

Higher Learning - Technology Serving Education



**There's No Business
Like School Business**

*The complicated relationship between
corporate America and academia.*



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The complicated relationship between corporate America and academia.

By Sabrina Mehra

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Welcome to the May/June issue of Higher Learning.

Our feature article investigates the delicate topic of corporate sponsorship in academia, examining the influence corporations have on universities when they accept cash donations, discounts, and gifts. The article considers whether universities should refrain from relationships with corporations that have questionable business practices, and looks at what happens to the relationships when a scandal erupts.

For information on the latest news, courses and programs, Web sites, and projects, turn to our departments.

An Internet2 performance coordinated by the Rochester Institute of Technology in Troy, NY and Mills College in Oakland, CA allowed student dancers, musicians, vocalists, and designers from each cost to interact with each other, live, on a virtual stage.

A science center in Huntsville, AL is offering its high-tech design facilities to interested professors and students. In exchange, participants develop content for the center's interactive shows – displayed on a 26.6 x 12 foot screen in front of 34 retractable audience workstations.

MBA students at Boston University have access to several career resources via BU's new MBA Toolkit. Offered by the School of Management, the Toolkit includes workshops, seminars, faculty and alumni mentors, career counseling, and more.

For the first time in history, the full-text of both the original 1543 and later revised 1555 versions of Andreas Vesalius' 16th century work, *On the Fabric of the Human Body*, are being translated and published into English. A new Web site from Northwestern University is posting the translations as they are completed, including the complete annotated text and all accompanying images.

Another new site, the Directory of Open Access Journals, promotes open access scientific and scholarly journals by presenting comprehensive information, as well as a search engine, on all full-text, quality-controlled journals in all fields and languages.

The High Performance Wireless Research and Education Network in San Diego, CA offers field researchers in astronomy, ecology, and geophysics the opportunity to remotely observe environments across a 45 megabyte

per second backbone network. Biology researcher Rolf Baumberger is using HPWREN's high-resolution still camera at the Santa Margarita Ecological Reserve to observe southern California hummingbirds from his remote office in Switzerland.

Researchers at Brown University have developed a life-size, 3D model of the Great Temple in Petra, Jordan, allowing archaeologists visiting Brown's CAVE to explore the reconstructed site in virtual reality. The SHAPE project is aiming to reach the point where archaeologists can use virtual reality to take measurements of excavation sites as precisely as if they were really there.

Another project trains undergraduate students in computer science and education to develop educational software for the K-12 market. TRAILS

provides the training and resources, while partnering universities develop prototype software, pilot its use in local classrooms, and publish it. ■

Jennifer Kavur



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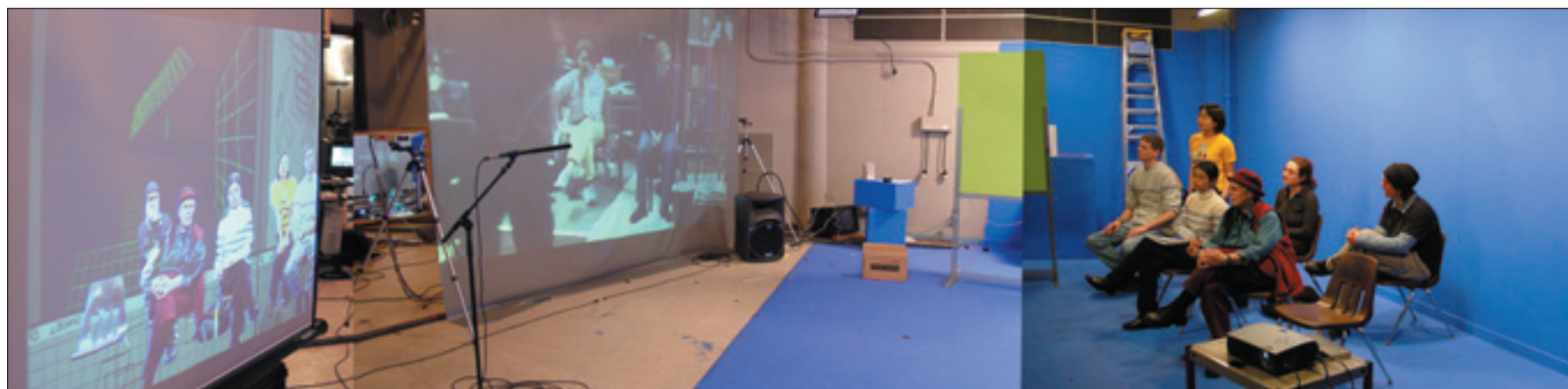
Internet2 Performance Blends Technology with the Arts

Technology blended with the arts last April, when students in New York and California took part in a real-time Internet2 (I2) distance performance. Pairs of dancers, musicians, and vocalists – one from each coast – performed interactive pieces on a virtual stage as if they were face-to-face.

Rensselaer Polytechnic Institute (RPI) orchestrated the I2 event, called Peerings, with Mills College. RPI Research Professor Pauline Oliveros and Assistant Professor of Architecture Brian Lonsway co-coordinated the show, which involved Oliveros' independent study music and dance students and Lonsway's Experimental Studio in Remote Collaboration class.

