence that computer-based tools enhance teaching process?
- Knowledge of modern computational methods and availability?
- Incentive from department and insufficient tech support?

LEAD Interviews with V.P. Singer, Deans, Chairs

Faculty Fellows program identified as a target

OUTCOMES:

- our local infrastructure at SDSU took us more seriously
- survey instruments refined
- Online tool (SWB) recog.

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Assessment not just requirement

Rather, found to be

- vital tool to assist in clarifying student and faculty needs
- improve prioritization skills
- validation of focus on human factors to integrate HPC (modeling & visualization) into undergrad curriculum

California Education Infrastructure

- K12 Education (standards based, performance based)
- Community Colleges (Freshman/Sophomore)
  - Vocational (and service to local community)
  - University preparation
- California State University System (24 campuses)
- University of California (9 campuses, Merced soon)
- Independents
  (Stanford U., CalTech, U. Southern California)

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California Education Infrastructure (testbed for change)

IMPAC http://www.cal-impac.org/
Intersegmental Major Preparation Articulated Curriculum Project
Community Colleges and Four Year Universities

Charter Schools (Preuss School) preuss.ucsd.edu
Dr. Rozeanne Steckler and Dr. Mike Bailey
"Fostering Scientific Curiosity in All Children"
San Diego Supercomputer Center

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Involving University Faculty

Infrastructure for Change

- NPACI/SDSU Faculty Fellows
  Local Support from College Deans and Department Chairs (participation buy-in and faculty recognition)
- SDSU Academic Advisors (across disciplines)
- Professional Meeting (SC2001, SIAM, ACM, SIGCSE, your suggestions?)

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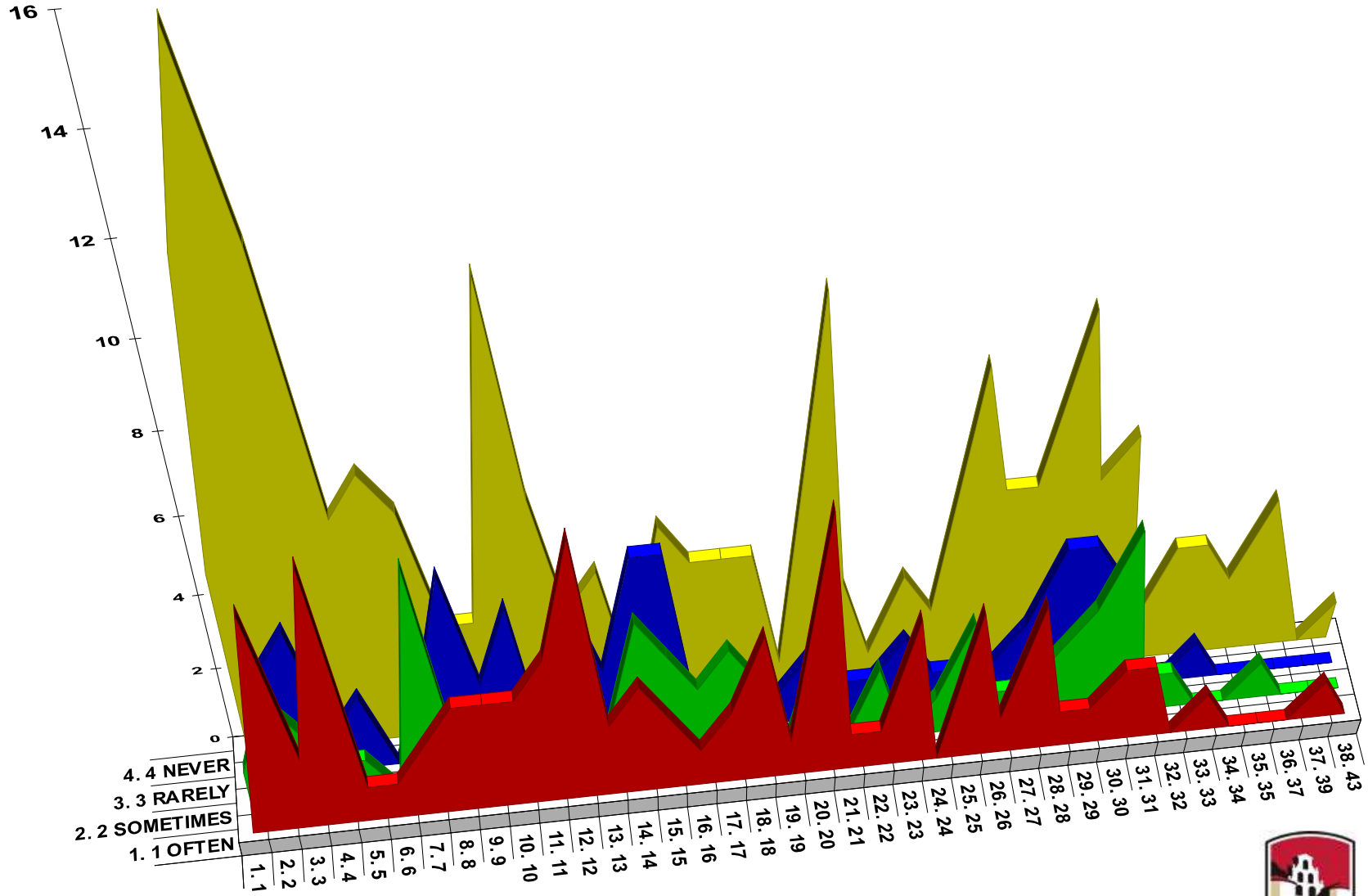
Undergraduate Faculty: A Tough Target Group

- Obstacles**: lack of time, tenure and review considerations, lack of awareness about available technologies**
- Undergraduate faculty (SSRL phone survey 1997 – thanks Doug Coe)**:**
  - ¾ have used WWW often or sometimes (1997), but not in the classroom (only 18% - 1998)
  - The gap between those NEVER using computers in the classroom, and those using them OFTEN, is the largest for untenured faculty, increasing towards tenure review
  - Only 12% of surveyed faculty saw themselves as having a use for HPC applications in courses (higher for Sciences and Engineering)
  - 11% of faculty have students working with computer models OFTEN

Using computers in the classroom versus number of years as a faculty member (1997 Faculty Survey by SSRL/Doug Coe funded by Academic Affairs)



