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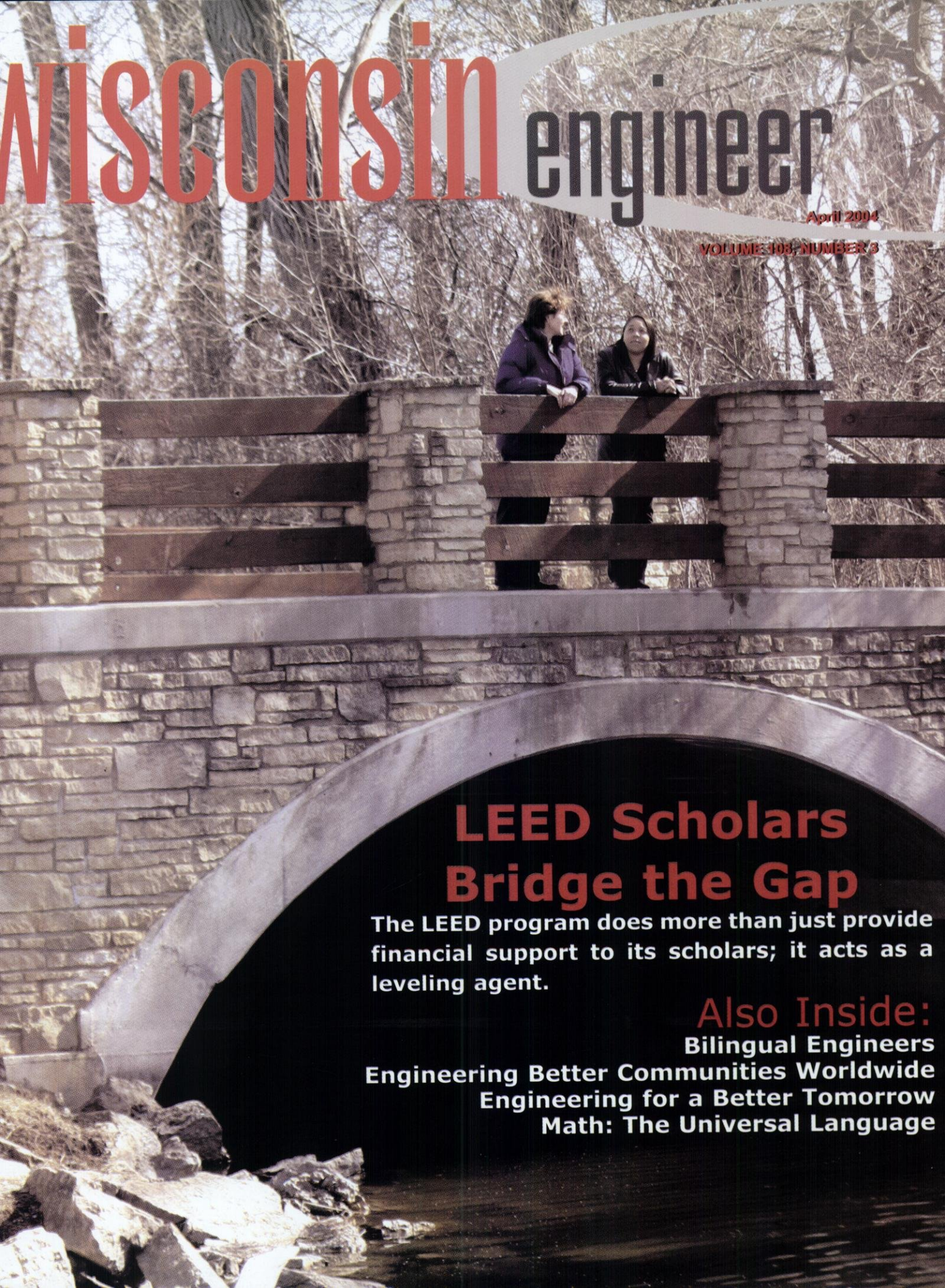
Wisconsin engineer