Peerings opened with a musical introduction played on two laptops. Next came a traditional Inuit Eskimo piece, where two singers use quick notes to sing back and forth into each other's throats. The light-hearted improvisation was followed by a dance number, and then an interactive music piece. Led by the laptop musicians, the piece allowed audience members at RPI and those watching the performance online to play along with their computers. A choreographed dance performance ended the show, which was accompanied by a graphics display.

Right: Broadcast image taken during a rehearsal break. Dancer Penny Hutchinson standing between two RPI students with live video feed from Ravensborne College of Communication in London.



The Synthetic Space Environment studio at RPI in Troy, NY.

Three separate audiences viewed the performance. Those at RPI watched the composite projection while the students performed in front of a blue screen next door. In California, the audience was able to see the students live on stage in addition to the virtual performance on screen. The third audience watched online, logged in at the Peerings' Web site.

"The performance went very well," says Oliveros, who has been working with distance performance since 1990. Oliveros was involved in an I2 remote performance with June Watanabe at Mills College last fall, but Peerings was the first to incorporate a synthetic graphic environment. "I did the performance with June just to start the ideas going," she says. "When Brian contributed the virtual environments, he opened all new opportunities."

Lonsway found Peerings to be an ideal means of testing the Synthetic Space Environment (SSE) – a research project under his direction for the past four years. "We have developed this system by testing connections between multiple sites on Rensselaer's campus, and were finally ready to experiment with the SSE via a remote connection. I2 was the obvious choice because of its bandwidth, and performance was an obvious choice because of its spatial requirement," says Lonsway. "This was the first actual remote experiment," he points out. "'Remote' to us in the past meant in two different rooms."

"A visual and aural environment for tele-collaboration," the SSE should not be confused with desktop-based video conferencing systems or avatar-based head-mounted display systems, says Lonsway. "We have developed a unique

system for people in remote spaces to collaborate in a common simulated spatial environment.... By having this spatial environment, participants aren't constrained by the very static conventions of typical video-conferencing systems, but are liberated (so to speak) to engage their bodies and the space they are in to express themselves."

Lonsway prefers to use the word "synthetic" when describing the system. "I prefer 'synthetic' rather than 'virtual' as we see these environments as 'real' as any other environment," he says. "What is 'virtual' about them is no different than what is 'virtual' about reading a book, where the thoughts in your head (the virtual) complement the words on the page (the physical)."

For Peerings, the synthetic environment consisted of "a physical design for the arrangement of three discrete performances to be simultaneously set up across two remote spaces...a visual design for computer-generated imagery within which the performers performed, and an acoustic design for an environment through which the sound was processed to increase the spatial sense of the performance venue for the RPI audience," Lonsway explains. "This combination of physical, visual, and aural environment design is what we see as a new direction for architects."

"It was a very complex project: socially, politically, and technically," says Oliveros. Mills didn't have an I2 connection, so the students had to use facilities at California State University, Hayward. But Hayward had a higher version of I2 than RPI, who had to send its version to Hayward so the two schools would be compatible with each other, she says.

The students, who had no experience working within a virtual environment, had to get accustomed to the medium and its pitfalls. Such pitfalls include latency (10-second delays) and dropouts (which wipe out the audio and video), Oliveros explains.

"But the real challenge was scheduling," she says. The three hour time difference, conflicting class schedules, and the collaboration of five departments (Art and Architecture at RPI, Music and Dance at Mills, and the Interdisciplinary Center for Immersive Technology at Hayward) proved very difficult.

Lonsway agrees: "The main challenge was one of coordination, to be honest. While the technologies are facilitating new kinds of interactions, and while it is expected that anything relying on a lot of technology will experience many constraints and technical problems, people in remote locations will still have their own physical, social, and cultural constraints."

Originally, three remote locations were involved, but due to coordination problems, one of the parties dropped out. "The third party, in London, was unable to routinely coordinate with our schedule because of the eight hour Pacific-to-Greenwich time zone difference," says Lonsway. "Just because we can connect across space like this doesn't necessarily mean that people will always want to!"

"It is easy to complain about the speed of the connection, or the speed of the computers, or the quality of the imagery, etc.," he continues. "However, these technical limitations are no different than gravity or wind or heat in my mind. We can see them as constraints – creative constraints – and work creatively within them, prodding them and recoiling from them where necessary."

When asked where 12 distance performance most needs improvement, Lonsway replied: "This is a difficult question to answer. On one hand, what the students put together was no different than work done thirty years ago, over slow video-over-telephone links. In this regard, the medium has gotten faster, and the technology more seductive, but little progress in the area of performance using these technologies has been made.... I think the improvement should be made in the area of conceptualization – how to design and develop a performance FOR these media rather than one which merely USES the media is an area requiring the greatest attention."

"All things considered, the students did very outstanding work in many aspects, including planning, testing, and executing the performance," says Oliveros. "I was very interested in the strong relationships developed."

