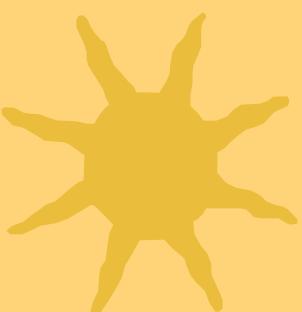
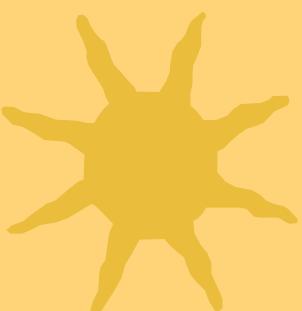
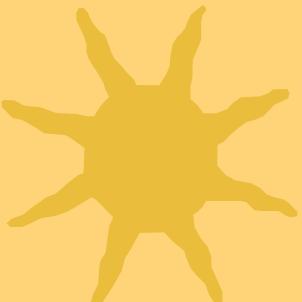




A Tale of Two HEDS with Ubiquitous Computing

2002 HEDS Winter Conference
San Antonio, Texas
January 16-19, 2002

Stephen W. Thorpe
Drexel University
Ross A. Griffith
Wake Forest University



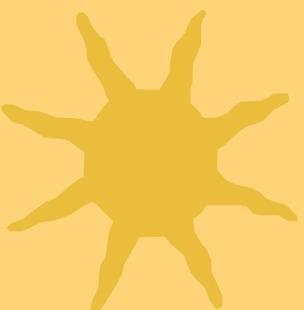
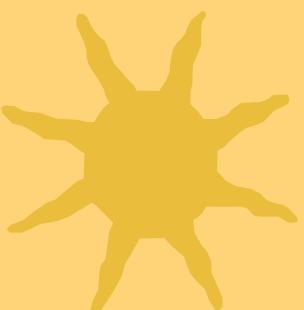
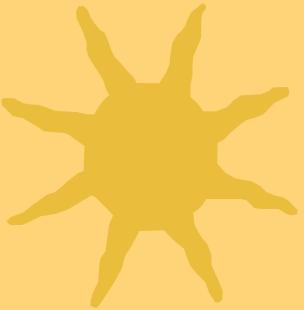
Overview of Presentation

- ★ Background of Ubiquitous Computing
- ★ Ubiquitous Computing
 - Drexel
 - Wake Forest
- ★ Assessment of Ubiquitous Computing
 - Drexel
 - Wake Forest
- ★ Collaborative Assessment Nationally
- ★ Summary



Background of Ubiquitous Computing

- ★ Ubiquitous computing implies that all students and faculty members possess computers containing a minimum software threshold standard
- ★ In the early 1980's a few universities decided they could be more effective if all students had regular access to high strength computing capacity
- ★ The U.S. Service Academies simply instructed all students to arrive with desktop computers. Dartmouth started teaching on the assumption that all students had their own computers

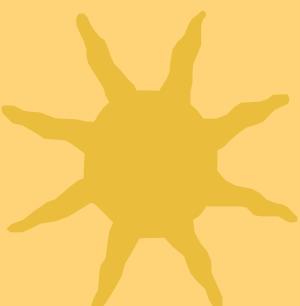
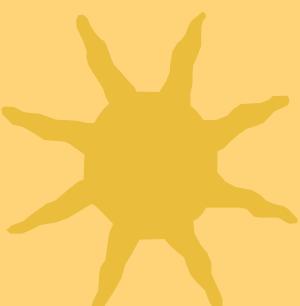


Background of Ubiquitous Computing (continued)

- ★ By the mid-1990's, the movement spread to liberal arts colleges and other schools within research universities
- ★ Laptops grew in popularity, so that today they are the predominant instrument of ubiquitous programs
- ★ The modern concept is not only that students must have constant access to computing power while on campus, they must have equal access when studying abroad and after graduation



Drexel University

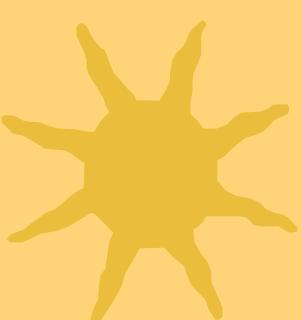
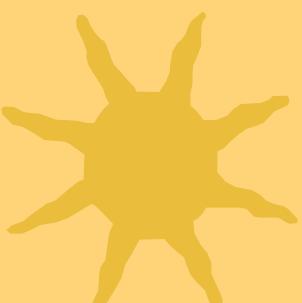
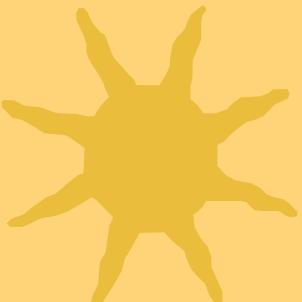


- ★ Private university founded in 1891
- ★ 13,500 students
- ★ Co-Op Education



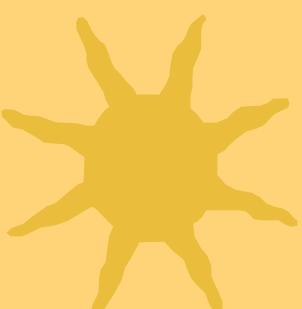
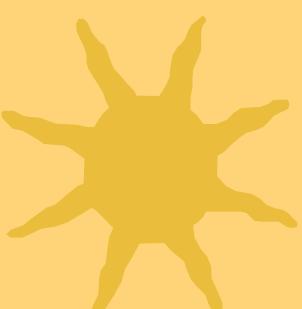
Mission Statement

To prepare students for leadership in a complex global society by combining high quality, **technologically-enhanced academic programs** with innovative research and meaningful real-world learning experiences.



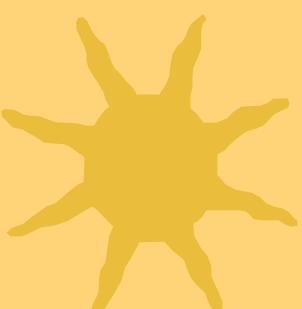
Ubiquitous Computing at Drexel

- ★ Policy in 1983 that all incoming freshmen must have “personal access” to a PC
- ★ Establishment of Microcomputing Policy Committee
 - Sub-committee of Faculty Senate
 - Set priorities, hardware/software
- ★ Programming support provided for faculty to develop tools to use in courses
- ★ One-third of faculty receive new computers each year



Vision for Technology

- ★ Provide entire community with current and developing technologies to improve academic program
- ★ Key to remain “just ahead of the curve”
- ★ Distribution of Licensed Software to students, faculty, staff annually

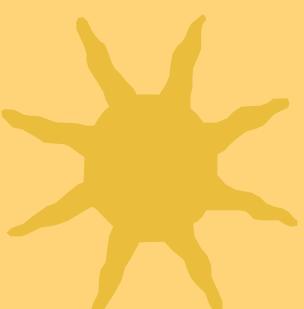
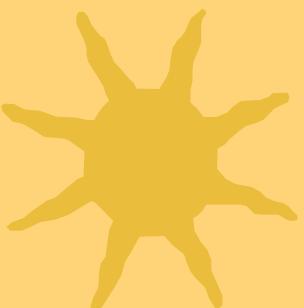
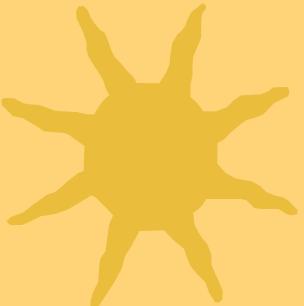


Wireless Technology

- ★ First major University to implement totally wireless campus, inside and outside, in 2000/01 academic year
- ★ Began in 1997 with wireless Library and Campus Center
- ★ Optional Program – personal purchase of wireless cards



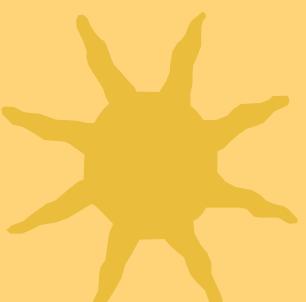
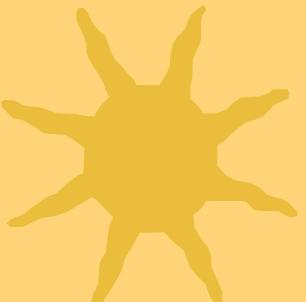
Wake Forest University



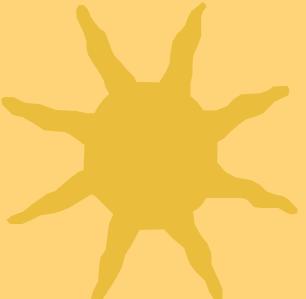
- ★ Private university founded in 1834
- ★ Seven schools with 6300 total students
- ★ Liberal arts emphasis with 4000 undergraduate students



Mission Statement

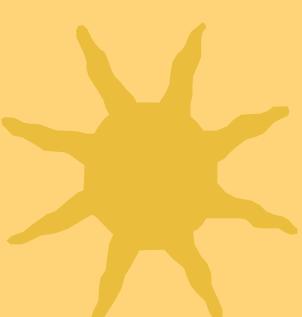
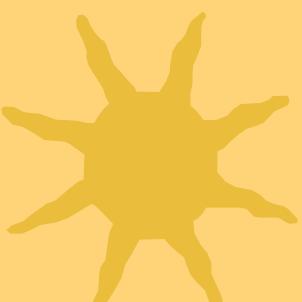
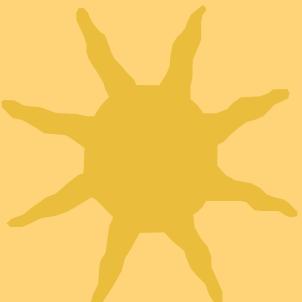