April 2004

VOLUME 108, NUMBER 3



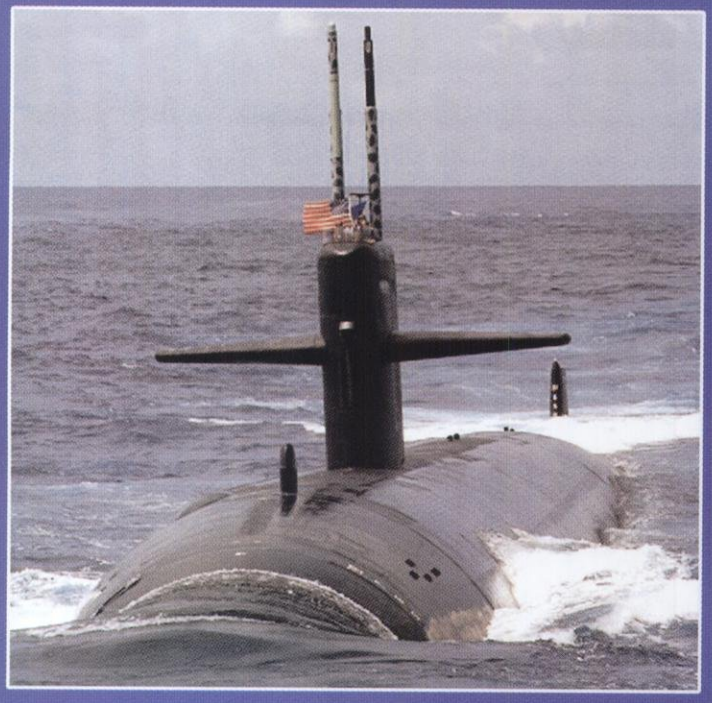
LEED Scholars Bridge the Gap

The LEED program does more than just provide financial support to its scholars; it acts as a leveling agent.

Also Inside:

Not All Engineers work in a Lab . . .

Submarine Officer

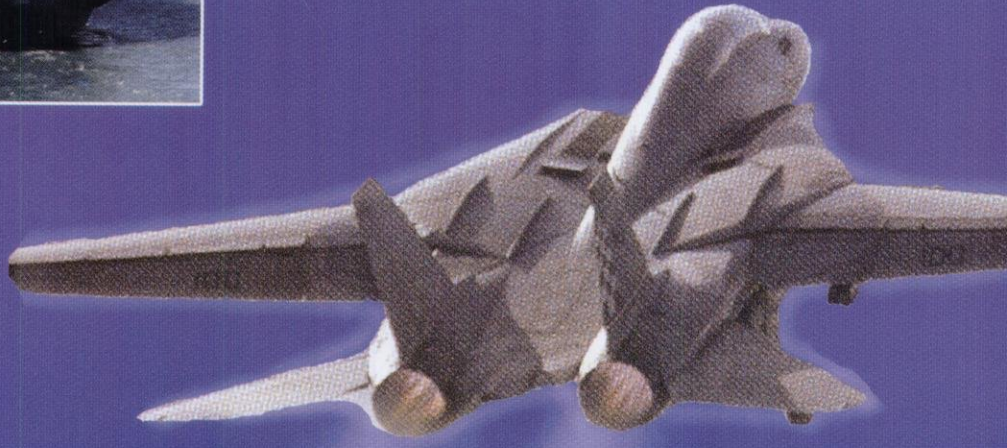


Navy SEAL

Surface Warfare Officer

Why Pay for School?