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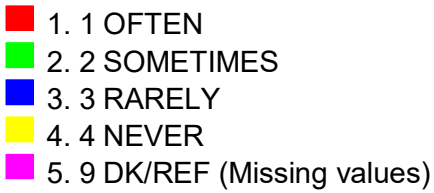
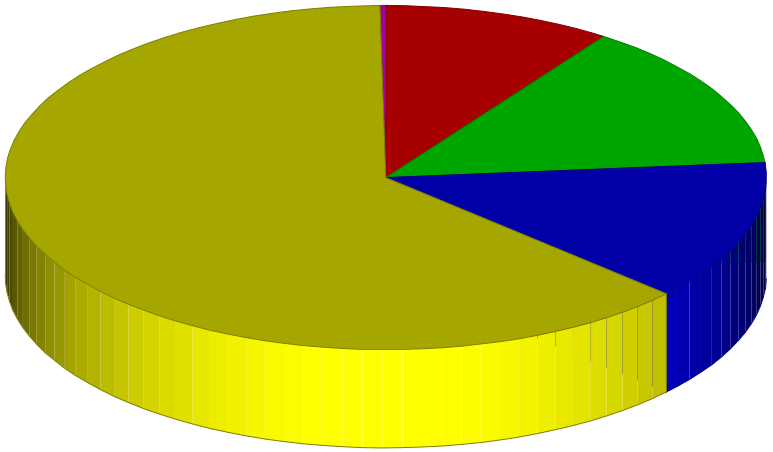
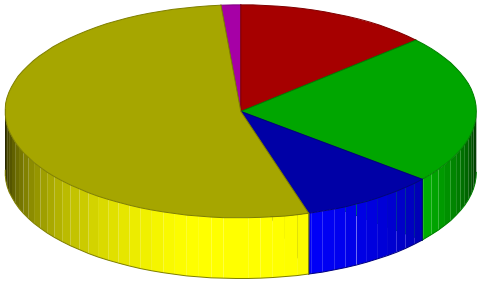
Students Using Computers in the Classroom (1997 Faculty Survey)

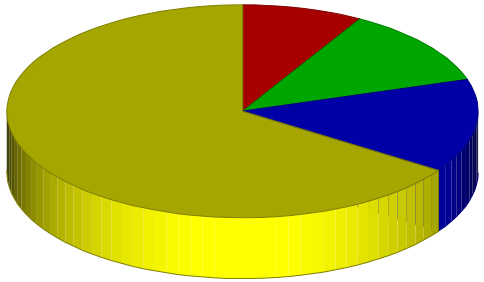




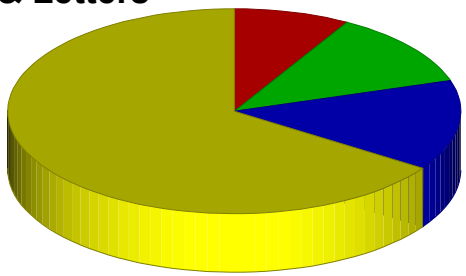
Primarily graduate faculty



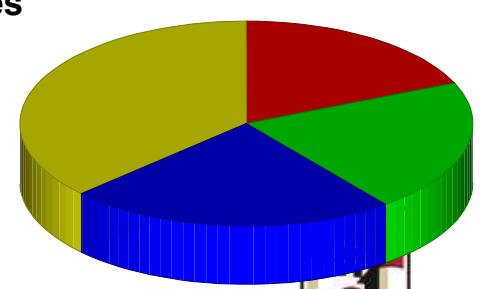
Primarily undergraduate faculty



College of Arts & Letters



College of Sciences



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Strategies for Building Faculty Community

- **Reliance on most enthusiastic and technically advanced instructors who are already using computing and modeling in classes**
- The Faculty Fellows program:
  - **Stakeholders:**
    - **College Deans - Specific support through faculty release time**
    - **Faculty - Compensation, and acknowledgement, of the value of the faculty members contribution**
  - **Benefits**
    - **College**
    - **Department (Faculty Fellows as discipline-specific spokespersons for EC/CSE and NPACI)**
    - **Faculty (as individuals)**
    - **Ed Center on Computational Science and Engineering**
  - **Building a special infrastructure for curriculum transformation: human, institutional, technical – is a requirement for successful introduction of advanced techniques (since they are more demanding on faculty time and efforts)**

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Faculty Fellows during 1998-2004

- Faculty Fellows representing departments from five colleges and the Library: Geological Sciences, Geography, Linguistics, Library & Info Access, Music, Education Technology, Biology, Computer Engineering, Computer Science, Business Information Systems
- Bi-weekly meetings at the Ed Center
- Faculty Fellows as "ambassadors" of computational science
- Partnership with LEAD for evaluation during 1998-99

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Faculty Fellows Fall 01 Synergy

among themselves and with their chairs and deans

People, Time, Support, Recognition …

Lessons Learned from ECCSE

- **Institutional support required for program to be sustainable**
- **Individual reform-ready faculty is focus for support**
- **Infrastructure:**
  - Build a Synergistic Environment (across disciplines) for Faculty
  - Continuous monitoring through interviews, surveys, discussions

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More Outside Wisdom – JSB

John Seely Brown – 17Jan05 @ SDSU

GROWING UP DIGITAL

How the Web Changes Work, Education, and the Ways People Learn

By John Seely Brown

In 1831 Michael Faraday built a small generator that produced electricity, but a generation passed before an industrial version was built, then another 25 years before all the necessary accoutrements for electrification came into place—power companies, neighborhood wiring, appliances (like light bulbs) that required electricity, and so on. But when that infrastructure finally took hold, everything changed—homes, work places, transportation, entertainment, architecture, what we ate, even when we went to bed. Worldwide, electricity became a transformative medium for social practices.

John Seely Brown is the chief scientist of Xerox and director of its Palo Alto Research Center.

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JSB
www.johnseelybrown.com

- Having the credentials that a computer science geek respects (Chief Scientist, Xerox; Director Xerox PARC)
- Having publications that the education community validates (he joined the HBR debate on "IT matters to Higher Ed"* in letter to editor)

***HBR May 2003 IT Doesn't Matter – Nicholas G. Carr**
***Does IT Matter to Higher Education? – Jack McCredie, Educause Review Nov02**

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CS440 Learning Outcomes

CS 440 Social, Legal and Ethical Issues in Computing (SDSU Catalog)
Impact of computers, applications, and benefits, copyright, privacy, computer crime, constitutional issues, risks of computer failures, evaluating reliability of computer models, trade and communications in the global village, computers in the workplace, responsibilities of the computer professional.

CS 440 provides opportunities to study and better understand how our profession, Computer Science, contributes to our world. We will cover most of the text book through readings and class discussions. As the semester progresses, **you will be expected to develop your own answers to the following questions**, and provide evidence to support your answer:

How does society interpret the place of computers in an individual's life?
How does the computing professional respond to the expectations of society?
How can you start the Life-Long process to remain current in your field?