"What excited me most were the creative possibilities that the medium – and the performance as a experimental example – offer the next generation of designer. The medium of computer-generated, computer-manipulated, and computer-networked space requires, at the same time, a very forward-looking and critical embrace of technological systems, and a thoughtful knowledge of the history of spatial design," says Lonsway. "The students put together some critical challenges to the limits of these technologies, as 'advanced' as they ostensibly are.... I'm impressed that the group embraced these challenges with such enthusiasm."

Peerings is archived at the Peerings' Web site, <http://o-art.org/peerings>.



Science Center Opens Design Lab to Professors and Students

The Sci-Quest Science Center in Huntsville, Alabama has opened a high-tech graphics and engineering design lab to professors and students. Participants render projects through a supercomputer system onto an interactive 26.6 x 12 foot screen, and in exchange for using the facilities, develop content for Sci-Quest's shows.

"Students develop content for the shows, which minimizes the content development expense for SGI and give students valuable tools and experience," says Laurie Provin, Director of Education at SGI Professional Services. SGI worked with Sci-Quest to create the new lab, which is equipped

"Cosmic Connections" at the Sci-Quest Science Center in Huntsville, AL.

with two Silicon Graphics Fuel Visualization workstations, four Dell workstations, and the SGI Onyx 300 system.

SGI also developed Sci-Quest's Immersive Theater, which opened to the public last March. With 34 retractable Linux-based workstations, the 56-seat, three-dimensional, interactive, high-definition facility is the first in the world to provide individual touch-screen computers for its audience. The theater's IMAX-like environment allows audience members to interact in real-time with what they see on the screen.

Content for the shows is collected from public domain research databases, such as The Visible Human and the Hubble Space Telescope. Sci-Quest also uses licensed data sets, such as Nefertari's Tomb. Two shows are currently running. "Cosmic Connections" traces the birth of a star and takes the audience on a journey of the solar system. "Nefertari's Tomb" is a visual recreation and tour of the famous

Egyptian tomb. Upcoming shows on ecology and human anatomy are under development.

There are two ways of interacting with the shows, says Provin. "Twenty minutes into 'Cosmic Connections,' the individual workstations pop up and visitors are given the opportunity to create a planet. They are given choices, such as size, temperature, composition, distance from the sun...and can look at the planet from ten different orbital perspectives," she explains. The facilitator can project any individual planet onto the screen for the rest of the audience to see. An alternative form of interaction takes place in "Nefertari's Tomb," where the facilitator asks the audience where they want to go (e.g., turn right or left down a passageway) on their tour.

The facility recently opened, Provin explains, so it hasn't had the opportunity to develop specific programs with colleges just yet. However, Provin encourages those interested in the technology

to contact the center. "Professors can be the facilitators if they choose," says Provin. "Any professor or student who would like to use Sci-Quest's facilities for their projects are free to do so." Medical students can make use of The Visible Human, history and art students can work with Nefertari's Tomb, and astronomy classes can explore images from the Hubble Space Telescope, she suggests.

The Immersive Theater is funded by a NASA grant. For more information, visit www.sci-quest.org. ■





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On the Fabric of the Human Body (De Humani Corporis Fabrica)

<http://vesalius.northwestern.edu>

The 16th century anatomical atlas by Flemish anatomist and physician Andreas Vesalius, *On the Fabric of the Human Body (De Humani Corporis Fabrica)*, is being translated from Latin to English and made available on the Web. Published in 1543 and later revised by Vesalius in 1555, the *Fabrica* provides a detailed account of the workings of the human body along with 272 woodcut drawings and diagrams. Professors Daniel Garrison and Malcolm Hast of Northwestern University are leading the project.



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Title Page from 1543 Edition of the *Fabrica*

“The *Fabrica* not only transformed the study of human anatomy and medical education, it also has had an enduring influence on medical art,” says university spokesperson Wendy Leopold. “Its illustrations became the very basis of medical art and illustration for generations, and continue to influence the way we view the human body.”

Facing several challenges, Garrison and Hast spent ten years translating the first book. “The Latin of the *Fabrica* is hideously difficult,” Garrison explains. “It’s not so much the terminology that makes it such a killer challenge, but the potential for unintentional ambiguity in the language.” According to Garrison, Vesalius may have learned his Humanist Latin from a student of Erasmus, whose Latin was “intentionally long-winded and written to impress where it should simply inform.”

Digitizing and editing the illustrations is also proving difficult. “The chief object of the graphical editing was to clean up the tiny Greek and Roman characters and other glyphs in the illustrations to make them more legible,” says Garrison. “Since no two woodcut impressions are identical, these repairs require a close reading of what Vesalius wrote about the illustrations in his figure legends, repeated scrutiny, and a certain amount of guesswork based on evidence found in original specimens and in reproductions of these originals.”

This is the first time that the full-text of both editions is being translated and published in



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Skeleton Collage



Skeleton Collage

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English. A high-quality print publication of Garrison and Hast's translation is in progress, but the online edition immediately opens Vesalius' work to a wide audience and offers interactive features that would be impossible to achieve in print. "The images can be enlarged and viewed next to the text for each specific anatomical feature," says Garrison. "This is something that doesn't work well in a book."