The University of Wisconsin Naval ROTC is offering full scholarships



Navy Pilot

THE UNIVERSITY of WISCONSIN MADISON

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NAVY

wisconsin engineer

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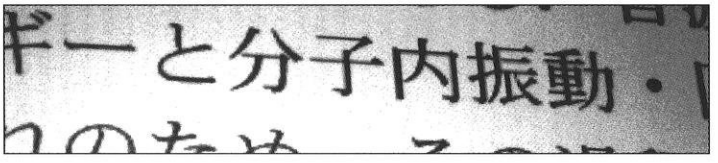
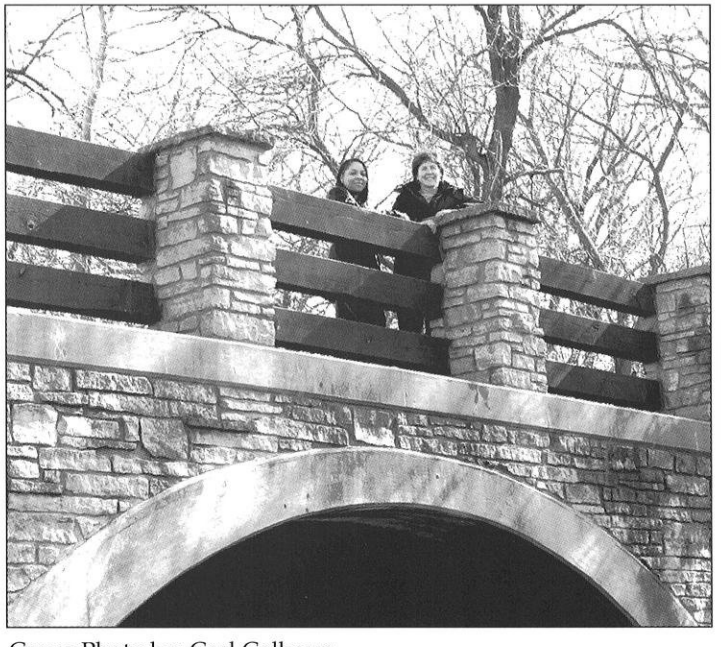
FEATURES



COVER STORY



Cover Photo by: Carl Calhoun

COMMENTARY

EDITORIAL

JUST ONE MORE

www.wisconsinengineer.com wiscengr@cae.wisc.edu (608)262-3494 1550 Engineering Drive Madison, WI 53706

Colleen Kelly,
Writing Editor

Bridging the Gap through Interdisciplinary Learning

Our issue this month focuses on matters of diversity in the engineering community. Diversity is a loaded term, as it can take on a variety of meanings according to the context of application. Often used to characterize matters of race, culture, socioeconomics and other demographic issues, diversity can also be used in terms of education.

Students at UW-Madison are fortunate to have a plethora of coursework options available to them ranging anywhere from the sciences to the liberal arts. In times of rapid technological change and global communication, it is essential for students to take advantage of such perks of higher education, and seize the opportunity to become scholastically well-rounded individuals.

Early in our undergraduate years most agonize over what will be the best academic avenue through which they can impact the world. Upon making this decision, one becomes apart of a specific segment of the academic population. Whether the choice is Industrial Engineering or Communication Arts, it is very possible for students on the UW-Madison campus to encounter the same 50 individuals and types of courses for the remainder of their education. For example, business majors may never venture far past the doors of Grainger Hall, just as some engineers rarely stray east of Randall Avenue.

With this, it is fair to say that choosing a major makes our immediate world a little bit smaller. It doesn't have to be this way. On a large campus with a population of over 40,000 students there is something to be said for recognizing a familiar face. Although being outnumbered is an intimidating experience, the benefits of moving out of our academic comfort zones far outweigh the temporary moments of uneasiness that result.

We have our own little "melting pot" of majors right here on the Engineering campus with the Technical Communication certificate program. Because it attracts students from a variety of majors, the curriculum encourages students to interact and share their diverse range of knowledge with one another.

Some students may be English majors or strong writers looking to channel their abilities into a scientific field, while others are scientists looking to hone their ability to clearly communicate their knowledge. Central to the program is the idea that there are practical communication skills that persons from all types of backgrounds must possess.

The program provides different windows of time for each type of major to thrive. Designing a web-site, for example, requires editorial and grammatical ability for content, and a technical-savvy individual for design. The Technical Communication program is an example of how it is possible to bridge the gap between two seemingly unrelated areas of academia.

The moral of the story is that while there is not a single academic path that leads to success, students who are able to both understand and articulately express themselves in a variety of subject matters are well-equipped to emerge as leaders in society. The most effective communicators of the future will have a quality education such that it incorporates a combination of academic content.