Required Activities:

- Readings from our text **A Gift of Fire: Social, Legal and Ethical Issues for Computers and the Internet (2nd ed.)** by Dr. Sara Baase. www-rohan.sdsu.edu/faculty/giftfire Author's WebPage
- **10 five-minute quizzes on assigned reading material** (be on time to class or you might miss one) **[10%] no make-up quizes** Preliminary Reading Assignments for Spr05 [Authors Suggestions]
- **Participation in class discussions (attendance is counted) [20%]**
- **Student Book Report [20%]** Book Report Assignment Details
- **Student Term Paper [20%]** Term Paper Details
- **Student Critical Reading / Feedback on Another Student's Term Paper [10%]**
- **Final Exam [20%] 16May05 1-3pm**

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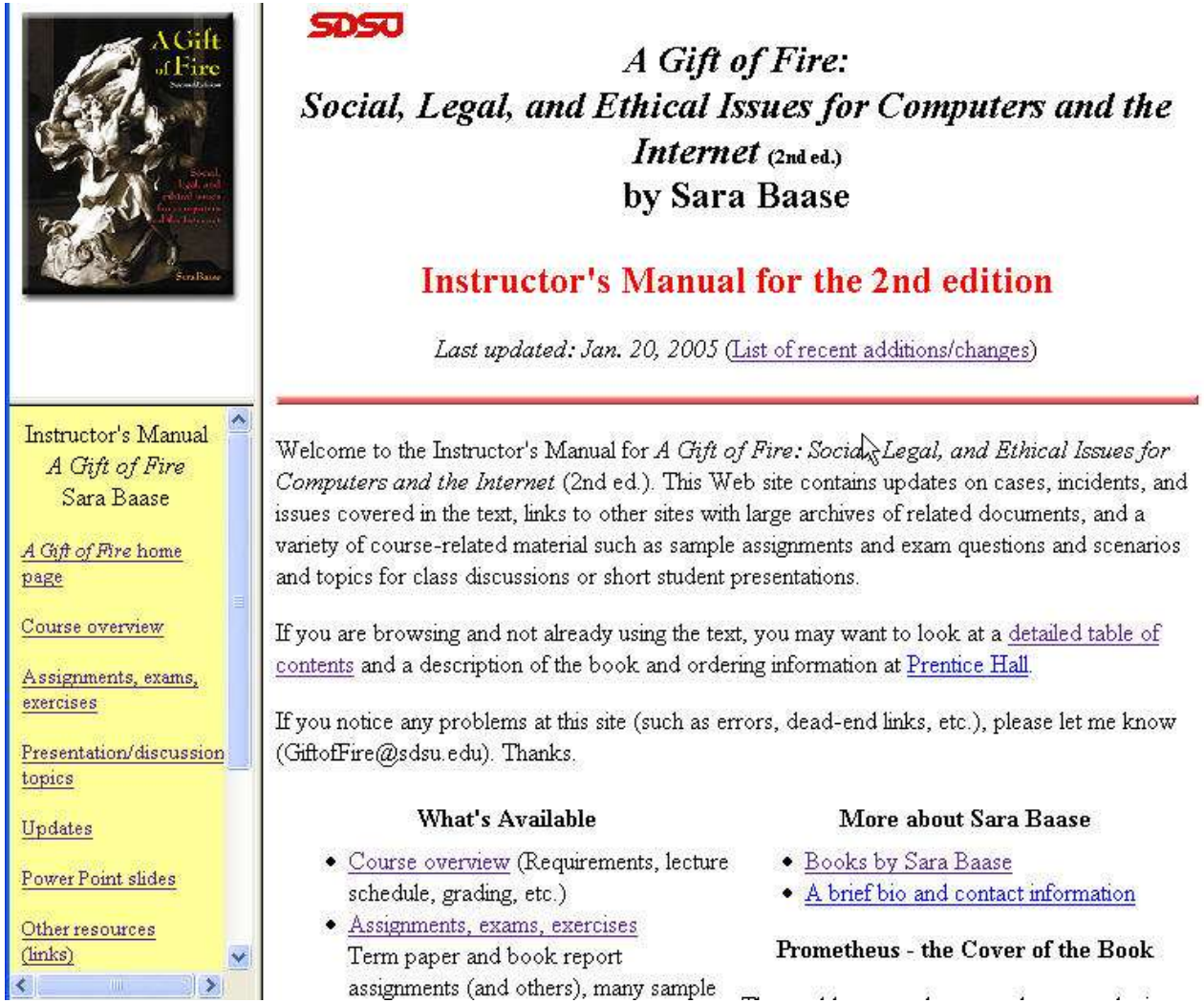
CS440 – Develop your own answers to:

- How does society interpret the place of computers in an individuals life?
- How does the computing professional respond to the expectations of society?
- How can you start the life-long process to remain current in your field?

Gift of Fire by Sara Baase



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Apply JSB Insights to CS 440

- Students have grown up digital; faculty are analog
- Capitalize on creativity by honoring the venacular of today's students (multimedia-literate)
- Communicate complexity simply (great skill)
- MIT's architecture studio – all work in public (development and critique) – in context
- Learning to learn "in situ" is key

Apply JSB Insights to CS 440

early in the semester, just the start

- JSB highlights

  multimedia literacy

- CS440 Student Learning Outcomes

  student group presentations were great (but classroom venue was not up to it)

Evaluation and Assessment of Classroom Practice

Where to start?

- User-Friendly Handbook for Project Evaluation: Science, Mathematics, Engineering and Technology Education, NSF 02-057
- Student Surveys - Need a compatible tool for instructor to examine results with
- Sociology WorkBench (SWB) developed by team of undergraduate computer science majors employed by the EC/CSE

The Tools

- Automated Survey Creation Process – Workshop for faculty – June 2004
- Sociology WorkBench – personal favorite