- ★ Wake Forest University is a university dedicated to the pursuit of excellence in the liberal arts and in graduate and professional education
- ★ It seeks to honor the ideals of liberal learning, which entail commitment to transmission of cultural heritages; teaching the modes of learning in the basic disciplines of human knowledge; developing critical appreciation of moral, aesthetic and religious values; advancing the frontiers of knowledge through in-depth study and research; and applying and utilizing knowledge in the service of humanity



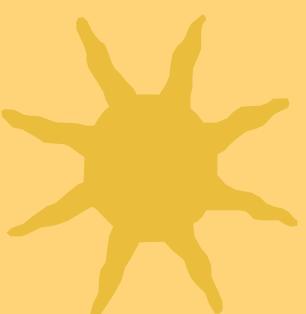
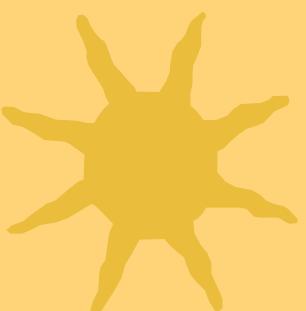
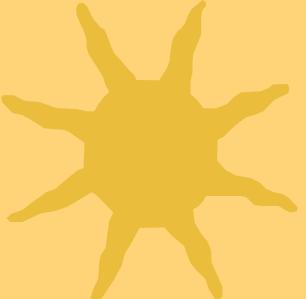
Ubiquitous Computing at Wake Forest

- ★ IBM laptop computers provided to all entering freshmen and faculty in Fall 1996
- ★ Standing Faculty Committee on Information Technology formed
- ★ Entire campus wired
- ★ Created new position of Academic Computing Specialist (ACS)



Ubiquitous Computing at Wake Forest (continued)

- ★ Information Systems Support Center (ISSC) revamped
- ★ Student and faculty training provided by library
- ★ Computer-Enhanced Learning Initiative (CELI) formed by faculty
- ★ Student Technology AdvisoRS (STARS) created

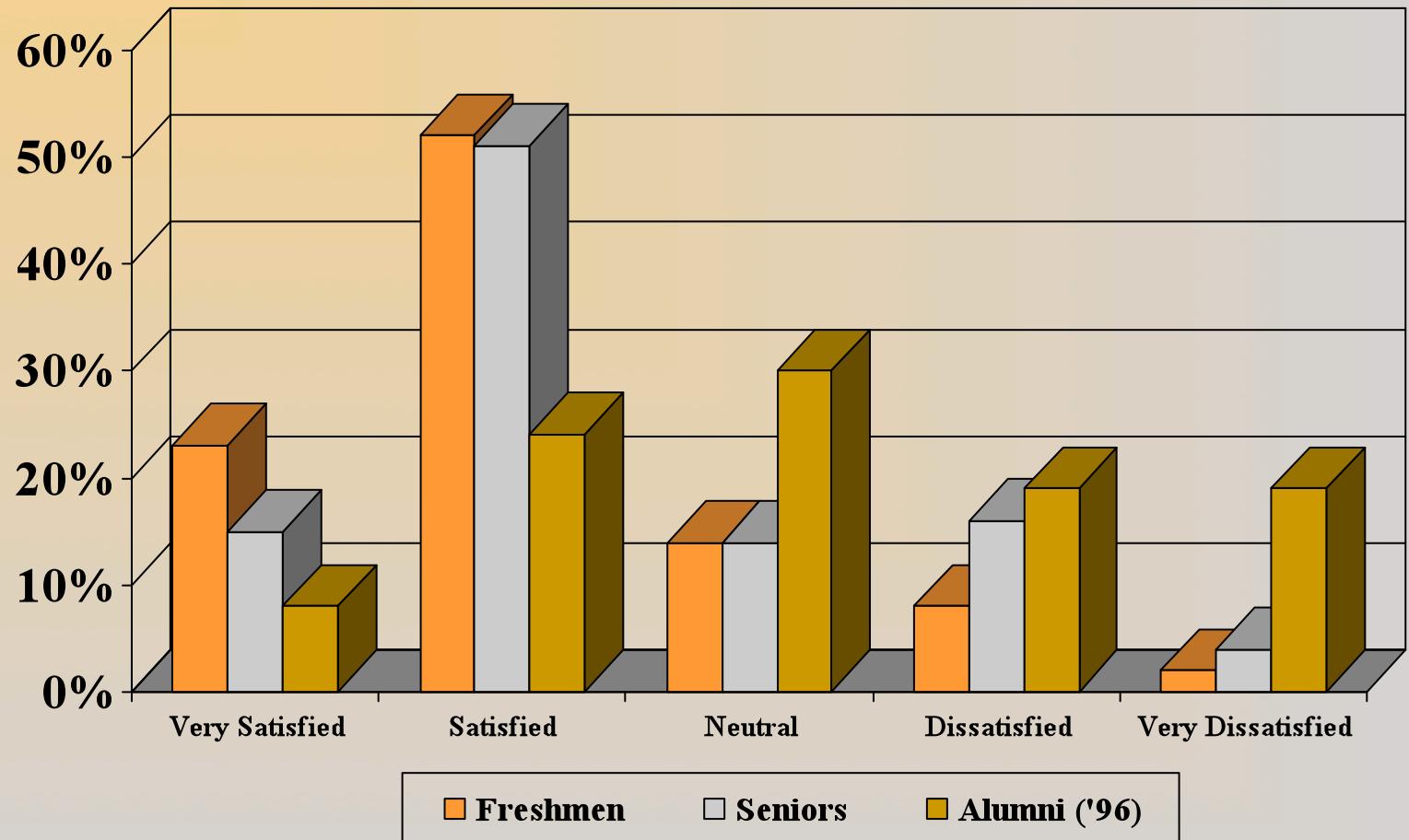


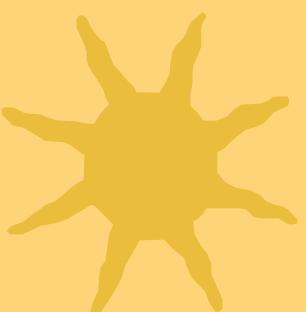
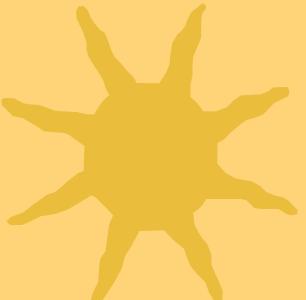
Assessment of Ubiquitous Computing at Drexel

- ★ Surveys of freshmen/seniors/alumni
- ★ Survey of Impact of Technology
- ★ Survey of Wireless Use
- ★ HERI Faculty Survey