The Web site currently includes the complete annotated text and all 87 images of the first book. The remaining six books in the 1543 edition, substantive revisions from the 1555 edition, and edited reproductions of all the illustrations from both editions will be added. Anatomical footnotes, ancient Greek and Roman sources, modern Latin names for all parts of the body mentioned by Vesalius, notes on contemporaries mentioned by



Andreas Vesalius Frontispiece Portrait

© 2003 Daniel Garrison. Used with permission.

Vesalius, as well as notes on unacknowledged sources are provided. A search engine is available for searching text, references to figures, and anatomical terms.



Directory of Open Access Journals

www.doaj.org

A new directory promotes open access scientific and scholarly journals on the Web. Hosted by Lund University Libraries (Lund, Sweden), the Directory of Open Access Journals (DOAJ) provides comprehensive information on full-text, quality-controlled journals in all fields and languages. Details include: journal title, publisher, subject, keywords, successor and/or predecessor, start and/or end year, language, and ISSN. Launched in May, the directory currently contains profiles on 350 journals, and will continue to grow as new titles are identified. Visitors to the site can suggest additional titles by filling out an electronic form. A search engine allowing researchers to search all journals in the directory at the article level will be added to DOAJ in the fall. The directory's database records are freely available to libraries and can be harvested by using OAI-PMH (www.openarchives.org). "The directory will give open-access journals a simple method to register their existence," says Lars Björnshauge, Director of Lund University Libraries. "For the researcher, DOAJ will mean simplified access to relevant information." ■



There's No Business Like School Business: The Complicated Relationship between Corporate America and Academia

By Sabrina Mehra

Since 1637, when John Harvard donated \$800 towards the building of the school that was to bear his name, universities have looked to the private sector for financial support, and corporations have been more than happy to oblige. With the rise of technology, the symbiotic relationship between universities and the corporate world has become even more pronounced.

“With the arrival of computers, universities played an important role for corporations as far as providing important endorsements for products,” says Kenneth C. Green, Director of the California-based Campus Computing Project, the largest continuing study of the role of information technology in American higher education. “You can look at IBM’s campaign for the 370 when it launched the mainframe in the mid-1960’s, or when the Mac was launched in 1984 and Apple signed on 24 universities to say, ‘We’re going to make Macs available to students.’ Universities provided very important endorsements.”

Of course, dollar amounts and donations have multiplied considerably since John Harvard’s time. Queen’s University in Kingston, ON, for example, received more than \$15 million (CAD) in corporate donations in 2000-2001 alone, up from more than \$14 million in 1999-2000 (Committee on Corporate Involvement at Queen’s University: Checks and Balances for the New Millennium, <http://www.queensu.ca/secretariat/corporate>).



But in an age where rapid technological advances deem new software obsolete overnight, many cash-strapped universities have come to rely on donations and discounts from corporate benefactors in order to offer the latest in education technology and remain relevant in this competitive world. “Public funding for the activities of colleges and universities is shrinking, and this is being made up by increases in tuition that students pay, and efforts to raise money in other ways,” says Alex Molnar, Director of the Commercialism in Education Research Unit at Arizona State University and author of *Giving Kids the Business: The Commercialization of America’s Schools*. “Generally, this means some involvement and participation with corporations.”

“ As corporations tighten their purse strings in the wake of the dot-com collapse and corporate scandals, the ethics of whether universities should accept donations from corporate America – let alone depend upon them to survive – is an issue of ongoing debate. ”

While they are prominent ones, relationships between corporations and universities are becoming increasingly complicated. As corporations tighten their purse strings in the wake of the dot-com collapse and corporate scandals, the ethics of whether universities should accept donations from corporate America – let alone depend upon them to survive – is an issue of ongoing debate.

For their part, many universities across North America are scrambling to readjust budgets that have come to rely heavily on corporate discounts and donations. “Discounts aren’t as large as they used to be, and in some cases, the absence of that discounting has created some real problems for institutions when they build budgets on one model and then find into the budget year that the company they do business with has changed that discount program dramatically,” says Green. “Some would say it’s predatory, monopolistic behaviour on the part of the corporations: sell low, lock them in, and then change the pricing. At the same time, Microsoft and others would say, ‘We can no longer afford to do the discounts that we’ve done in the past.’”

But whether universities should even be put in a position where continental economic upheavals significantly impact their operating budgets remains an issue of contention. One of the main concerns is the opinion that corporations only donate money and technological resources to areas within universities that serve their own interests, says Lawrence C. Soley, a professor at Marquette University in Milwaukee, WI and author of *Leasing the Ivory Tower: The Corporate Takeover of Academia*. “We’re seeing a lot of earmarked funds and fewer and fewer contributions to the general operating funds or to general scholarship funds,” says Soley. “Most of the money that goes to universities... is narrowly targeted for a specific purpose, and the corporations know ahead of time what it is. They’re not contributing money that could be used in any way a university sees fit. They’re contributing money primarily in areas of interest to them.”