The process of crafting higher education is similar to that of ordering from a menu at a restaurant. Although we must commit to an entrée, there is nothing in place to prevent us from choosing the appetizer sampler as well. Students should satisfy their appetites for learning by taking on and embracing something new rather than giving into the temptation of the familiar.

Colleen Kelly

THE UNIVERSITY of WISCONSIN MADISON

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ASM

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The *Wisconsin Engineer* magazine, a charter member of the Engineering College Magazines Associated, is published by and for engineering students at UW-Madison. Philosophies and opinions expressed in this magazine do not necessarily reflect those of the College of Engineering and its management. All interested students have an equal opportunity to contribute to this publication.
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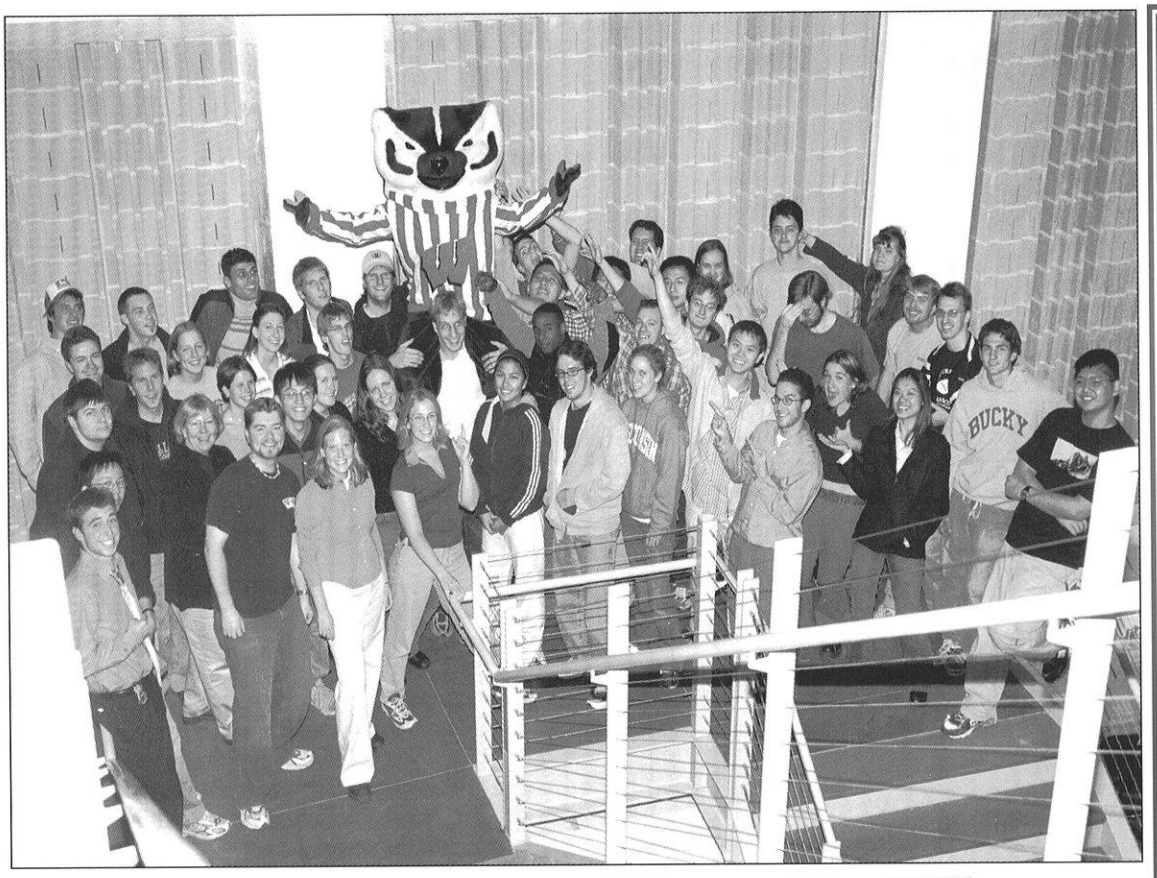

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BILINGUAL ENGINEERS

A True Asset

By Jonathan C. Hedstrom

For more than 10 years, Japanese companies have held at least half of the spots on the U.S. Patent and Trademark Office's annual top ten list for receiving the most U.S. patents. Acknowledging this international presence, employers know they need more than an army of English speaking engineers.