Satisfaction with Computing Resources, 2001 Surveys



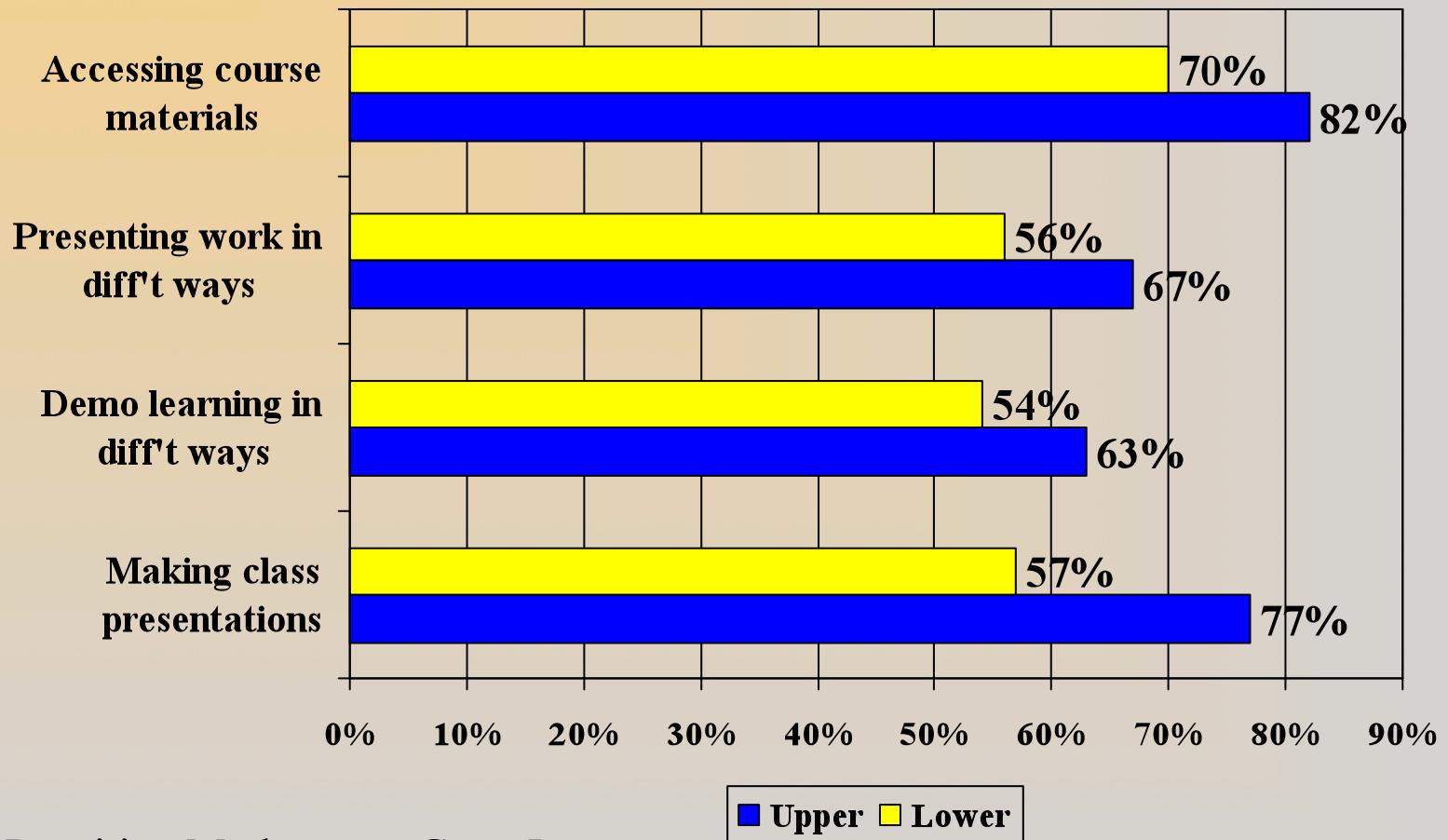


Impact of IT on Academics

- ★ About one-third of students cited IT having a **GREAT IMPACT** on the following:
 - Having contact with professors on course content
 - Making class presentations
 - Getting prompt feedback on performance from faculty
 - Learning technology-related skills
 - Accessing materials related to course content

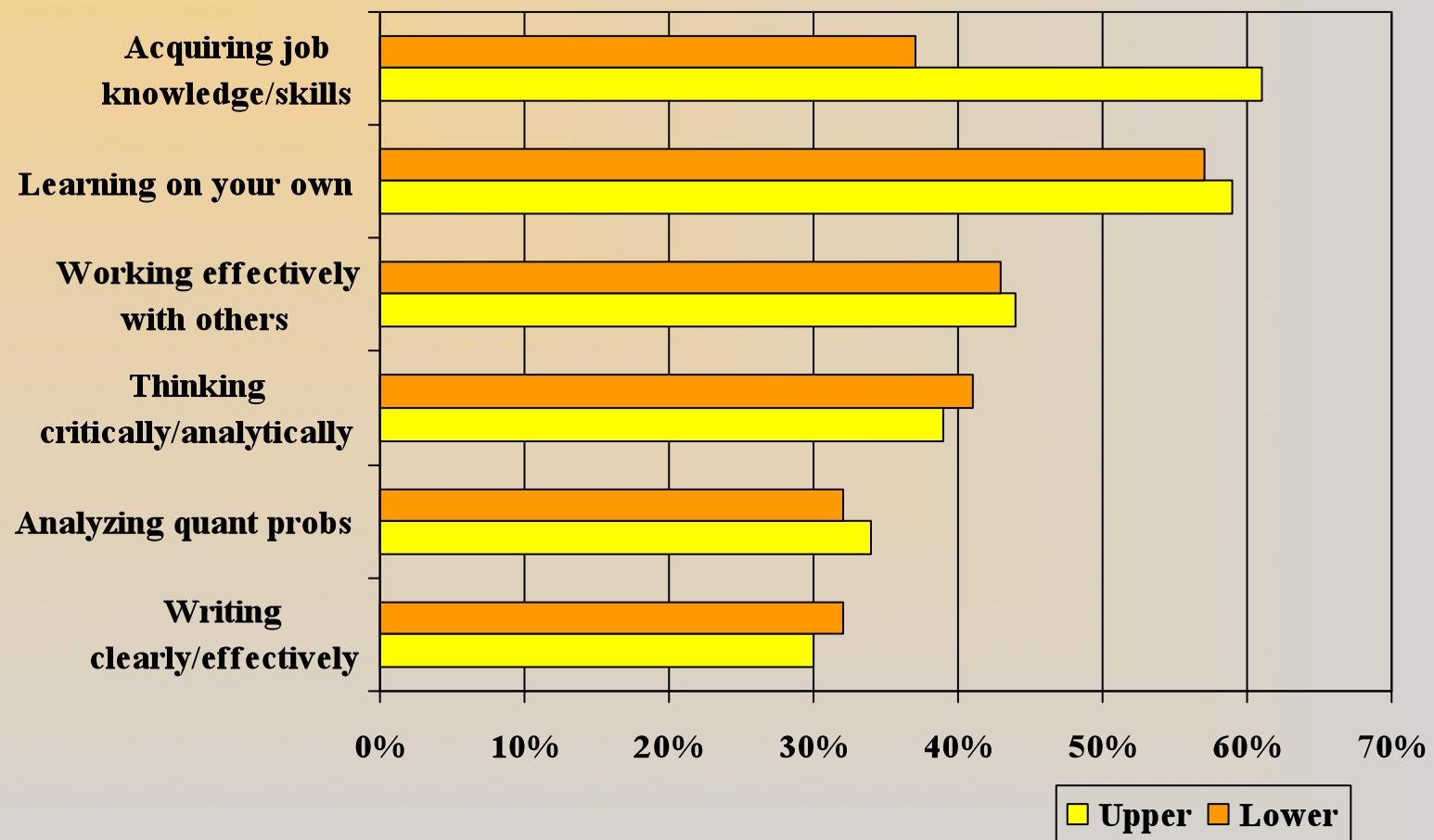


Differences by Class





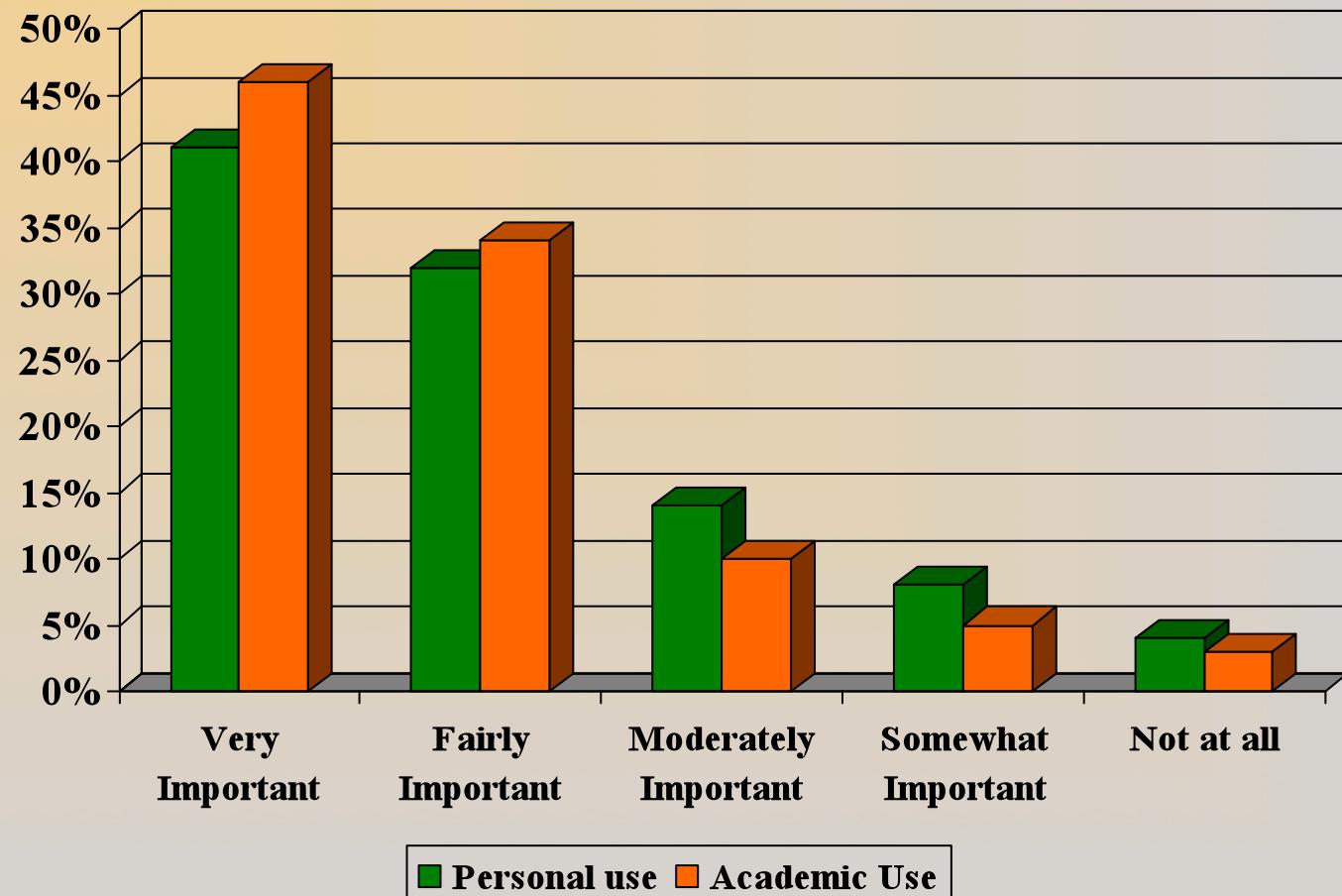
Impact of IT on Personal Development



Includes “Quite a Bit” and “Very Much”

