

A Laptop Computer Requirement for William and Mary?

We need MORE COMPUTERS! (A feedback comment from a William and Mary student on the opening day of the Swem Library Information Commons.)

For more than twenty years, each generation of college students has required “MORE COMPUTERS!” than the previous one. Historically, computer labs were seen as the most cost-effective way to provide student access to required hardware and software, and almost every institution invested significant amounts of time and money in building, maintaining and refreshing labs and classrooms. Publishers of college rankings began collecting information on the number of labs and seats, and college catalogs proudly cited the technical specifications of their lab machines.

As early as 1983, however, engineering schools like Drexel University and Virginia Tech recognized the impossibility of ever building enough computer labs to meet growing demand and began requiring entering students to purchase computers as an alternative method of assuring universal access. The need for technology quickly spread from the engineering and technical disciplines to the rest of the curriculum, and by 2003 more than 25% of four-year colleges and universities required computer ownership.

Many of those institutions now require all students to own notebooks rather than desktop computers. Students find that current laptop models have more than enough processing power and storage, the productivity and entertainment software they need, and that built-in wireless connections are convenient and reliable. Wireless networking has become a mainstream application, and its expansion across campuses has greatly increased the value and flexibility of student-owned notebook computers.

At the Provost’s request, we have reviewed the potential benefits of a notebook ownership program, and we believe the time is right to adopt a laptop requirement for students entering William and Mary. Convenient access to computer technology is essential for academic success, and we anticipate that academic computer use will increase dramatically for the foreseeable future. Current students and their parents obviously agree—99% of freshmen brought a computer to college. Unfortunately, many of those computers lack the speed and storage to meet curricular demands or are plagued by hardware or software incompatibilities which make it difficult to integrate them into the campus infrastructure. A policy requiring students to bring computers meeting a minimum standard helps resolve those problems and insures that all students have equal access to the information resources they need to be successful.

Adopting the policy is just the first step. Even without a requirement, William and Mary freshmen invest nearly \$2,000,000 each fall in purchasing computers. Helping students get the maximum value from their computers requires more than just new policies, facilities, services and support—it requires a whole new way of thinking about computers and communication on campus. Moving from a lab-based culture to a student-ownership culture is a huge transition requiring continuous communication and cooperation among various campus groups. This paper is designed to help foster that communication and to focus the time and energy needed to make a program of this scope a success.

What a might a William and Mary notebook program look like?

The specifics of William and Mary’s notebook program will be decided through extensive discussion with members of the community. As a highly selective public research university, William and Mary’s preliminary notebook plan would **probably** include the following guidelines and principles.

- All incoming freshmen must have a notebook meeting specific hardware and software specifications. Our current thinking is that students will keep their computers for four years, though a two year refresh cycle is also possible.
- Grants and/or loans will be available to students on financial aid. Low cost loans will be available to all students who need assistance in purchasing a notebook. The costs of increased financial aid may be funded through some combination of: 1) income from an expanded retail

operation, 2) possible redirection of resources currently supporting public access labs and 3) additional private funds.

- The College will conduct an aggressive procurement program to offer the lowest possible price on a business class computer meeting College specifications. Ordering, delivery, setup and orientation will be managed by the College in close cooperation with the vendor.
- Selected packages will include a four-year warranty and insurance. Students purchasing from the recommended program will be eligible for on-site support. Students purchasing machines from other vendors will have to arrange hardware and software support on their own.
- As part of that procurement process, the College will negotiate a support agreement including loaner machines, on-site spare parts inventory and reimbursement for warranty work.
- The College will expand wireless service to cover all academic buildings and public spaces. Additional services, such as wireless printing, battery swap locations, recharging stations and computer work spaces, will be established to encourage students to carry computers with them.
- Faculty members can count on students having compatible computers for in-class assignments or for installation of course-specific software.
- The College will aggressively pursue licensing agreements for software that allows students to install copies on their personal machines at a reasonable cost.
- Public access computer labs will be scaled back and investments will be refocused on upgrading computer classrooms and on building specialty labs to provide hardware and software with requirements that exceed the capacity of the required notebooks.

What might the timeline for adoption be?

This is obviously a long-term commitment by the College. One possible timetable would call for the selection of a vendor in the summer of 2004 so that applicants for the class of 2009 have the option to purchase a standard notebook. This optional year would serve as a pilot project, allowing us to test and refine the policies, procedures and systems required to support the program. Based on our experience with the Dell purchase agreements, as many as 75% of incoming students might purchase the recommended notebooks, which would provide a very broad scale test of the program.