Automated Survey Creation

Login/password protection of your data

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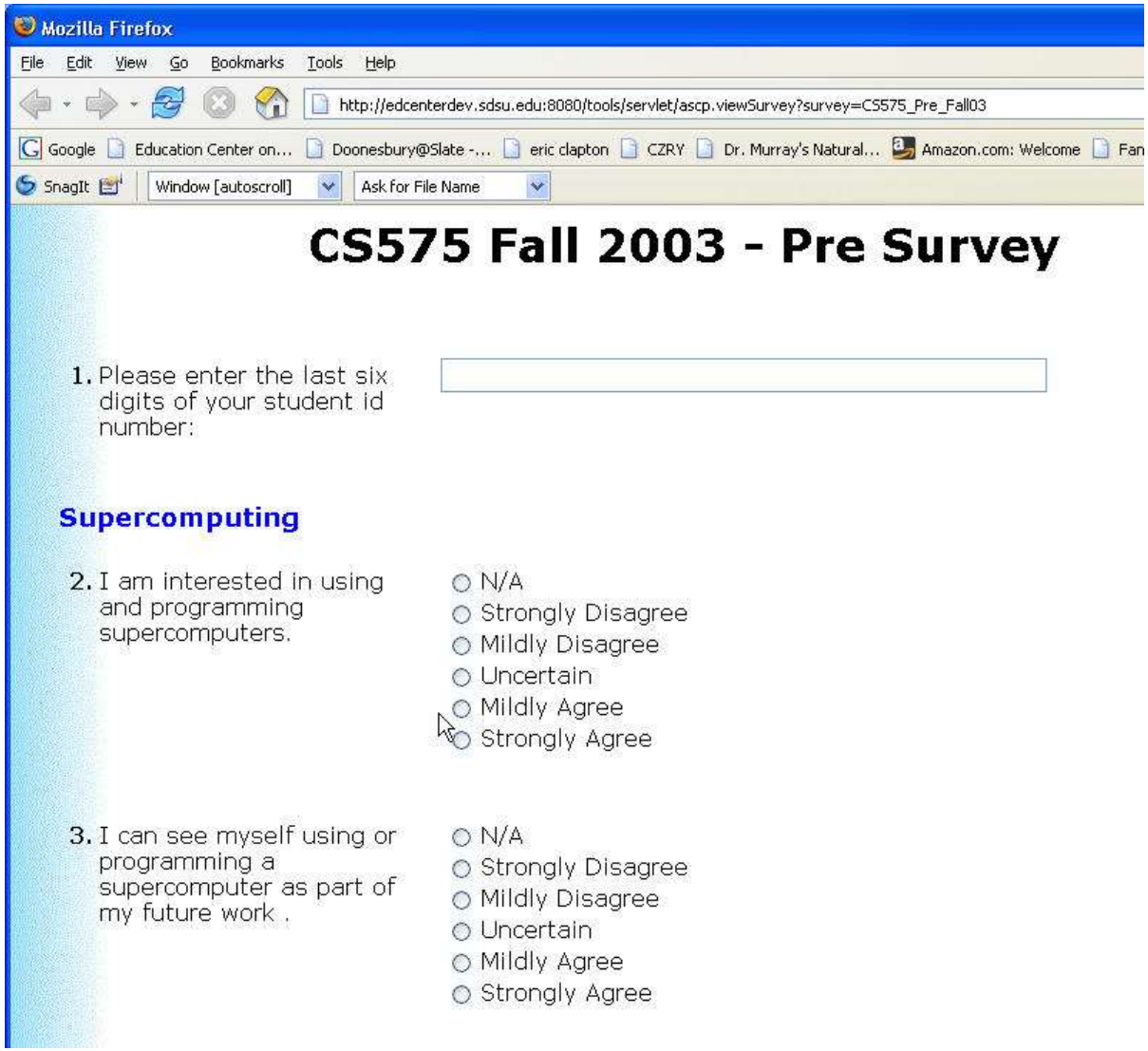
CS 575 – Fall 2003 Pre Survey



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ASCP Survey Manager (new)

Welcome to the Survey Manager Interface.

The Survey Manager is currently under production, and will be periodically updated to provide more flexibility and efficiency. The Survey Manager is up and fully functional. To continue now, scroll down.

The Survey Manager utility was created to allow ASCP users to link multiple surveys together under a common interface. This has been found useful by groups that have a large number of survey questions that cannot feasibly be completed all at one time.

Currently, the Survey Manager provides users with a Consent Form option, registration by student id number (which is then encrypted and stored in our database) and self-retrieval of survey "credit" (who has completed how many of the surveys).

Additional features we expect to offer soon include:

- Add Additional Surveys to a Survey Manager
- Remove Surveys from a Survey Manager
- Replace/Update Survey Manager Surveys

To Continue: Please select one of the options below.

Link Surveys Retrieve Credit

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Automated Survey Creation Process

Survey Functions

- List Surveys
- Create Survey
- Replace Survey
- Update Survey
- Delete Survey

Result Functions

- Clear Results
- View Results
- Retrieve Results

Other Functions

- Survey Manager
- Contact Us
- FAQ
- Home

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Automated Survey Creation

Survey Name	Last Update	Responses Retrieved	Last Response
CS101GroupAtEnd	DEC 12, 2001	NOV 14, 2003	JAN 01, 2004
CS101InfoTechEnd	DEC 04, 2001	MAY 27, 2004	JAN 01, 2004
CS101_Survey	NOV 07, 2001		JAN 01, 2004
CS575_FALL02_Post	SEP 25, 2002		JAN 01, 2004
CS575_FALL03_POST	DEC 10, 2003		JAN 01, 2004
CS575_Pre_Fall03	SEP 10, 2003	NOV 14, 2003	JAN 01, 2004

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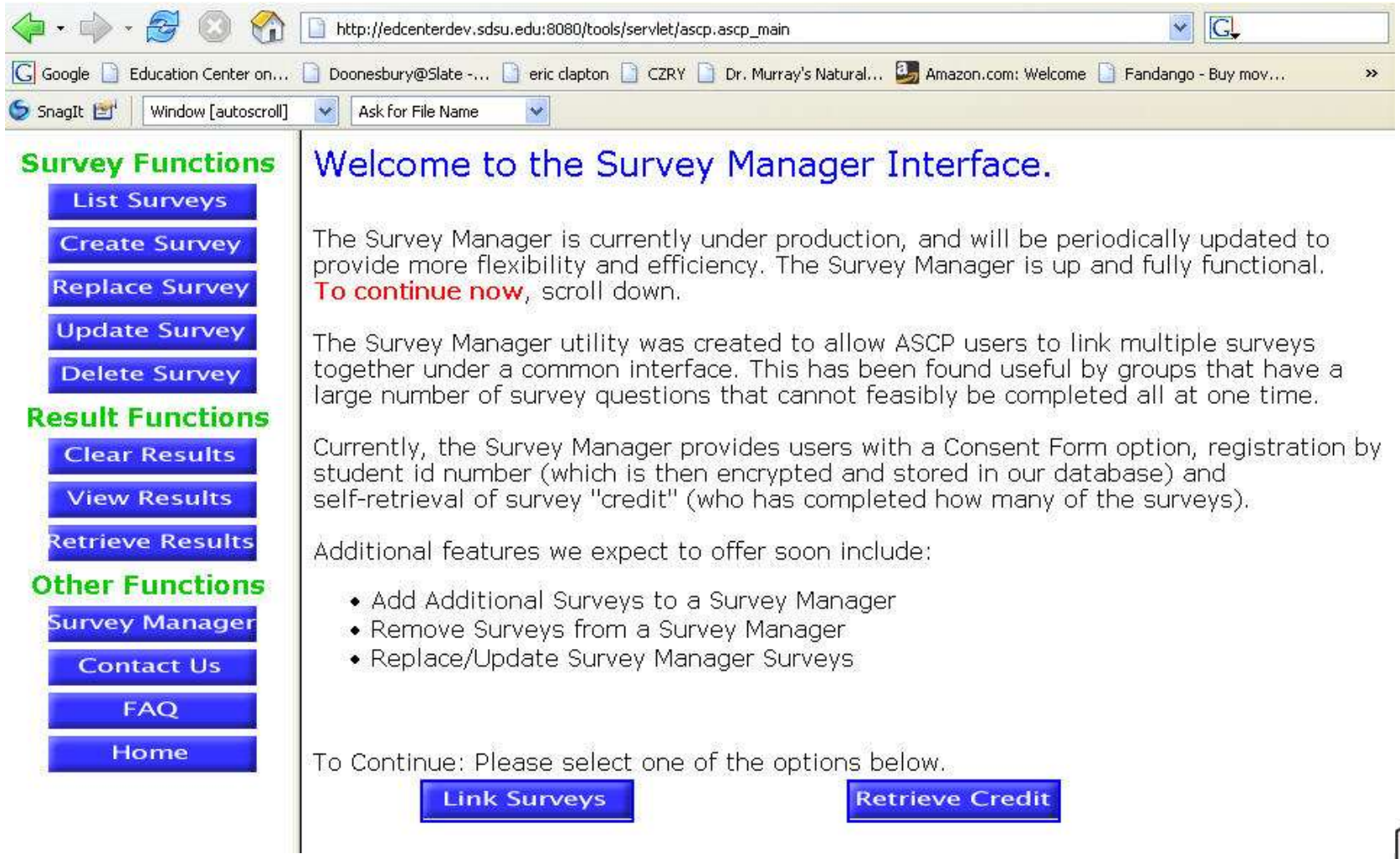
Survey Manager Interface