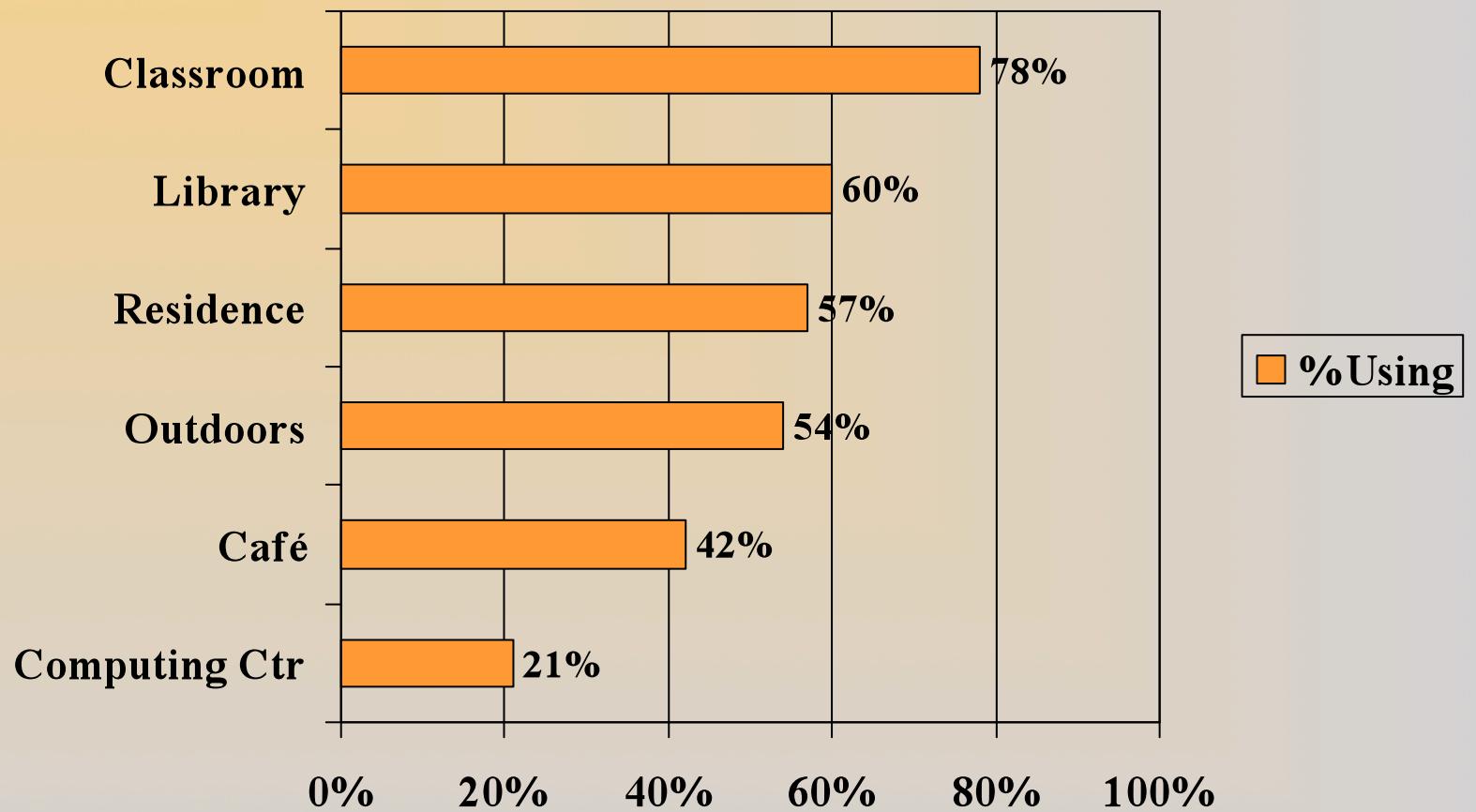


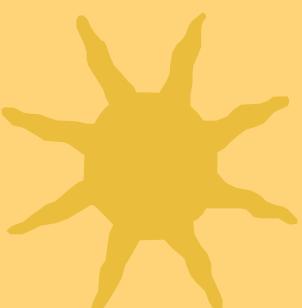
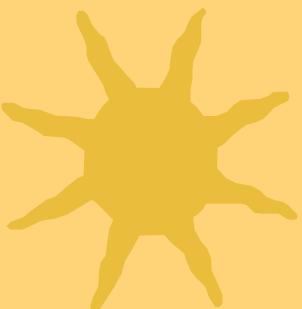
Importance of Wireless Services





Where is Wireless Used by Students?





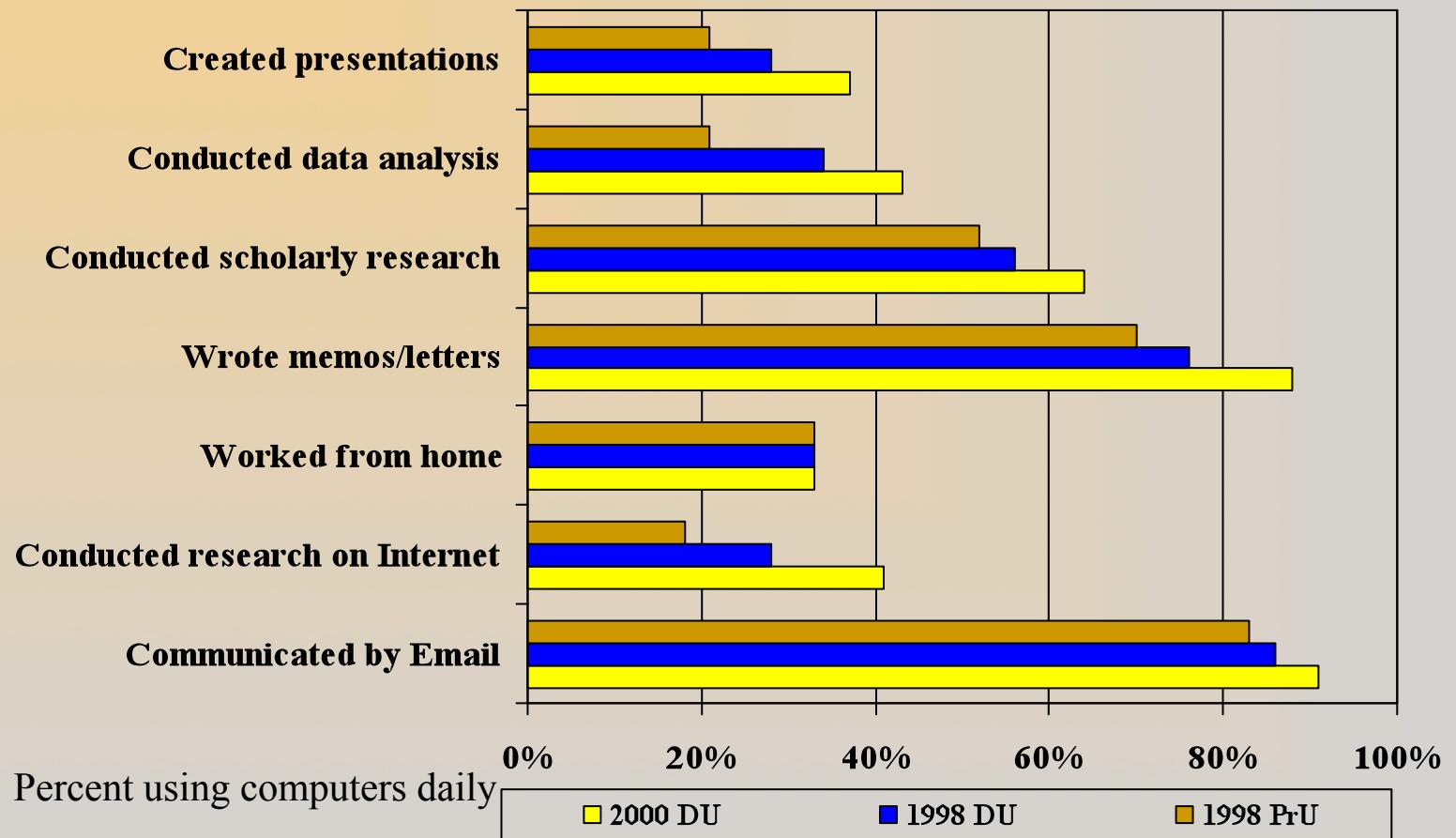
Unique Uses of Wireless

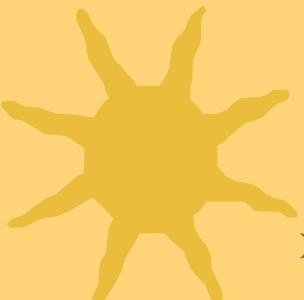
- ★Look up information during class
- ★Makes research easier/faster
- ★Work/resources available anywhere
- ★Spontaneous meetings or group work
- ★Don't have to depend on availability of lab computer or free jack