Yet corporations aren’t the only ones with their eyes on the prize: corporate money is an area of great interest to the post-secondary institutions that have come to rely upon it. Publicly-funded institutions in particular find themselves between a rock and a hard place where corporate donations are concerned, says Green. “The level of state or provincial funding that goes into the so-called public institutions these days sometimes can be only 10 to 25 percent, and yet the state has great control over policy and planning issues that many would argue put great pressure to go find outside funds but don’t provide the flexibility to act like an independent agent,” he says.

Cutbacks, funding constraints, and the need to possess the latest in technology and research have resulted in university administrators placing undue emphasis on satisfying corporate constituencies, says Molnar. “I think that administrators of universities live in a hyper-political environment which is dominated by neo-liberal ideas and that they have a whole series of very troubling practical problems, and those are associated primarily with questions of resources, and that makes them more interested than many of them should be in reaching accommodations, for lots of reasons,” he says. “One reason is they will be applauded for having done so by a very important constituency: corporate executives and politicians.... They can take comfort in the belief that they have prevented things from being even worse than they might otherwise be.”

Some universities are seeking creative solutions to maintain productive and beneficial relationships with their corporate sponsors while staying in control



of where the money goes. For example, money from the Technology Sponsorship Fund at Queen's University goes towards applications that are difficult to accommodate from the operating budget alone. The Fund, now in its first year, was established with monies rebated to Queen's University from IBM and Toshiba, companies that sell computer equipment through the campus computer store.

"From the point of view of corporate involvement, this is really not involvement in the sense of having any of the issues of steering the university to do certain things and not do certain things," says Dr. John Dixon, Associate Vice-Principal (Academic) at Queen's University and Chair of the Technology Scholarship Fund. "Based on the volume of sales, the companies rebate a certain amount of money back to the university for distribution to good causes." "Good causes" include projects related to adaptive and special needs technologies, as well as technologies that have an impact on the teaching and learning environment. "[Special needs software] is an area that is hard to keep up-to-date with using funds out of the operating budget, so having the flexibility to purchase these items is a big step forward," he says.

Students and faculty at Queen's University aren't the only ones benefiting from the Fund. The corporations involved stand to gain through their participation in the program, says Dixon. "Obviously the hope of the companies is that when people on campus realize that this fund grows as the sales grow, they'll be enticed to make their purchases from these vendors through the campus store instead of going online and buying from Dell," he says. "Since it is a sponsorship arrangement, obviously they're being motivated by the hopes that it will increase sales, and the bigger the sales are, the more money comes back to campus groups."

And it is with profit in mind that corporations reach out to universities with offers of donations, discounts, and sponsorship, says Molnar. "Universities have a highly-skilled workforce in one respect, and so corporations would benefit by having access to that highly-skilled workforce," he says. "You can't criticize corporations for doing this any more than you could criticize mold for growing in a petri dish. It's what they do." According to Molnar, because corporations are interested in contributing to departments and programs that could potentially benefit them, arts departments are put at an obvious and significant disadvantage. "Where does the money go to support faculty work? It goes to places where outside money can be raised," he says. "This operates against the humanities and the fine arts by distorting the university's priorities."

In Molnar's eyes, institutions who agree to things like non-disparagement clauses further abrogate traditional ideas about academic freedom and the role of the university in society. "What [non-disparagement clauses] say is that no employee of the institution can say something bad about the sponsor or the sponsor's product or undermine it...which means the administration of the university would be obliged to try and discipline the faculty member who speaks out," says Molnar. He cites an example from the University of Wisconsin, who entered into a non-disparagement clause with an athletic shoe manufacturer. The university was challenged by a Wisconsin paper to retaliate against university employees who made disparaging remarks about the company in the paper. According to the newspaper, if the university disciplined any employee who broke the non-disparagement clause and spoke to the media, the school itself would risk negative publicity. In the wake of the controversy, the university renegotiated the agreement to remove the disparagement clause. "These are apparently pretty standard in the corporate sector," he says.

People who are doing research in business should be doing research about business, not research for business, says Soley. "There's a big difference, and maybe if they were doing their research about business we would have found out about these scandals long before and some of these scandalous operating procedures of companies would have been exposed," he says.

“ How universities should respond when the company they've been receiving donations from becomes embroiled in scandal is a question that has been faced time and time again... ”

Corporate scandals have presented even more challenges for university administrators. How universities should respond when the company they've been receiving donations from becomes embroiled in scandal is a question that has been faced time and time again by dozens of universities over the last couple years. When the shady dealings of Enron and WorldCom were exposed, a string of universities – including Harvard University, Mississippi College, and the University of Michigan – were forced to defend the legality of the donations they had received from the toppled transnationals.

Molnar says he's witnessed few changes in the manner in which administrators approach corporate sponsors as a result of the scandals. "The scandals in corporate America can be written off by administrators as the aberrant behaviour of rogue executives," says Molnar. "From a university administrator's point of view, probably it was more important that Ken Lay's cheque didn't bounce than Ken Lay wrote the cheque, so it would be possible to say, 'They were bad business practices, but he treated us well, so it's got nothing to do with me.'"