According to Professor James L. Davis, Director of the Technical Japanese Certificate program at UW-Madison, globalization and the information revolution have created an environment where "everybody is selling to everybody. There is so much information being exchanged that someone needs to understand the design specifications and benchmarks." Without the ability to follow foreign innovation and production, American companies are at a competitive disadvantage.

Many of the major players in technical innovation are based in Japan and the U.S. They share resources and expertise in their established fields with others overseas in order to create better, cheaper products. This practice generates the need for engineers who are technically adept in both languages.

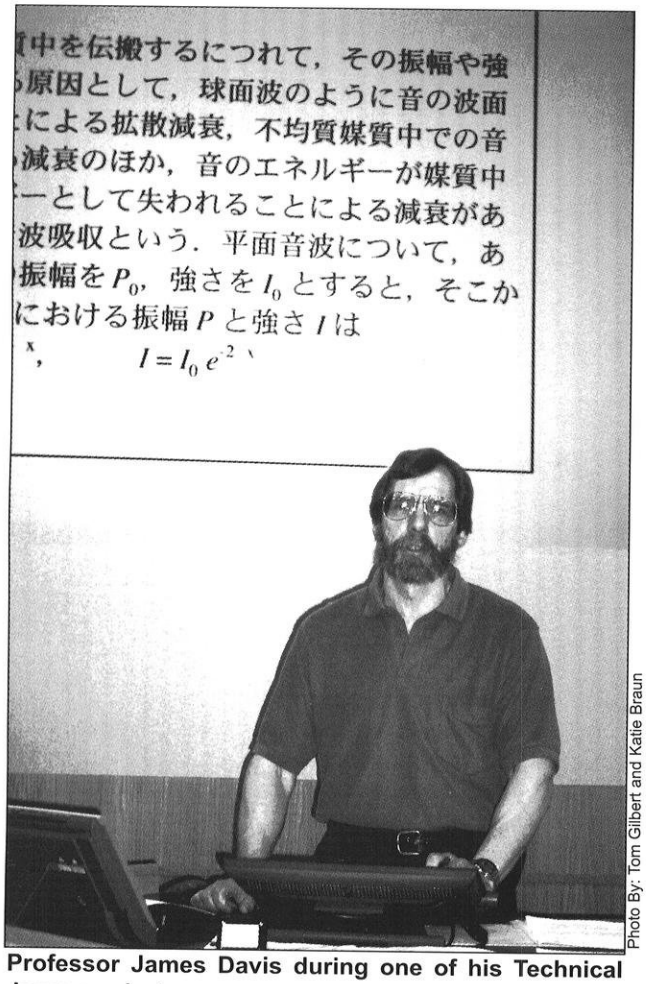


Photo By: Tom Gilbert and Katie Braun

Professor James Davis during one of his Technical Japanese lectures.

Yet to say that Japan and the U.S. are the only players in the global marketplace would be like saying quarterbacks and kickers are the only ones playing a football game. Sure they are extremely important, but as a whole the rest of the world overshadows both. A quick search on Monster.com for multilingual jobs in engineering yields Spanish, Japanese, Mandarin Chinese, German and French as the most desirable. No one is saying that engineers will be turned away from their jobs because of an inability to read the Japanese title to this article, but bilingual employees can fill a niche that is not likely to be endangered by volatile markets and changing times.

"American companies either directly or indirectly, through ownership of other companies, have a presence in every major market in the world," says Davis. A great example is General Motors, which owns part of Suzuki, a Japanese company. Suzuki, in turn, has facilities in other countries. Corporations like General Motors are able to increase their profit margin by designing one product and distributing it globally. And in order to ensure foreign regulations and laws are met, multilingual engineers are essential to understanding these standards.