2004-5:	Choose potential vendor; wide-ranging campus discussion and decision-making.
2005-6:	Broad Scale Pilot; strongly recommend students purchase standard computer.
2006-7:	Year One: 25-50% coverage (depending on purchases during pilot year).
2007-8:	Year Two: 50%-75% coverage.
2008-9:	Year Three: Greater than 75% coverage.
2009-10:	Year Four: Full implementation.

How students will benefit from a laptop requirement?

Throughout our discussion of this project, we have been constantly concerned about the financial impact on students, particularly in view of continued increases in tuition and fees. While this program requires an additional expense to each student of approximately \$500 annually, moving from a lab-based model to an individual-ownership model has significant potential benefits that we believe justify the cost:

- **Insuring access to technology resources for students on financial aid.** By requiring computer ownership, some portion of the computer's cost could be included in the financial aid award.

- **Increasing student productivity.** Students can arrange their desktops and preferences, cache passwords, allocate their files between local and shared space, manipulate templates and maintain bookmarks and keyboard shortcuts in ways that allow them to work more efficiently.
- **Providing students the opportunity to use some software packages more effectively.** Students are much more likely to learn the intricacies of software they install on their own machines than they are working with software installed in the labs. Inexpensive student licenses allow software to be used on breaks, while studying abroad or at a job or internship.
- **Lowering acquisition costs for high quality (business class) technology through group purchasing contracts.** A computer requirement provides the necessary sales volume to motivate top-tier computer manufacturers to provide substantial discounts on their most current business-class technology. Business class machines use more robust parts and have significantly fewer repair problems than machines that are sold primarily for home use.
- **Allowing students to use the wireless network more effectively for collaborative work.** The use of group projects, case studies, simulations and other interactive exercises has expanded dramatically across disciplines. These interactive methods are being accommodated through more flexible classroom designs and through major investments like the group-study rooms in Swem Library. Notebooks are key tools in building on this collaborative educational environment.
- **Lowering support costs and shortening turnaround time for repairs.** As computers become more central to academic work, repair times become critical. The Technology Support Center currently services about 1400 student computers without charge each year, but turnaround time at the busiest times of the year can run as much as 10 days. Repair times for most problems can be greatly reduced by standardization of hardware and software, agreements for on-site parts inventories and availability of loaner machines.

How might this program support faculty?

Almost every institution that has invested in a notebook program has found that the primary benefit comes from the way students use their machines **outside** of class. Face-to-face interaction among students and faculty is the most precious commodity at the College, and individual faculty members remain the best judges of how to use computer technology in their own teaching—if they choose to use it at all. However, those faculty who **do** use technology in their teaching will experience the following benefits from a common hardware and software platform.

- **Faculty can require students to bring notebooks for class sessions rather than having to schedule a computer classroom.** The College's hands-on computer classrooms are generally booked solid during most of the semester, making it difficult to schedule skills training such as web page development, spreadsheet or database tools into a class. When fully implemented, the combination of notebook and wireless would allow these skills to be taught and practiced in any classroom on campus.
- **Faculty members can feel comfortable requiring students to install supplemental materials and software on their machines.** Most introductory textbooks already ship with extensive supplemental materials on CD-ROM, but many faculty are reluctant to incorporate these tools into their courses because they can't be certain that students have the required hardware. We expect that these supplemental resources will expand dramatically in the next five years to include such tools as student versions of software, open-source learning modules, electronic books, expanded audio exercises in languages, self-scoring practice questions and real-time textbook updates.

- **This program can expand the reach of laptop methods already in use.** Faculty at the William and Mary have already invested significant amounts of time and money in developing classes using wireless laptops in education, biology, chemistry and applied science. These classes have proven to be very effective, but the high cost of purchasing, installing and maintaining wireless computer carts has kept other faculty from incorporating laptops into their courses. Many existing lab courses can be redesigned to use student computers to collect and analyze data, freeing the department from the need to purchase and maintain lab computers.
- **The Equipment Service Program (ESP) can be revised to offer faculty the choice between a desktop and notebook computer.** As the plan is currently conceptualized, the College would fully fund the cost of those faculty who wanted to replace their desktop machines with a laptop, allowing them to more fully participate in the benefits of the wireless campus in their own work.

How would this program support the improvement of the academic infrastructure?