HERI Faculty Survey

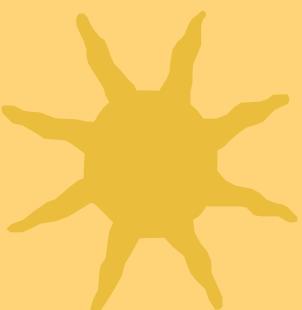
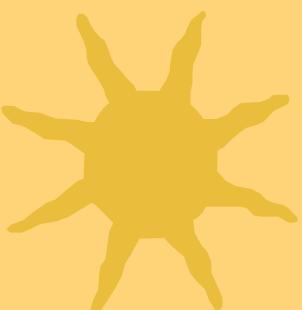
Use of Computers





Assessment of Ubiquitous Computing at Wake Forest

- ★ The College Student Experiences Questionnaire (CSEQ), directed by George Kuh of the University of Indiana, was administered to freshmen, sophomores and juniors in 1996, 1997 and 1998 and on the web in spring 2000
- ★ Wake Forest results are compared to norm groups consisting of undergraduate students at Research Universities (RU), Doctoral Universities (DU), Comprehensive Colleges and Universities (CCU), Selective Liberal Arts Colleges (SLA) and General Liberal Arts Colleges (GLA)



Wake Forest Items for 2000 CSEQ with Significantly Higher Mean Scores than 1998 CSEQ

Time spent:

Used e-mail to communicate with instructor/other students

Searched the WWW or Internet for course material

Used computer to retrieve material from outside library

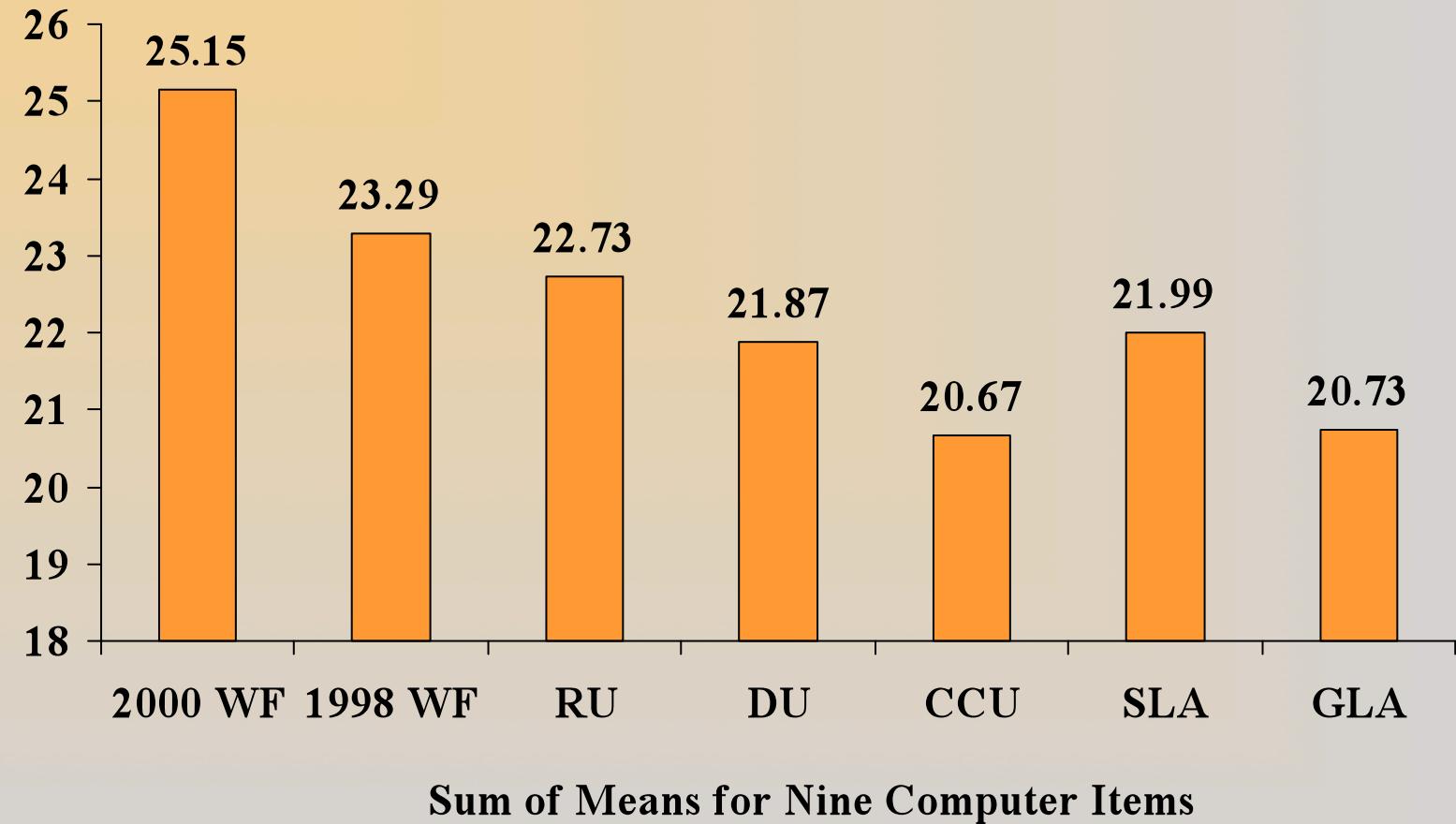
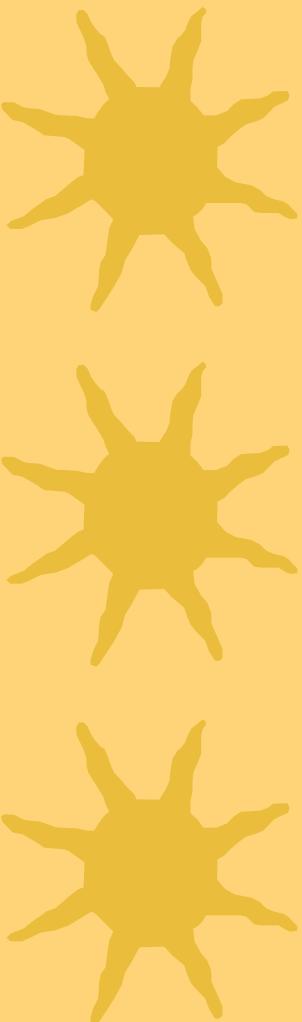
Used computer to produce visual displays

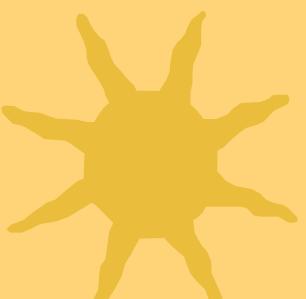
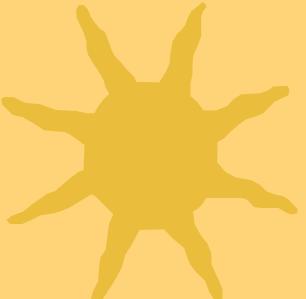
Used computer to analyze data