Gateway to your Data



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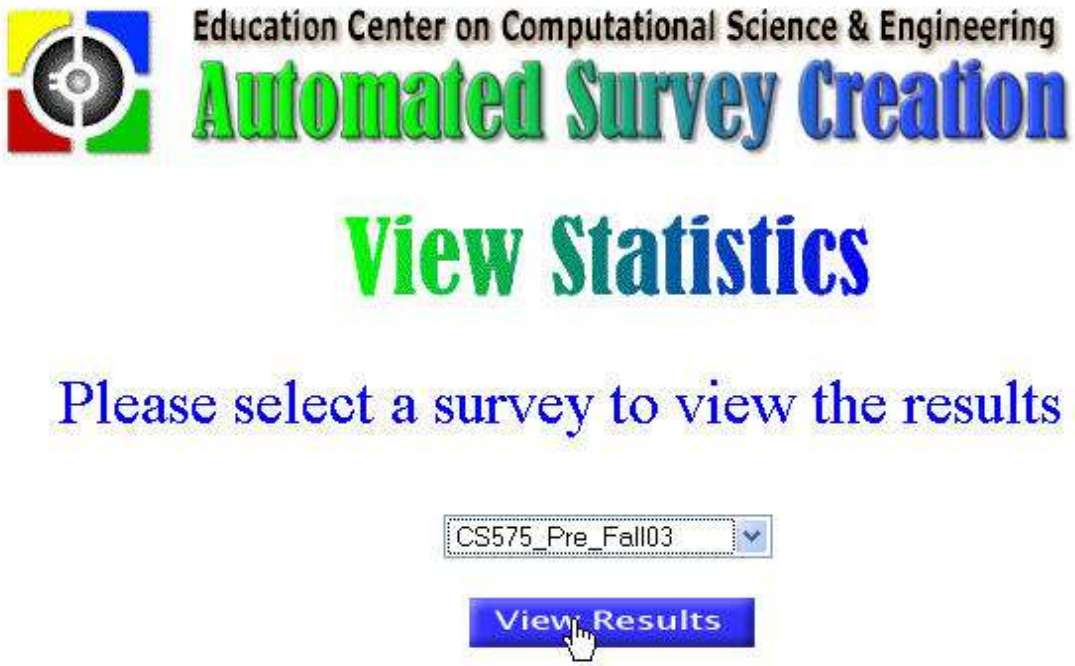
ASCP – Select Your Data



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ASCP gather dry #'s

or use the Sociology WorkBench

View Statistics

Number of Responses: 15

Survey Posted: 2003-09-10

Survey Removed: none

Response file emailed: 2005-02-08

If you have linked your ASCP account to an SWB account, you can explore your results more thoroughly in the Sociology Workbench.

Use SWB

If you do not have an SWB account, or did not link it to your ASCP account upon creation, please contact us at swbdev@edcenter.sdsu.edu to learn more about the Sociology Workbench.

Row #	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	RESPDATE	CREDITDATE
1	999999	0	0	0	0	0	0	0	0	0	0	0	0	0	null	null
2	999999	0	0	0	0	0	0	0	0	0	0	0	0	0	null	null
3	681374	5	5	2	5	2	5	4	4	2	5	4	5	5	null	null
4	6687	5	4	2	4	4	4	5	3	3	4	4	4	4	null	null
5	310596	4	4	2	2	4	5	5	2	4	5	5	5	5	null	null

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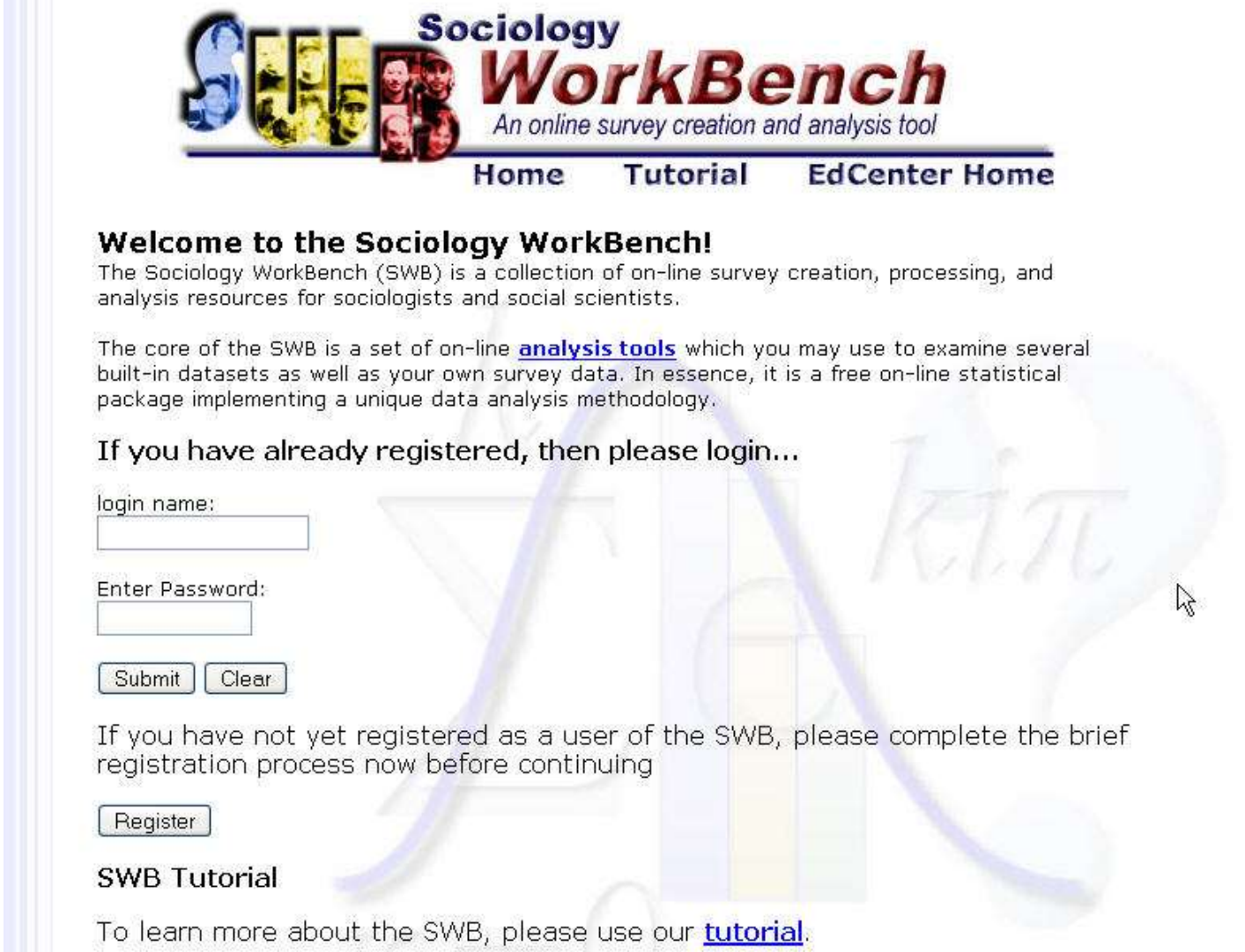
Logon to SWB – Password Protect Data