Many computer ownership plans have been sold with the promise that they would save money by eliminating the need for computer labs and classrooms, but we don't share that illusion. Information technology is no longer a luxury for higher education, and colleges must continue to increase their investments in enhanced networks, security, and equipment for research and teaching. Adoption of a laptop requirement **does** provide an opportunity to contain and manage costs more effectively in two ways: 1) by making better use of limited engineering staff time and 2) by improving the instructional capabilities of our hands-on computer classrooms.

PAC Labs at William and Mary were designed with the goal of providing students with a single interface to all the software they needed from any lab computer on campus. Over the years the number of applications used for teaching and research has grown to well over a hundred, and building a lab image of that complexity requires hundreds of hours of engineering time each year. Many problems came from the sheer number of applications and the inevitable interactions and conflicts among them. Others came from trying to adapt applications designed to run on a single desktop to run effectively on a network. Adopting a notebook policy would improve the labs in the following ways.

- **Eliminate the need to develop a single image for all the labs.** Currently fewer than 10 applications account for more than 90% of all lab usage. Moving those applications to the laptop image provides students with continuous access to key productivity tools and allows some labs to be repurposed. The image in the Swem Info Commons and the other public access sites can be greatly simplified by removing most specialized instructional software.
- **Eliminate the need for extensive engineering to run individual applications on a network.** Students would install software that was designed to run on a single machine directly on their laptops, eliminating the need for complex engineering solutions. The software repository can be expanded to allow students to secure packages through commercial purchase, site license or through freeware or shareware sources.
- **Provide more focused and effective use of lab space and equipment by eliminating the need for a common hardware platform.** Most required software will be included on the base image or installed as needed on individual machines, but some applications still require outrageously expensive software or extremely powerful hardware. Some public access labs would be converted to special purpose labs with hardware and software optimized for these applications such as multimedia production, GIS, high level statistics, visualization or music composition.

A laptop initiative also offers the opportunity to improve our teaching facilities by refurbishing and refocusing our hands-on teaching classrooms. Morton 341 is the only classroom specifically designed with the full suite of tools available to support hands-on computer classes--individual and group broadcasting, student monitoring and workstation sharing. The bulk of our hands-on computer instruction

takes place in PACLABS retrofitted with a LCD projector and instructor stations. Full implementation of the notebook program allows classrooms to be used much more effectively.

- **Provide more effective support for hands-on computer classrooms.** Once students routinely use their laptops for purposes now provided by the PACLabs, several of those rooms can be completely redesigned for instruction in computer intensive classes. The current design—affectionately known as the veal feeding pen model—would be replaced with one that encourages greater communication between instructor and students. These high-end classrooms would include wired high-speed network connections.
- **Allow relatively simple hands-on courses to be taught in any of the presentation classrooms.** Most of the classes taught in the current computer labs could be taught equally effectively in any of the College's presentation classroom by having students bring their laptops to class.
- **Eliminate the costs of refreshing departmental notebook labs.** There are currently approximately about 80 notebooks in use (requiring \$160,000 refreshment cost every three years) and requests for another 40-60 machines are in the pipeline. Redesigning those classes to take advantage of student notebooks would eliminate purchase and maintenance costs.

Where do we go From Here?

A sentence from the introduction summarizes our direction for the future.

The change from a lab-based culture to a student-ownership culture requires continuous communication among the various groups on campus whose cooperation will be needed to make a change of this magnitude successful.

Adopting a policy is relatively easy. Creating a culture where several thousand students actually carry their computers with them as they move about the campus each day is much more difficult. Accomplishing that goal will require the careful management of a myriad of technical and non-technical details so that faculty and students actually experience the potential benefits we've outlined in this paper. Coordinating all those details will require a somewhat formal organization working closely with the Provost. More discussion would be needed to finalize that organization, but we would think it would include the following:

- A high-level steering committee to continue to articulate the long-term institutional vision and to make decisions and resolve issues that cut across traditional lines on the organization chart. This committee would need to stick with this project over the long haul, since full implementation is not expected until 2009-2010.
- An early task of the steering committee would be to create and staff a series of subcommittees with the responsibility for decisions, policies and processes in areas such as: procurement, software selection, finance, logistics, engineering, marketing and communication.
- Build a specific communication plan to identify student, faculty and staff groups who are affected by this program and meet with them to get their concerns, ideas and suggestions for implementation. Those concerns should be documented and passed on to the steering committee or appropriate subcommittee.

We welcome the opportunity to discuss any of these issues further.