Such a view was not welcomed by students at the University of Michigan – where a building bears the name of A. Alfred Taubman, the ex-chairman of Sotheby's Holdings who was convicted in early 2003 of commission-fixing – who said the university's decision to uphold the status quo conflicted with the heart of the institution. "In respect to honesty and civility," wrote the student editors of the campus newspaper, "Taubman has abandoned the university's standards and his name should no longer grace the university's property and institutions."

The integrity of universities would be upheld on matters of corporate involvement should faculty be allowed to actively participate in the decision-making process, says Soley. "I think the decisions should not be made at the administration level. I think they should be made at the department and professorial levels," he says. According to Soley, faculty should have veto power over all decisions related to corporate involvement.

With ongoing economic upheaval and no apparent decrease in the drive of universities to obtain the most up-to-date technology, the debate over corporate involvement will undoubtedly continue. Indeed, Molnar contends that to change anything in the relationship between universities and corporations would require sweeping changes on the societal level. "What you would have to do [to change things] would require changes in the legal framework by which universities are governed, it would require the willingness to invest substantially more public resources than are currently invested, and it would require a general cultural understanding that these things are desirable," says Molnar. "All of those things are part of a larger struggle within a society to understand what it is and what it wishes to be, so the issues confronting the universities, although they have unique elements, can't be understood apart from this broader social context." ■

Sabrina Mehra is a writer and columnist based in Vancouver, BC. She can be contacted at sabrina@sabrinamehra.com.



Courses & Programs



MBA Toolkit Prepares Graduates for the Job Market

Boston University is boosting students' job-hunting skills with its new MBA Toolkit – an ensemble of employment resources designed specifically for business students in their second year of study. The Toolkit builds upon the skills students acquire in the CareerLab – a mandatory course for first year MBA students.

"The School of Management found that advanced training was required," says Jennifer Lawrence, Dean of Career Services. Lawrence points out that although business students become experts in areas such as marketing and finance, they don't gain expertise in the job search. "We are leaving nothing to chance," she says.

Every MBA student received an email invitation to the "Toolkit Launch," held last February. "We didn't know what it was about or what to expect," says Merline Cherian, a second year student in the MS.MBA program. The 45-minute event introduced the Toolkit to students. Cherian says she was surprised to find so many faculty members from various departments gathered together for a single event. Over 35 faculty attended, in addition to contacts from the business world. "It was a Who's Who gathering," she says.

The MBA Toolkit includes workshops and seminars, a mentorship program, and a professional protocol

consultant. A customized package listing articles, books, and URLs, a business writing guide, and library research resources is also supplied to each student. Career, job search, and interview counseling is also available, as are private phone rooms. "The private phone rooms are used by students who don't have cell phones, or run out of their minutes," says Cherian.

The workshops and seminars, such as "Professional Protocol and Executive Etiquette," are presented by experts on various subjects. "Nail That Interview" was a series of talks by a retired senior marketing executive, says Lawrence. Students

who attended the workshop were allowed to schedule individual meetings with the speaker, who hosted mock interviews. "This was very popular," she says.

The mentorship program assigns one faculty mentor and two alumni mentors to every student. "Matching students to their mentors is a bit like running a dating service," says Lawrence. Faculty and alumni fill out various tests and surveys when they volunteer for the program, and are matched to students with similar personalities, backgrounds, and interests.





“The mentors are completely open and want the best for you,” says Cherian. “As a student, you don’t know what is out there. You talk to other students, but they are in the same situation as you. You can’t critique yourself or other students.” Although the mentors are Cherian’s favorite aspect of the Toolkit, she found the faculty more helpful than the alumni. “I was really able to connect with my faculty mentor,” she says, “but the alumni mentors were not such a good match.” Cherian explains that although the alumni tried to help, they were not involved in the areas she wanted to focus on.

Graduating students seeking additional advice on interpersonal skills, etiquette, and manners can turn to Professional Protocol Consultant Judith Bowman for help. “Judith is concerned with first impressions,” says Lawrence. “She tackles issues from the outside in.” Examples include cocktail party etiquette, how to hand out business cards, and appropriate dress.

“The student organization contacted Judith via the Career Center and organized some sessions,” says Cherian. “They were extremely helpful.” Bowman taught the students how to shake hands and properly introduce business associates. She also had students critique each other’s outfits. Cherian especially appreciated the session on dining etiquette. “We went to an actual restaurant to practice our dining skills,” she says.

The Toolkit is very different from the CareerLab, says Cherian. “The CareerLab focused on securing internships. It was more focused on skill training for first year students to prepare them to meet the job market. The Toolkit is mainly focused on building relationships rather than preparation.”

Now that she has realized the importance of relationships, Cherian is increasing her contact with the Career Center. “I am more diligent about keeping in touch with people,” she says. “When I graduate, I have to keep in touch with them...I need to start building the relationships now.”

Intercollegiate Business Program for Non-Business Students

The Intercollege MBA (iMBA) at Pennsylvania State University is a new online program geared to students who don’t have undergraduate business degrees. Offered by Penn State’s World Campus, the intercollegiate program suits managers with at least three years of work experience.