Developed a Web page/multimedia presentation



CSEQ - Quality of Effort: Computer and Information Technology Scale





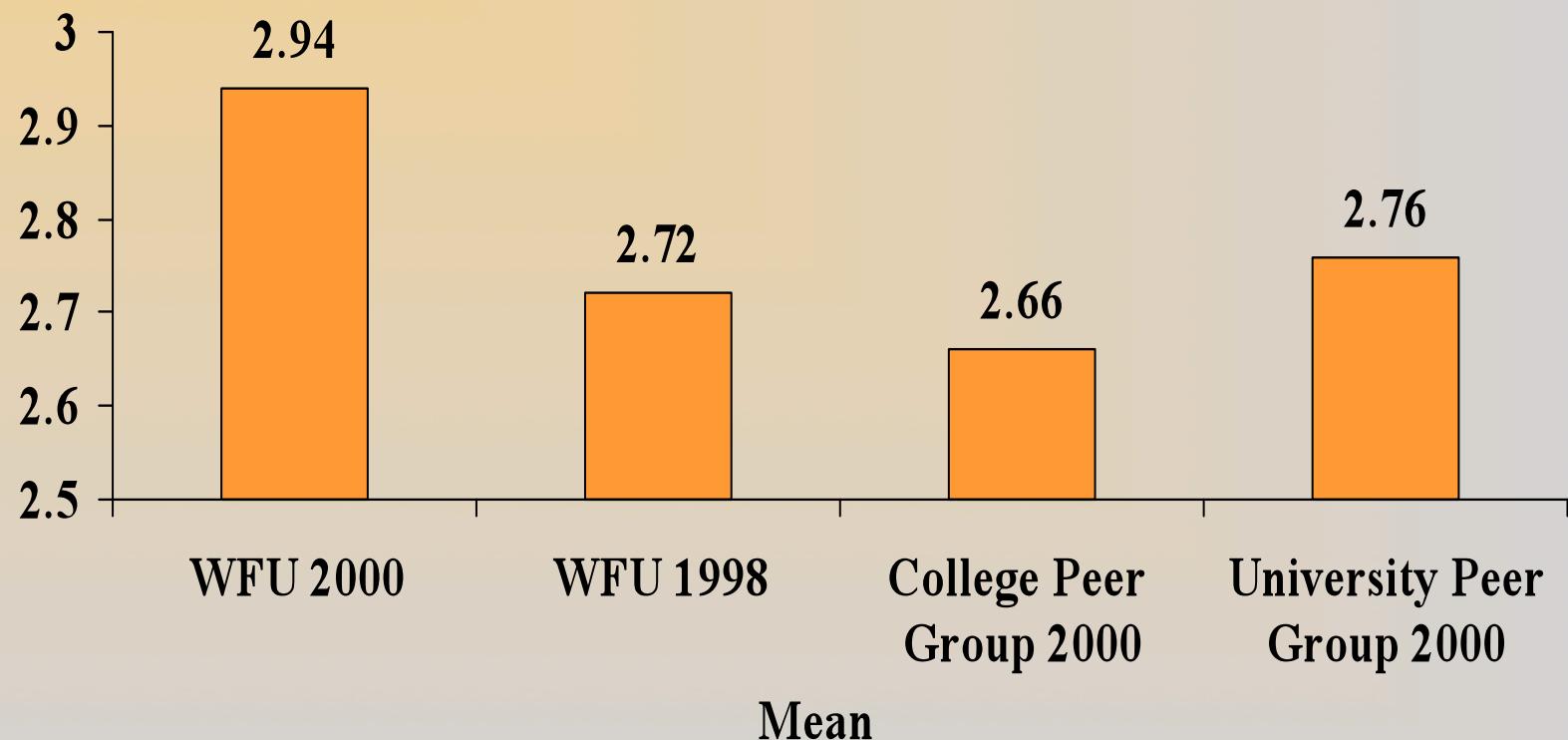
HEDS Senior Survey

- ★ The HEDS Senior Survey was administered to the Classes of 1993 through 1998 and the Class of 2000 in the spring of their senior year
- ★ The Class of 2000 is the first class to graduate under ubiquitous computing while the senior survey results are compared to the Class of 1998 as well as a College Group and a University Group of peer institutions



HEDS Senior Survey

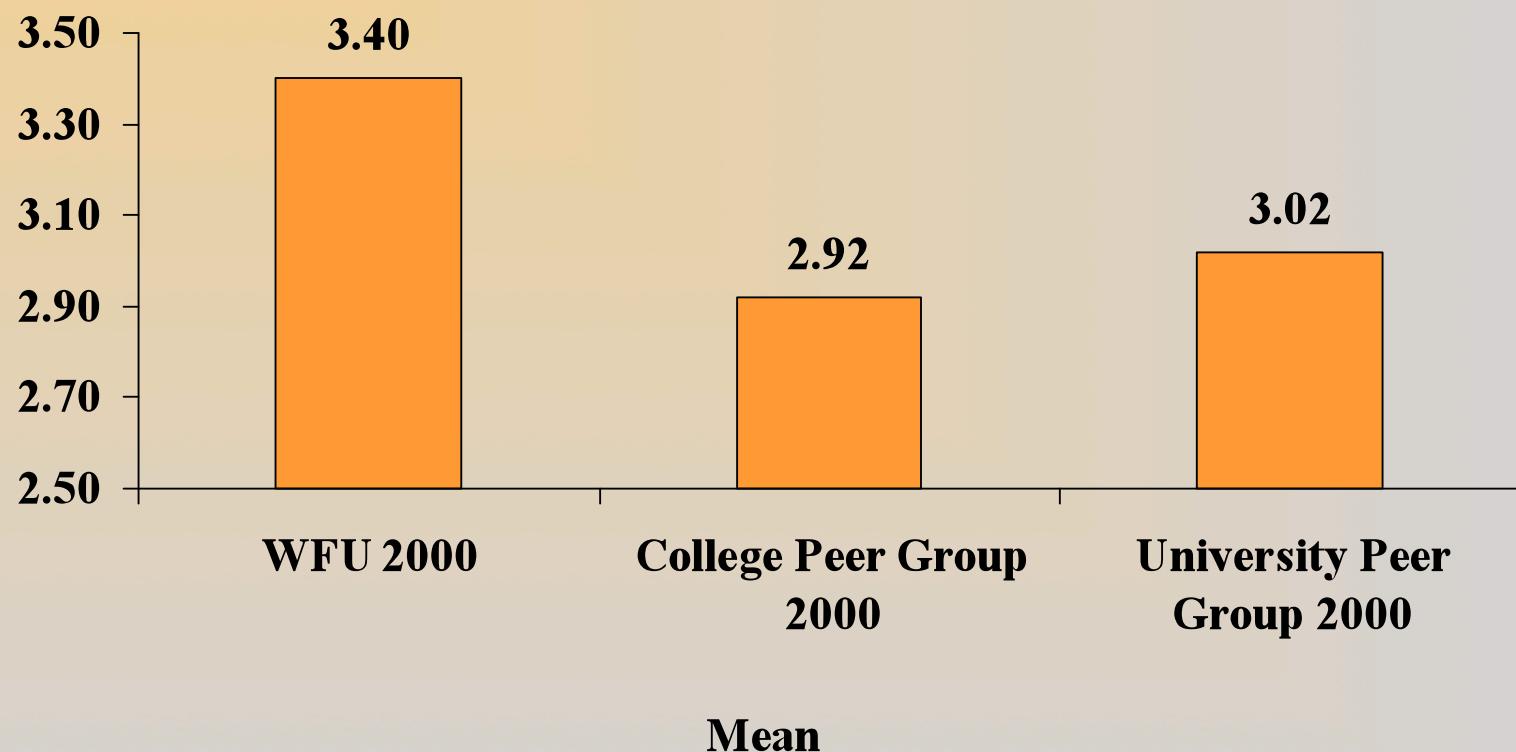
Use of Quantitative Tools - Enhancement

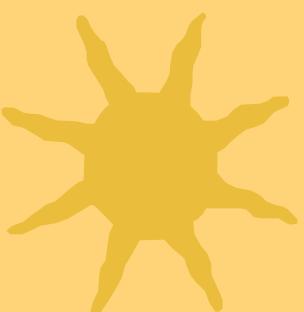
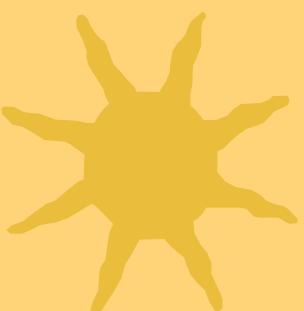
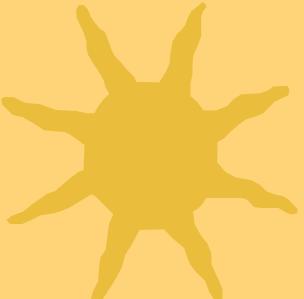