The ways products are developed, designed and manufactured in these companies are becoming more and more cooperative between international counterparts - especially in the electrical, automotive and chemical industries. Achieving this interconnectedness is a daunting task run on the skill of multilingual employees. For those corporations able to overcome the barriers, the benefits are quite clear: profits. A key factor in increasing profits is minimizing cost of production. This is why proficiency in Mandarin Chinese is quickly becoming a desirable asset in the workplace. The low-cost manufacturing that China is able to provide is now a driving force in the production of many of today's commodities; it allows many businesses to succeed in the fiercely competitive global marketplace. A five minute "Made in China" scavenger hunt shows just how pervasive this practice is.

A quick search on Monster.com for multilingual jobs in engineering yields Spanish, Japanese, Mandarin Chinese, German, and French...

Because of the overall positive outlook on growth and the current large share that China holds in manufacturing, Davis hopes to have a program in technical Mandarin running at UW - Madison in five

years. It will likely be the first one of its kind in the country. Creating such a program is a daunting task; there are no course books, and there is no precedent to follow.

These programs seem essential to Lindsey Addison, an Industrial Engineering major who is also earning the Certificate in Technical Japanese. "You don't really get exposed to technical lingo in regular foreign language classes, she said. "And as an engineer, if you tell your employer that you can speak a foreign language, I think the day will come when they ask you to prove it by translating a technical document for them, and it would be good if you can actually do it."

With an upcoming six month internship in Japan, Addison will surely be tested on just that. She will be working in marketing for a mobile communications company, through a program sponsored by the Japan External Trade Organizations.

Traveling to exotic lands, discovering new cultures and gaining marketable skills are just a few of the benefits of becoming a bilingual engineer. And because of businesses' desire to trade in foreign markets, there are, Davis says, "more opportunities for international jobs than ever before. It's just a matter of who's going to get them."

Author Bio: Jon Hedstrom is a freshman majoring in Electrical Engineering and Physics. With all of this extraordinary scientific knowledge, he hopes to finally understand why in the near future.

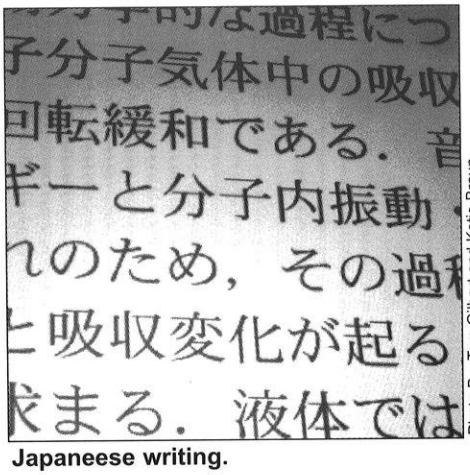


Photo By: Tom Gilbert and Katie Braun

Japaneese writing.

Japanese to English Translation

〔従来の技術〕

メモリチップにパイプラインレジスタ（もしくは、ラッチ）を設け、チップ内において処理中のリクエストとは別に相前後して発せられたリクエストのアドレス／書込データ／読出データ等を保持する半導体メモリが開発され、レジスタ付メモリ或はパイプラインメモリと呼ばれている。これにより、メモリへの外部からのアドレス、書込データの供給、或はメモリ部での読出データのチップ外への供給を、メモリ自体の書込／読出動作と独立に行うことが可能となり、システムとしてのメモリのサイクルタイムを速くすることができ、メモリシステムのスループットを向上させることが出来る。

更に、アドレスデコーダの入力段からセンスアンプの出力段に至る間にもパイプラインラッチを設け、メモリ自体の書込／読出動作をいくつかのステージに分割することにより、サイクルタイム自体を速くするとともに、分割された各ステージ