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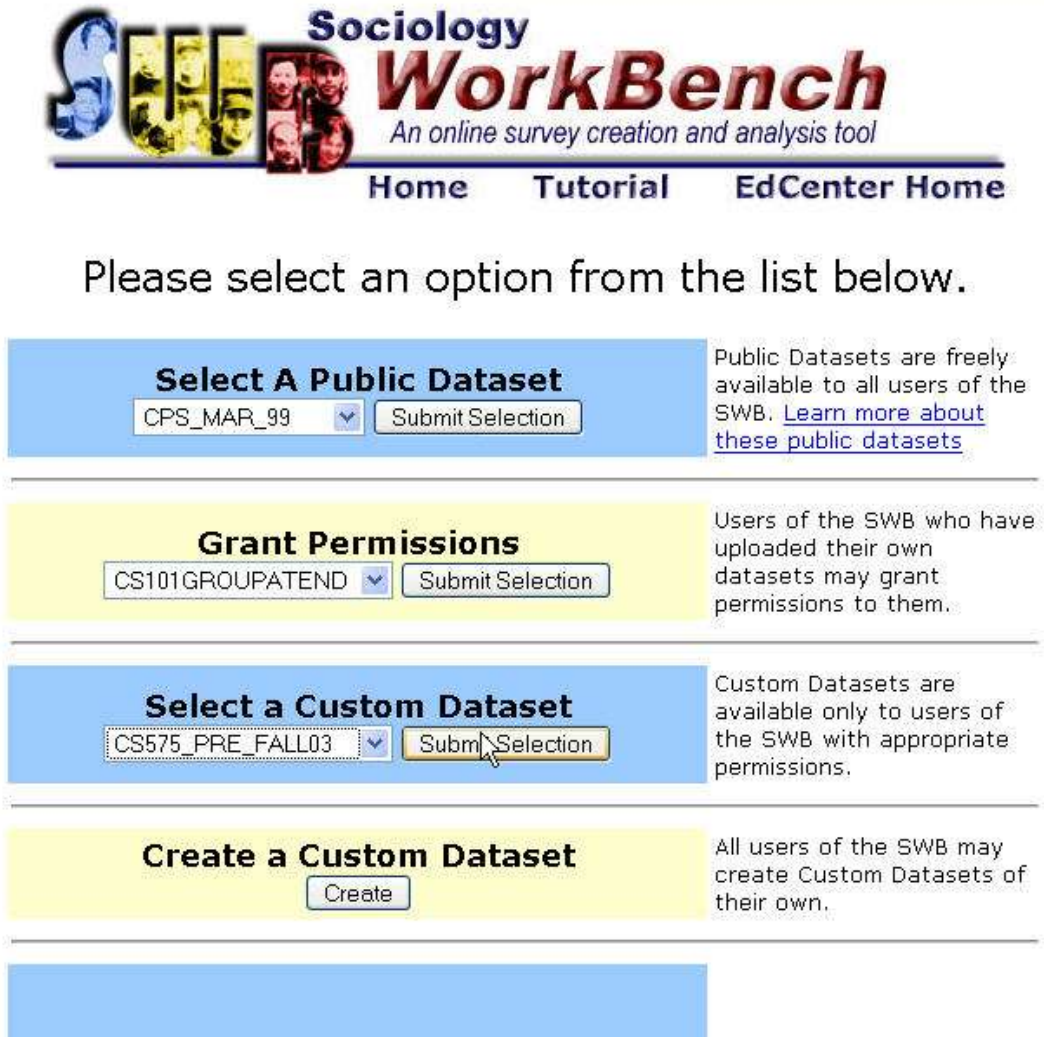
Sociology WorkBench to Select & Analyze Survey Data



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SWB Convenient Tool to Learn from Student Survey Data

- Online tool for "standard public data sets" or your own data set
  http://www.edcenter.sdsu.edu/projects/index.html#swb

- Small Sample, therefore useful as feedback for the instructor

- CS575 Supercomputing for the Sciences – Fall 03

http://edcenterdev.sdsu.edu:8080/tools/servlet/ascp.viewSurvey?survey=CS575_Pre_Fall03

http://edcenterdev.sdsu.edu:8080/tools/servlet/ascp.viewSurvey?survey=CS575_FALL03_POST
Student Attitudes Towards Working in Groups on Computational Projects

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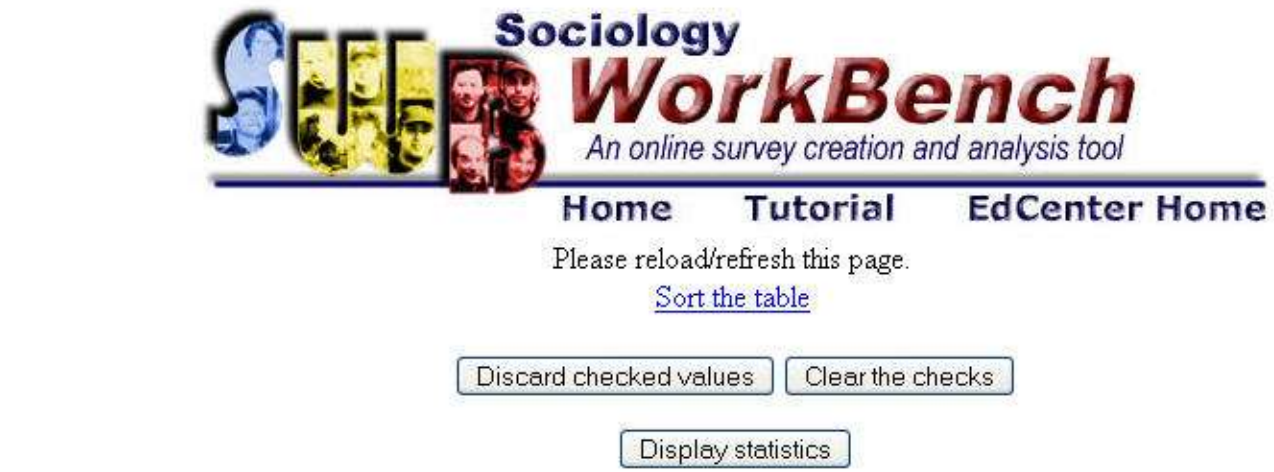
SWB generated Frequency Tables for Initial Investigation of Data



Frequency Table

I am interested in using and programming supercomputers.