HEDS Senior Survey

Use of Technology - Enhancement



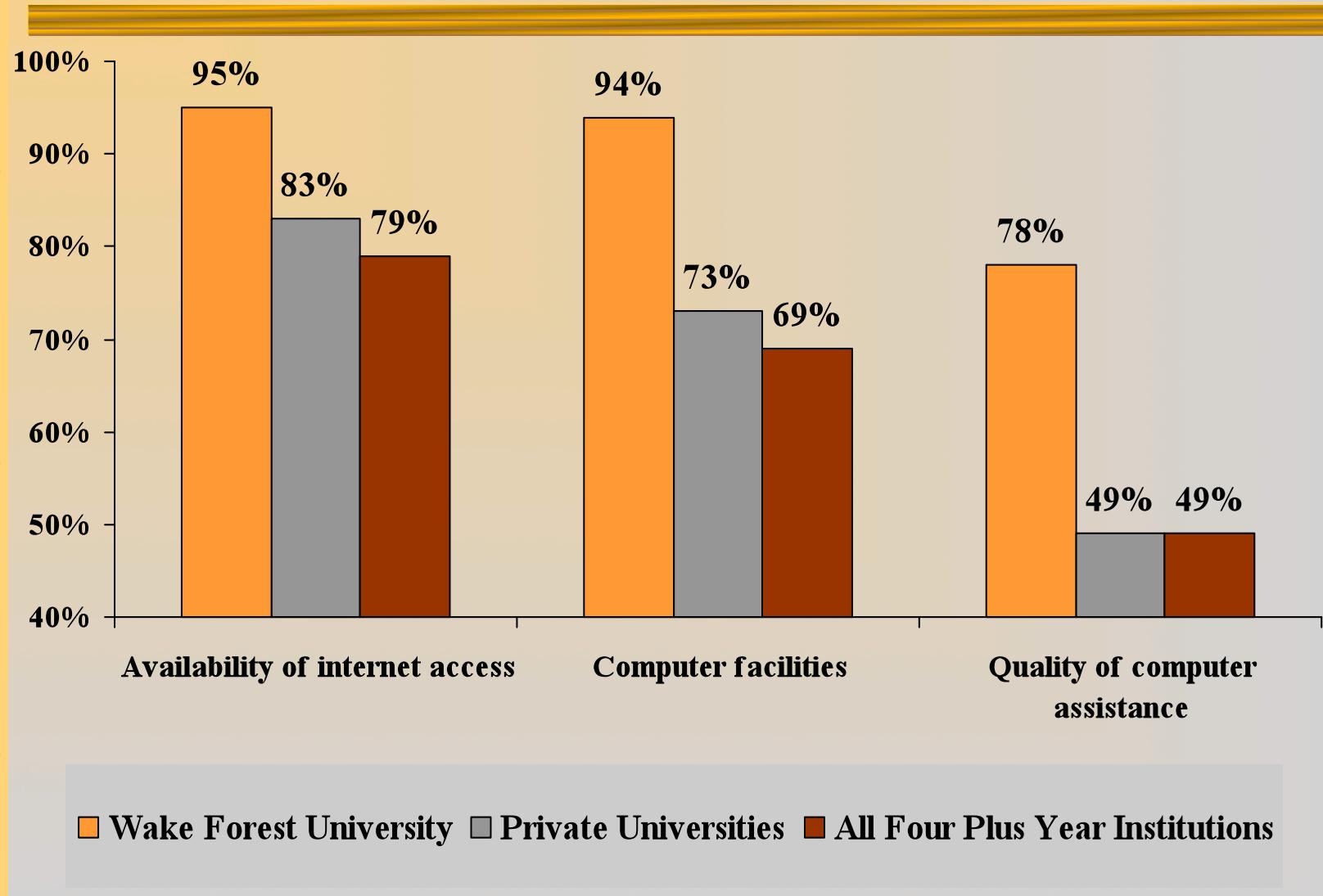


2001 Senior/Freshman Essay Analysis and College Student Survey (CSS)

- ★ Follow-up Senior Essays to Freshman Essays were requested from 25% of the 2001 seniors randomly selected while the College Student Survey (CSS) was administered to the remaining seniors
- ★ Several positive comments about computing in the essays from seniors were indicated including one from a student who said, “I expected to become well-educated about modern technology at Wake Forest so that when I applied for internships and when I graduated I would be competitive and able to keep up in the real world. This was met and exceeded”



2001 CSS - Students Reporting They Were “Very Satisfied” or “Satisfied” with:



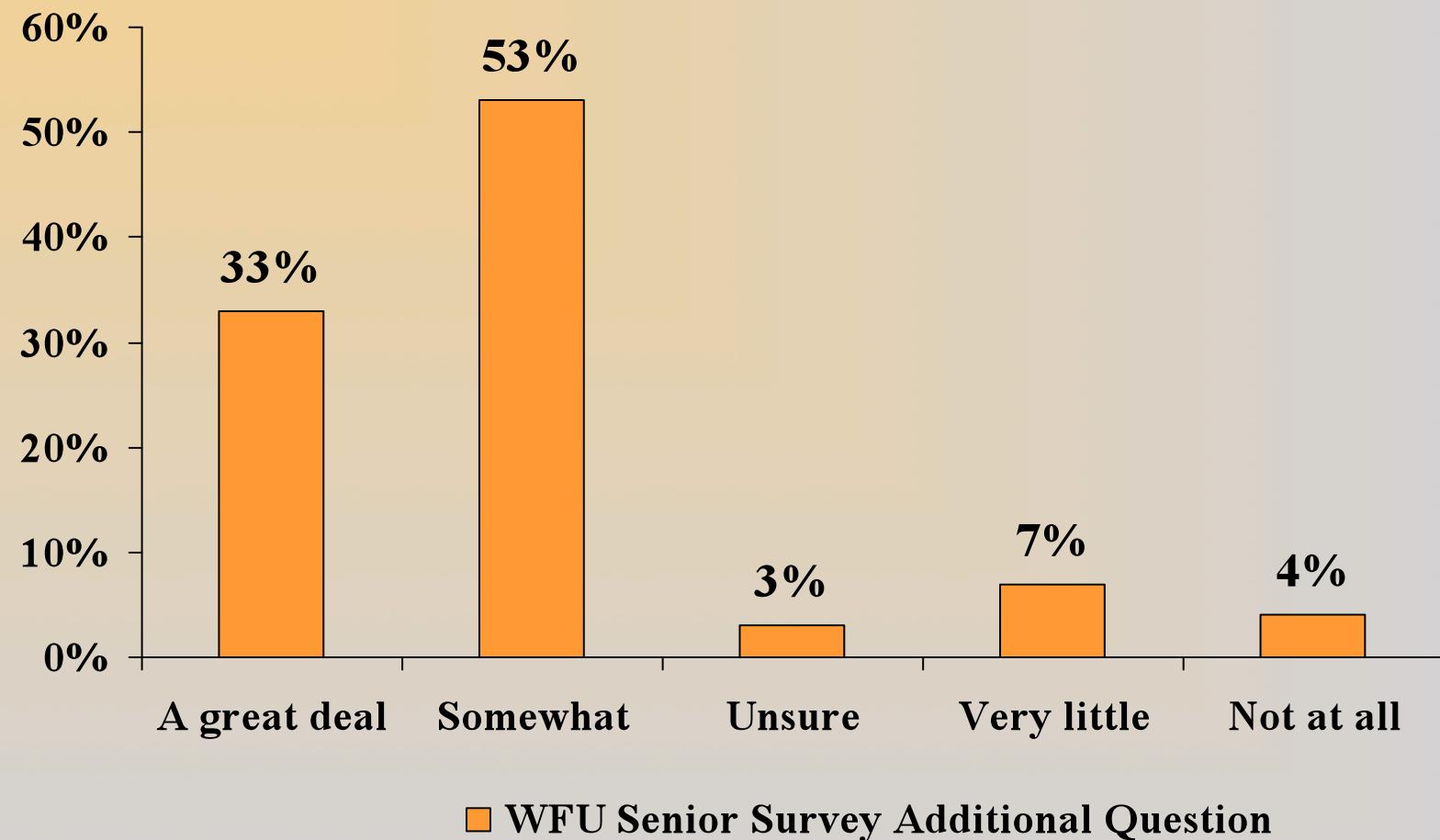


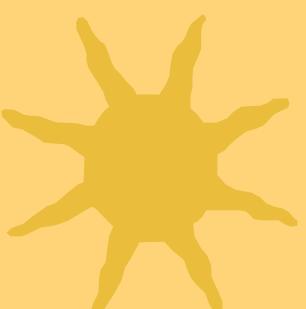
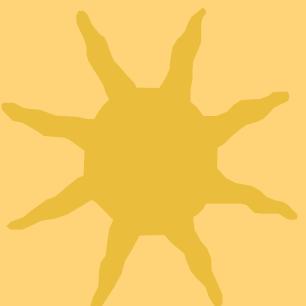
What Is the \$64 Question Everybody Asks?

Are Students Learning
More as a Result of
Ubiquitous Computing?



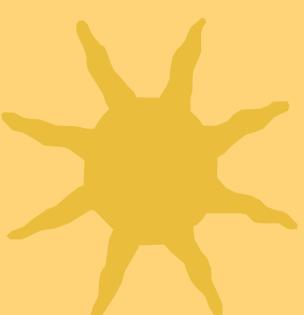
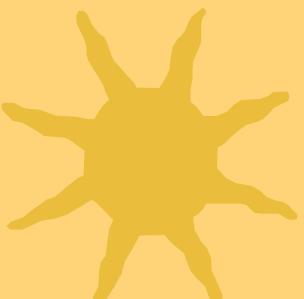
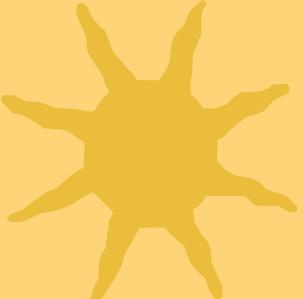
2001 CSS - *To What Degree Did the Use of Technology in Classes Add to Your Learning Experience and Mastery of the Course Material?*





In-house Faculty Survey

- ★ The Faculty Survey was developed by the Evaluation Committee to assess the effectiveness of all portions of the Wake Forest strategic plan
- ★ The survey was administered to the undergraduate faculty in 1995, 1998 and 2001



In-house Faculty Survey Results

Mean Scores Significantly Higher:

2001 vs. 1998 and 1995

- ★ Computers in teaching
- ★ Computers in communication
- ★ Computers in individual instruction
- ★ Computers with information gathering
- ★ Computers for resource material
- ★ Computers for presentations