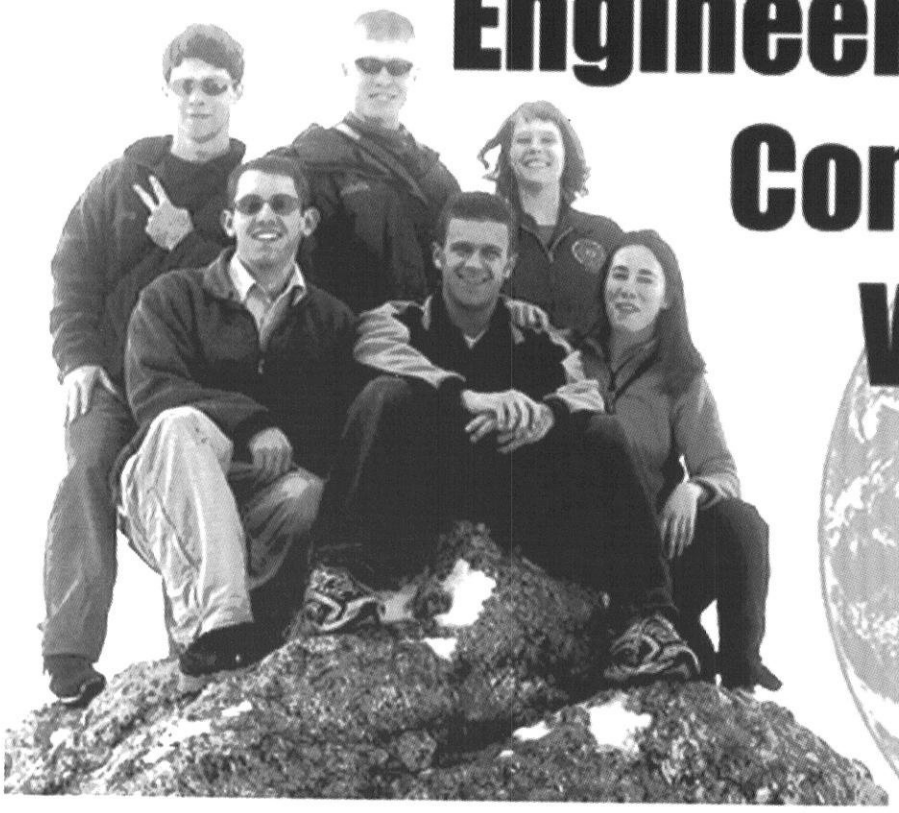
Semiconductor memories have been developed wherein the mamory chip is provided with a pipeline register (or Latch) which stores the address/write-data/read-data, ect., of requests other that the requests being prcessed, which are generated at approximately the same time, on the chip, these are known as register or pipeline memories. By these means, addresses and write-data can be supplied to the memory from the exterior, and data read from the memory can be supplied to the exterior of the chip independently on the read/wtite operations of the memory itself, which can reduce the system memory cycle time and can improve the throughput of the memory system.

Furthermore, a pipeline latch is also provided between the adress decoder input stage and the sense amplifier output stage, and by dividing the read/wrtie operations of the memory itself into several stages, the cycle time itself can be decreased while allowing for processing of each independent request in the various divided stages, and therefore, the throughput of the memory can be improved.

Furthermore, conventoinal memory, known as multiport memory, has been commercialized. This memoty which has a first port and second port, by which reading and writing are performed with respect to addresses provided from the exterior, it is possible to access memory from these two ports at the same time

Photo By: Erik Sua

Engineering Better Communities Worldwide



By Yoon Kim

While many engineering student organizations work on projects that benefit the university and surrounding area, a group new to UW-Madison is concerned with reaching out to needy communities worldwide.

Engineers Without Borders-USA (EWB) is a non-profit organization established in 2000 to help developing countries with engineering needs, such as clean water, adequate sanitation, renewable energy, shelter, housing and appropriate, sustainable technology. According to its website, EWB is also interested in training engineering students to be a new kind of internationally responsible engineer, perceiving themselves as part of the solution to the world's problems. The organization provides an innovative way to educate these engineers about how to address the specific problems faced by developing countries and communities.

Civil and Environmental Engineering Professor Peter Bosscher led the effort to create the new chapter of EWB at UW-Madison. "I see a need for a university like this-an internationally recognized university-to take some leadership for the majority of the people in the world. We need to not only serve the needs of the 1 billion rich but also the needs of the 5 billion poor," he says.