Group work takes place via asynchronous methods such as bulletin boards, email, and listservs, and synchronous methods such as chat and audio conferencing. Students can also communicate with their peers, professors, and

students in MBA programs of collaborating colleges via the iMBA CyberForum. Overseen by a committee of faculty and student volunteers, the CyberForum offers extracurricular discussions on business and management issues.

Two one-week residency projects require students to visit the campus. The first residency, which takes place during the third term, has students work in groups on case studies and decision-making analysis. The second occurs during the eighth term, where students develop and present strategic plans to a panel of faculty and business professionals.

The 48-credit program spans 8 continuous terms and takes 2 years to complete. The core curriculum covers four business areas: domestic and global economic environments; human behavior in organizations; creation and distribution of goods and services; financial reports, analysis, and markets. The program also incorporates six business themes: leadership, strategic planning, customer and market, information and analysis, human resources, and process management.

Twenty-eight students enrolled in the inaugural iMBA class, which began in September of 2002. The World Campus, which launched in January of 1998, offers several online undergraduate degrees, graduate degrees, and certificate programs to students around the world. For more information, visit <http://worldcampus.psu.edu>. ■

Projects

HPWREN

Besides offering educational opportunities to rural Native Americans and performing network analysis research, the San Diego-based High Performance Wireless Research and Education Network (HPWREN) offers field researchers high speed Internet access and the chance to remotely observe environments – sending and receiving data at the rate of 45 megabytes per second – in real time.

HPWREN's opportunities have had a significant impact on three fields: astronomy, ecology, and geophysics. Researchers no longer have to physically travel to locations for observation, are able to collect research from inaccessible

locations, and can now use high-bandwidth instruments, such as high-resolution still cameras and digital video systems, to measure and monitor environmental systems and wildlife. "HPWREN (as well as other wireless networks like HPWREN) allow people from around the world to access remote field sites in real-time - without straying from their desktop," says Kimberly Mann Bruch, a researcher at HPWREN. "Wireless networking technology also allows students in urban classrooms to experience the same ecological marvels as their rural counterparts."

Rolf Baumberger's field research on hummingbirds, bees, and moths is just one example of the

Left: Cameras linked to HPWREN at the Santa Margarita Ecological Reserve allow scientists and educators to catch a real-time glimpse of a biologically diverse area where coyotes roam, golden eagles next, and hummingbirds sip nectar.

Middle: Pots of bush monkey flower and a hummingbird feeder in southern California are studied by Rolf Baumberger, a biology researcher in Switzerland.



San Diego State University's Field Station Programs (SDSU FSP) Remote auto-imager that is part of the reserve's sensor network.



SDSU FSP Staff



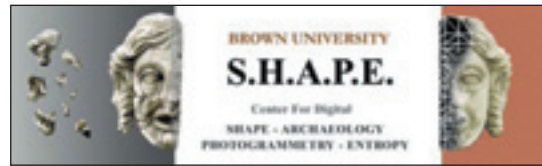
possibilities HPWREN opens for ecologists. For the past year, the biology researcher at the University of Zurich in Switzerland has been remotely studying hummingbirds at the Santa Margarita Ecological Reserve (SMER) in order to determine their role in the pollination of the bush monkey flower, *Mimulus aurantiacus*.

“Every hour of the day, a camera photographs pots of bush monkey flower representing each color of subspecies [red, orange, and yellow] as they grow and bloom - as well as a hummingbird feeder, as it encourages the hummingbirds to feed at the camera's location. From Switzerland, Baumberger can observe the flowers' rates of growth and see how often the hummingbirds feed at the site. Once the flowers bloom, the feeder will be removed, and Baumberger's team will begin observing the hummingbirds' decisions about which color of flower to feed from. This data will help him track the rate of hybridization among these California subspecies.” (<http://hpwren.ucsd.edu/news/020415.html>)

HPWREN provides Baumberger with real-time access to SMER's high-resolution still camera. “Delivering more than three megapixels per image,” describes HPWREN, “the connection of the camera to the Internet allows us to capture the wing of a hummingbird in flight.”

Other examples of scientists utilizing SMER will be soon available at HPWREN's Web site, <http://hpwren.ucsd.edu>. Bruch is currently interviewing nearly 40 field scientists, and will post her interview results in the upcoming weeks.

HPWREN is connected to SMER, the Mount Laguna Observatory, the Palomar Observatory, and the earthquake sensors at the Borrego Valley Downhole Seismic Array.

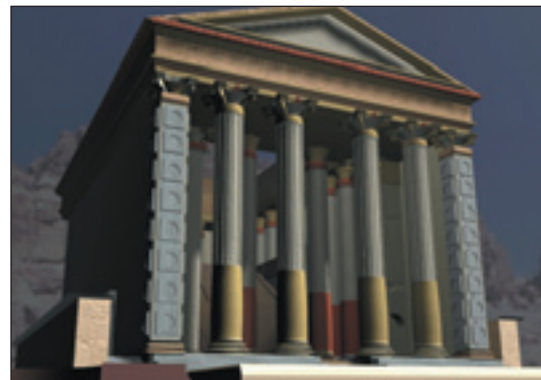


Eileen L. Vore ©1999.