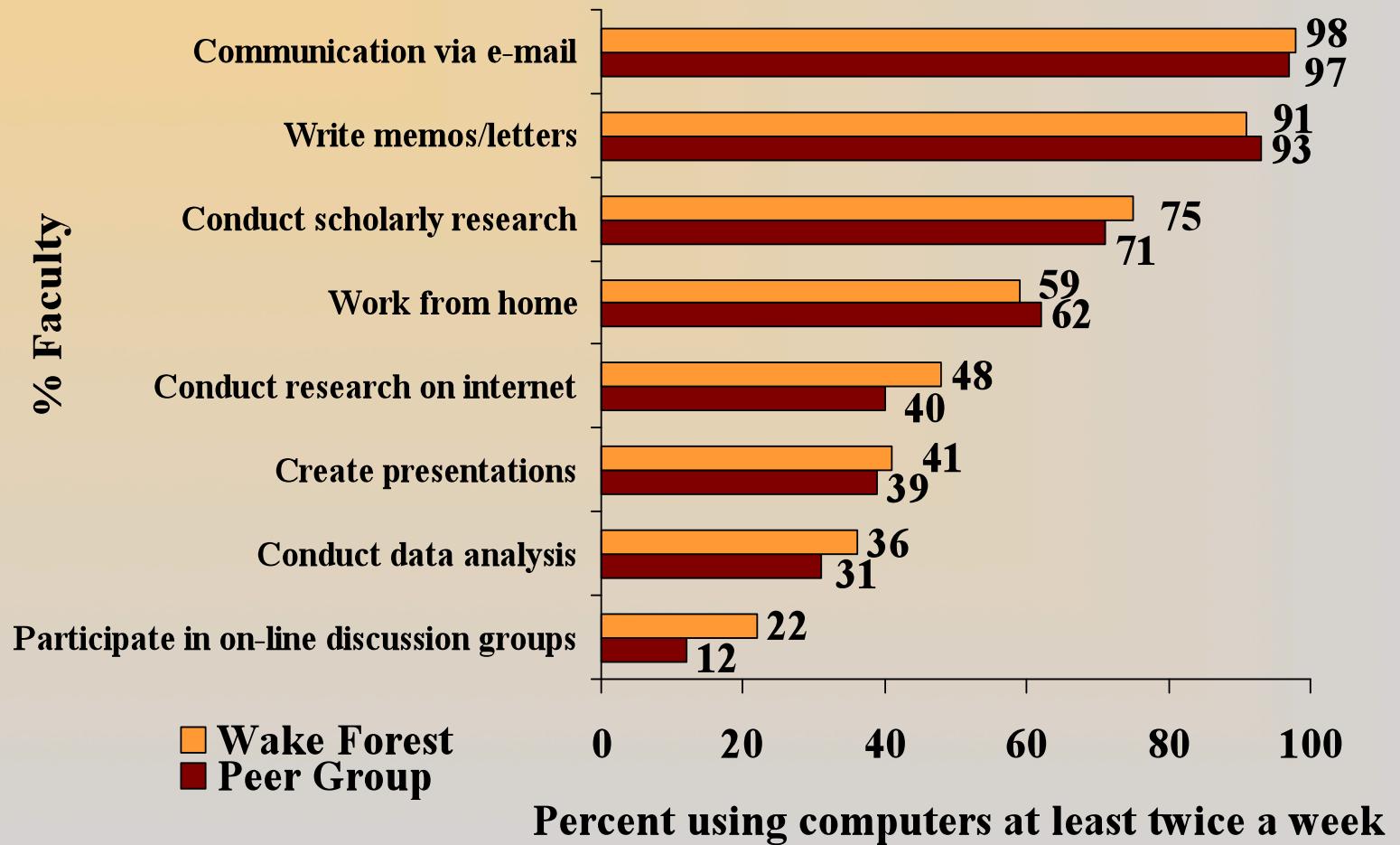
1998 HERI Faculty Survey

- ★ Administered by UCLA in Fall 1998 and currently to faculty nationally
- ★ Several questions contained items regarding computer use and opinions
- ★ Wake Forest full-time undergraduate faculty results compared by HEDS with peer group of pre-selected nine private institutions



1998 HERI Faculty Survey

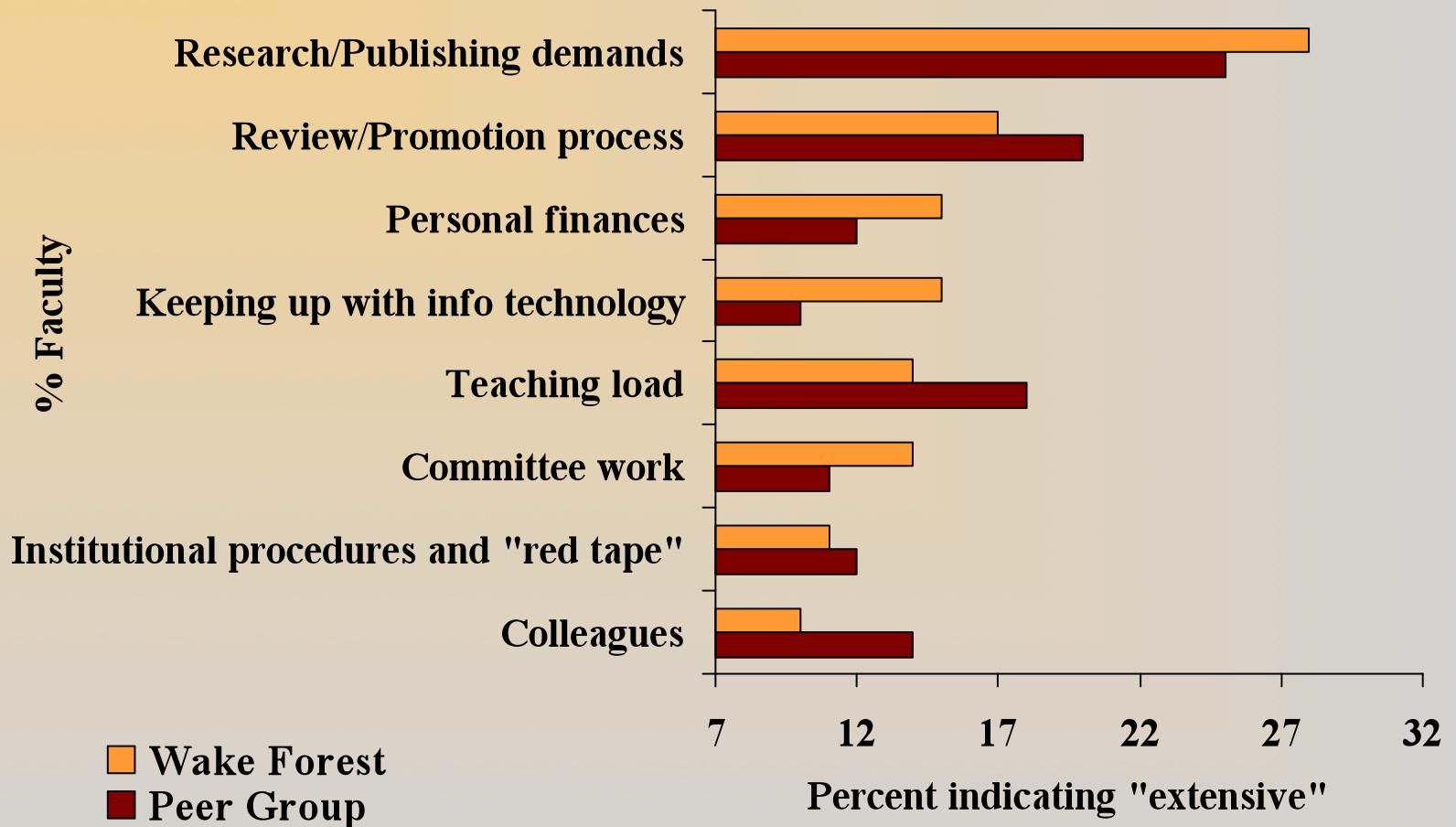
Use of Computers





1998 HERI Faculty Survey

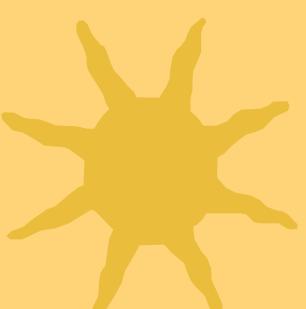
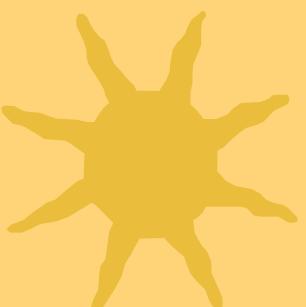
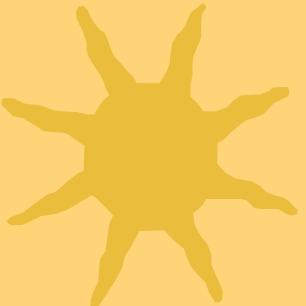
Sources of Stress





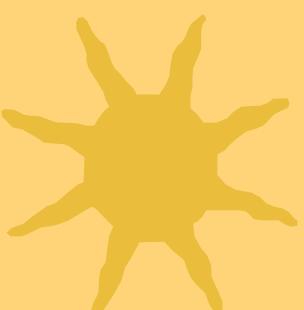
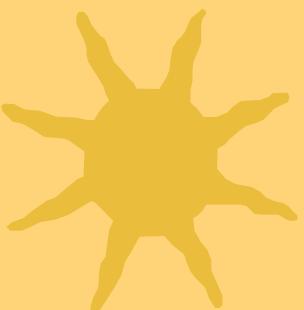
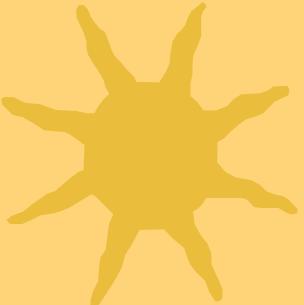
Collaborative Assessment Nationally

- ★ The recently formed “Assessment Data Repository” of ubiquitous computing institutions provides an excellent opportunity for the development and sharing of survey instruments as well as data
- ★ Seton Hall University is “hosting” the Assessment Data Repository for approximately 25 ubiquitous computing institutions including both Drexel and Wake Forest



Summary

- ★ Ubiquitous computing is a well-established practice at Drexel University
- ★ Ubiquitous computing expands the classroom beyond the four walls
- ★ Impacts of information technology appear to be positive on the academic experience, but assessment needs to continue



Summary (continued)

- ★ Student and faculty computer usage has increased significantly since the implementation of ubiquitous computing at Wake Forest
- ★ Student and faculty computer usage at Wake Forest is also higher than peer group institutions while student computing enhancement and satisfaction are higher as well
- ★ Overall, continuing institutional and collaborative assessment is necessary to address the question of improved learning outcomes as a result of ubiquitous computing



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