N/A	2	13.33%
Strongly Disagree	0	0.00%
Mildly Disagree	0	0.00%
Uncertain	1	6.67%
Mildly Agree	2	13.33%
Strongly Agree	10	66.67%

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SWB as Analysis Tool

View Student Comments (text)

HOW CAN THIS COURSE BE IMPROVED

(0) Not defined	28
(1) Give a brief on a technical writing and report formats	3
(2) Let students freely choose team members	3
(3) More lab time as a group during class time	2
(4) Go into details on materials	6
(5) Give a guide lines on group project	1
(6) Assign group according to time available	2
(7) I don't know	2
(8) Other	4
Total	51

SWB as Analysis Tool

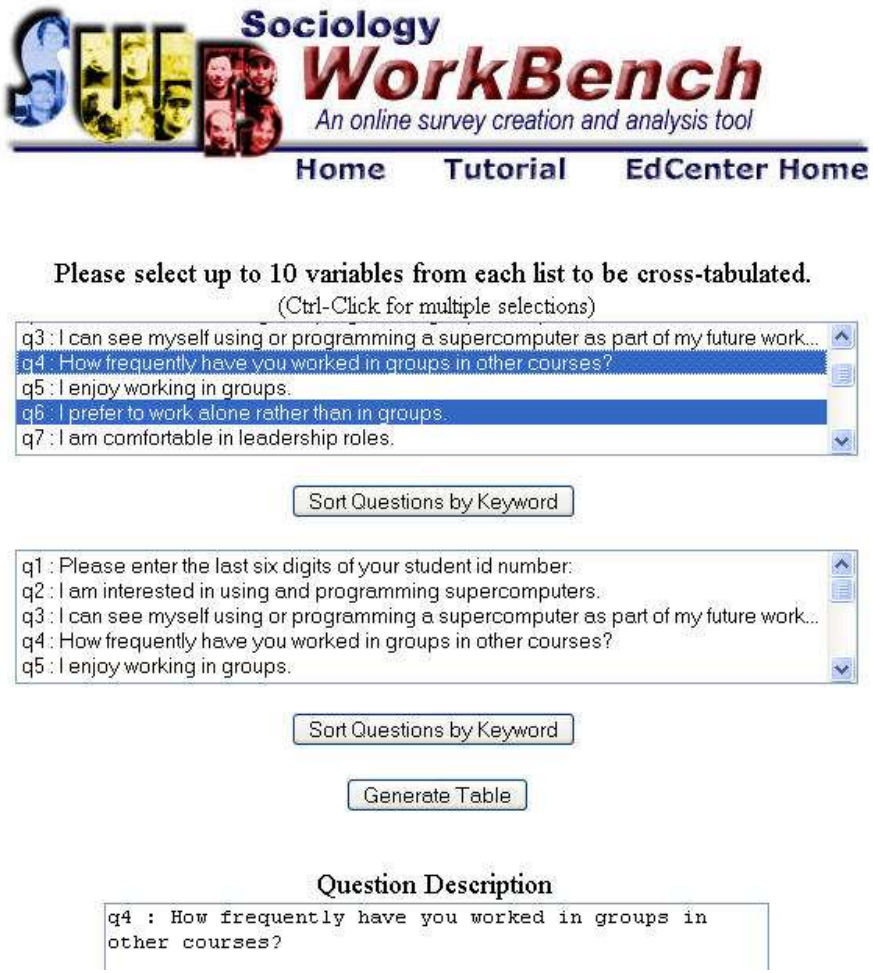
Isolate on Specific Survey Response

WHEN DID YOU LEARN MORE?

(0) Not defined	28
(1) Beginning computational experiments (done as an individual)	4
(2) Later computational experiments (working in a group)	12
(3) I don't know	7
Total	51

Individual first project versus group project for 2nd and 3rd projects

SWB builds Cross Tabs



Explain the dependency of outcomes by discovering common attitudes shared by the students

Can easily experiment with host of possibilities

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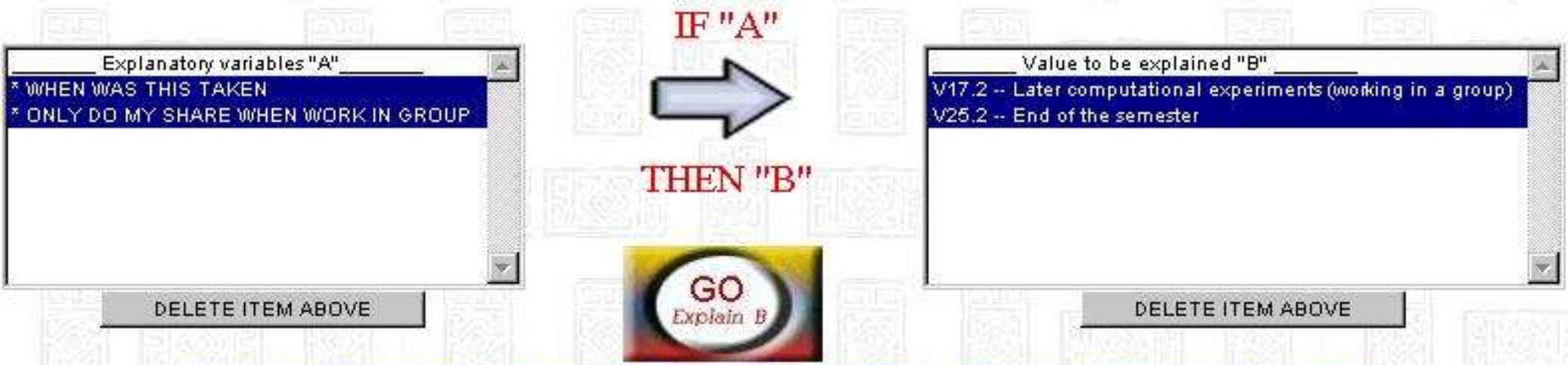
SWB as Analysis Tool

Explain the Response on Learning with “doing more”



Value to be explained (12 cases out of 51):

17 : WHEN DID YOU LEARN MORE? (2 : Later computational experiments (working in a group))