SHAPE

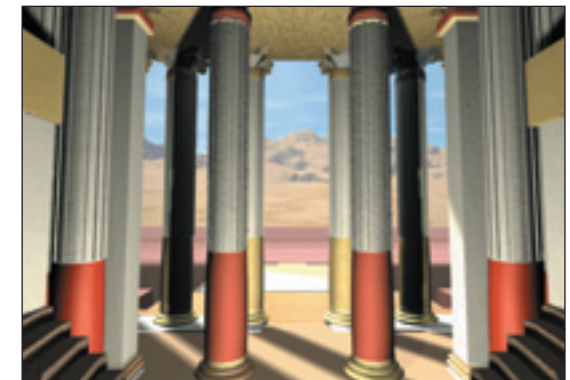
Researchers in engineering, computer science, applied mathematics, archaeology, art, and anthropology are working together at Brown University's SHAPE (SHape, Archaeology, Photogrammetry, Entropy) Lab to develop new forms of computer modeling and reconstruction software. Several projects are currently underway: SHARP, STITCH, STYLE, ARCHAVE, and MIRAGE.

One of SHAPE's latest achievements was the creation of a life-size 3D model of the Great Temple in Petra, Jordan – a site under excavation for the past ten years. With glasses and a hand-held mouse, archaeologists can now explore the reconstructed site in Brown's 8 x 8 foot immersible virtual reality room, known as the CAVE. A desktop version is under currently development. “It is hoped that we



By E. Vore, N. Ratford & A. Walsky – June 2000.

A view at the preliminary 3D reconstruction (temple proper) of the Great Temple in Petra, Jordan.



By E. Vore, N. Ratford & A. Walsky – June 2000.

Snapshot from inside the Petra Great Temple.

will be able to have an archaeologist use virtual reality to look at an area under excavation as if that person was actually there and to make precise geometric measurements of small artifacts and large structures,” says Martha Joukowsky, one of eight principal research collaborators and a professor at Brown's Center for Old World Archaeology and Art and Department of Anthropology.

New software that will allow archaeologists to model, recover, assemble, and reconstruct archaeological sites, structures, and artifacts – perhaps even humans and animals – is also in the works. “Other major applications of the work are to use computers to reconstruct models and images of objects in their original conditions from images of found artifacts, categorize reconstructed objects into like groups, relate them stylistically, and compare them to similar objects found at other sites,” says David Cooper, Director of the SHAPE Lab and Professor of Engineering. “This technology could also help archaeologists determine where objects originated, and trace both ancient trade routes and the stylistic influences between sites.”

The software will eventually be able to recover 3D free-form objects and selected scene structures from digital photos and video. "In essence, the project is looking at new approaches for handling huge amounts of complex image data from single images or from video of complex freeform shapes in order to build three-dimensional models," says Dr. Frederic Fol Leymarie, Manager of the SHAPE Lab.

SHAPE is funded in part by the National Science Foundation of the USA (NSF), under grant ITR-0205477, directed towards difficult computational problems requiring multidisciplinary approaches. For further information, visit <http://www.lems.brown.edu/shape>.

TRAILS

Training and Resources for Assembling Interactive Learning Systems, or TRAILS, was launched by SRI International's Center for Technology in Learning



last fall. The project aims to address needs in K-12 education by helping undergraduate students develop high-quality K-12 software.

TRAILS performs educational research on how children engage in deeper problem solving, reflection, strategizing, generalization, and communication. Using this knowledge, TRAILS provides training and resources to undergraduate computer science and education students in order to help them develop interactive learning systems. Students in the program study a series of TRAILS modules, which focus on mutual understanding of educational requirements, shared elaboration of designs with modeling tools, building prototypes from components, and field-testing prototypes. SRI International provides

three resources for co-designing the classrooms: tools for designing and prototyping educational software, shared spaces for design artifacts, and access to a network of pedagogical and technical experts.

In addition to gaining an appreciation for interdisciplinary collaboration, computer science students learn how to develop software that meets the needs of K-12 classrooms. Education students learn how to be critical and demanding of educational software, and gain a better understanding of how to use technology effectively in the classroom. TRAILS addresses real classroom needs by involving experienced teachers, complementing the role of textbooks, and aligning content to accepted academic standards.

With the assistance of university partners, TRAILS also designs course modules, publishes online resources, and recruits experienced mentors. Stanford University, The University of Colorado at Boulder, and Drexel University were the first three universities to become TRAILS partners. Students at Stanford and Colorado are currently working to develop prototype educational software and pilot its use in local K-12 classrooms, while The Math Forum at Drexel is publishing the software created by the TRAILS students.

In the future, the TRAILS team will seek university partners to field test the modules developed by Stanford and Colorado, dissemination partners interested in deploying selected TRAILS products through the Web, and middle school math classes to pilot initial TRAILS software. For information on how to get involved, send an email to trails-info@sri.com.

The TRAILS annual report will soon be available at the TRAILS Web site, www.trails-project.org. ■



Education and computer science students participating in the TRAILS program at Stanford University. Students collaborate on educational software projects in actual K-12 classroom settings.