25 : WHEN WAS THIS TAKEN (2 : End of the semester)

25 : WHEN WAS THIS TAKEN	6 : ONLY DO MY SHARE WHEN WORK IN GROUP	Accuracy	Completeness	Number of applications	Number of confirmations	
2 : End of the semester (contribution , 0.42)	2 : Mildly disagree (contribution , 0.28)	80.0	66.7	10	8	Explain
2 : End of the semester (contribution , 0.16)	1 : Strongly disagree (contribution , -0.19)	33.3	25.0	9	3	Explain
2 : End of the semester (contribution , 0.16)	3 : Mildly agree (contribution , -0.27)	25.0	8.3	4	1	Explain

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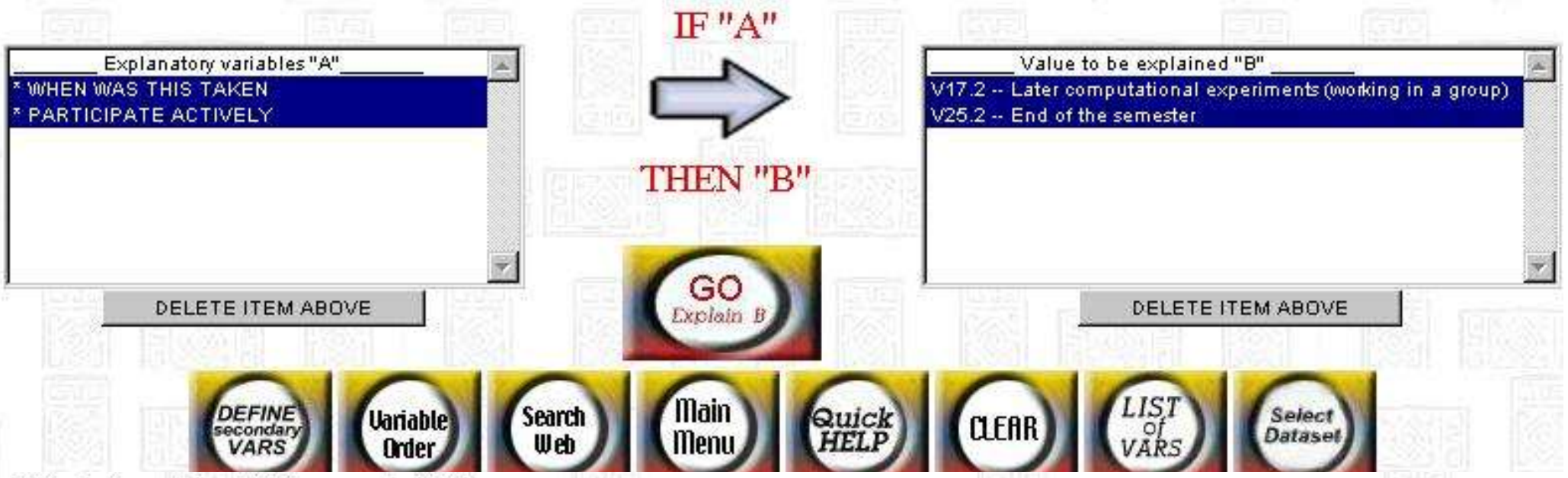
SWB as Analysis Tool

Explain learning with “active participation”



Value to be explained (12 cases out of 51):

____ **17 : WHEN DID YOU LEARN MORE? (2 : Later computational experiments (working in a group))**

____ **25 : WHEN WAS THIS TAKEN (2 : End of the semester)**

25 : WHEN WAS THIS TAKEN	5 : PARTICIPATE ACTIVELY	Accuracy	Completeness	Number of applications	Number of confirmations	
2 : End of the semester (contribution , 0.30)	3 : Mildly agree (contribution , 0.08)	60.0	50.0	10	6	Explain
2 : End of the semester (contribution , 0.26)	4 : Strongly agree (contribution , -0.06)	46.2	50.0	13	6	Explain

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SDSU Faculty Workshop on ASCP – June 2003

Need help creating an online survey?

The Education Center on Computational Science and Engineering presents the

Automated Survey Creation Process
Workshop

Where: LA076 (SDSU Library Instruction Classroom)
When: Friday June 4, 2004, 1-4pm

The SDSU/NPACI Education Center on Computational Science and Engineering presents a hands-on introduction to the Automated Survey Creation Process, a free, publicly available on-line tool that supports a survey-developers' effort to create a web-based survey. The resulting survey can then be delivered through a secure web page so that the target audience can easily respond to the individual questions. All individual responses are stored indefinitely in a central database so the survey-developer can view the responses, perhaps using the on-line categorical data analysis tool, the Sociology Workbench. The survey-developer can also download the response data to their own machine for off-line analysis using their own chosen data-analysis software.

We will present sample surveys as starting points to allow survey-developers to use the Automated Survey Creation Process. We also invite interested individuals to bring their own surveys, which we can use to demonstrate how simple it can be to build a personalize survey, distribute to a class of students, analyze the response data and incorporate this information into the curriculum.

While you may be aware of other available survey creation tools, we are confident you will find our free, secure and adaptable system can uniquely enable you to create your own online surveys and facilitate:

- Dissemination of the survey instrument,
- Collection of the response data, and
- Management of sequences of surveys

This XML-based software tool has been used at SDSU by faculty from the Psychology Department, Biology Department, Computer Science Department, and more. We will provide instruction in the use of the ASCP in the SDSU Library Instruction Classroom with sample surveys and personalized assistance that will be adaptable to your individual assessment needs.

Developed & Presented by the SDSU/NPACI Education Center on Computational Science and Engineering (http://www.edcenter.sdsu.edu)
and co-sponsored by the SDSU Library and Information Access (http://infodome.sdsu.edu/)

Please RSVP by phone or email, including your name, affiliation, e-mail and phone number:
Email: edcenter@sdsu.edu
Phone: 619-594-0491

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What's Next?

- CS440 being taught Spring 2005
- Expect interesting feedback from students on their opinions on the Digital Age, given they were born digital
- Expect interesting changes in the learning environment and its support on campus, through evidence gathered use these Online Tools
- Applaud SIAM for embracing CSE and now challenge to ensure awareness of IT in higher education

References – SIAM CSE05

This Presentation www.stewart.cs.sdsu.edu/PPT/stewart_cse05_SIAM

Ed Center on Computational Science & Engineering

http://www.edcenter.sdsu.edu/

Automatic Survey Creation Process (ASCP)

http://www.edcenter.sdsu.edu/projects/index.html#ascp

Sociology WorkBench (SWB)

http://www.edcenter.sdsu.edu/projects/index.html#swb

John Seely Brown http://www.johnseelybrown.com

NSF User-Friendly Handbook for Project Evaluation

http://www.nsf.gov/pubs/2002/nsf02057/start.htm

Education, Outreach and Training (EOT) PACI

http://www.eot.org/

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ECCSE support as part of the NPACI

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