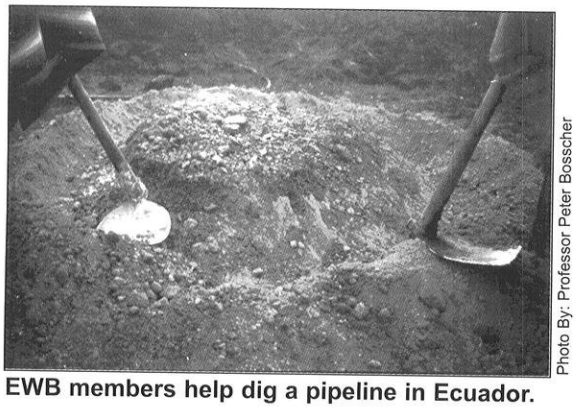


Photo By: Professor Peter Bosscher

EWB members help dig a pipeline in Ecuador.

EWB projects are conducted by groups of students under the supervision of faculty and professional engineers from partnering firms or universities.

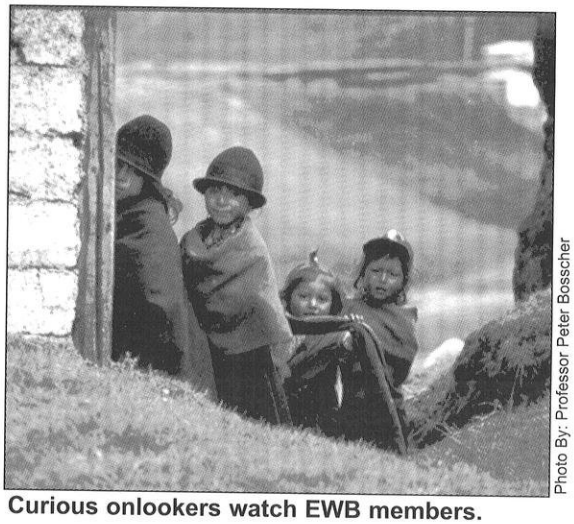


Photo By: Professor Peter Bosscher

Curious onlookers watch EWB members.

"You don't need to have a PhD or a master's degree in engineering to do these kinds of activities," Bosscher says. "But you do have to have a heart and a desire to make a difference."

Currently, the UW-Madison chapter is working on a multi-year project in

Rwanda, in partnership with University of Colorado-Boulder. They will be building a basic potable water supply for a village devastated by the Hutu-Tutsi conflict and AIDS. Bosscher and Andrea Khorospour, a senior in Biomedical Engineering, will travel to Rwanda in March to make preparations for a larger group going in July. The roup will also likely assist in a sustainable land use and housing project in conjunction with the Navajo nation near Gallup, New Mexico. They hope to obtain a grant from the U.S. Environmental Protection Agency to help pay for this work.

We need to not only serve the needs of the 1 billion rich but also the needs of the 5 billion poor.

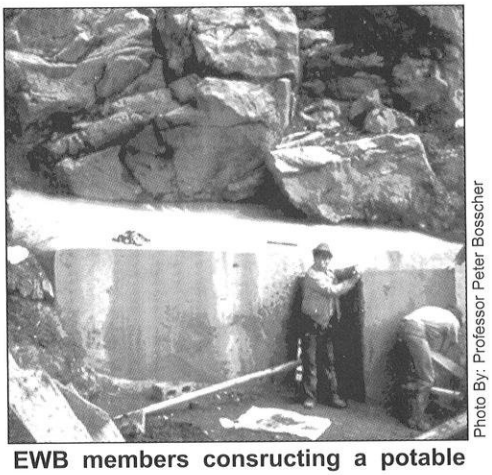


Photo By: Professor Peter Bosscher

EWB members consructing a potable water supply.

EWB has a vision of giving the needy of the world a good quality of life through engineering projects, which they believe will benefit national development in the long term. In order to achieve these goals, EWB still needs a lot of help, particularly in finding more engineering professionals and students who are passionate about applying their knowledge and skills to improve communities. As it continues to grow, the organization will work to make a difference, one project at a time. WE

Author Bio: Yoon Kim is a senior in Electrical and Computer Engineering. He wants to be a passionate engineer who makes a difference in the world, and he would like to thank the photographers, Aaron and Alex, and the production people, Robin and Steve, who worked on the article with him, and especially Prof. Bosscher for his input and time.

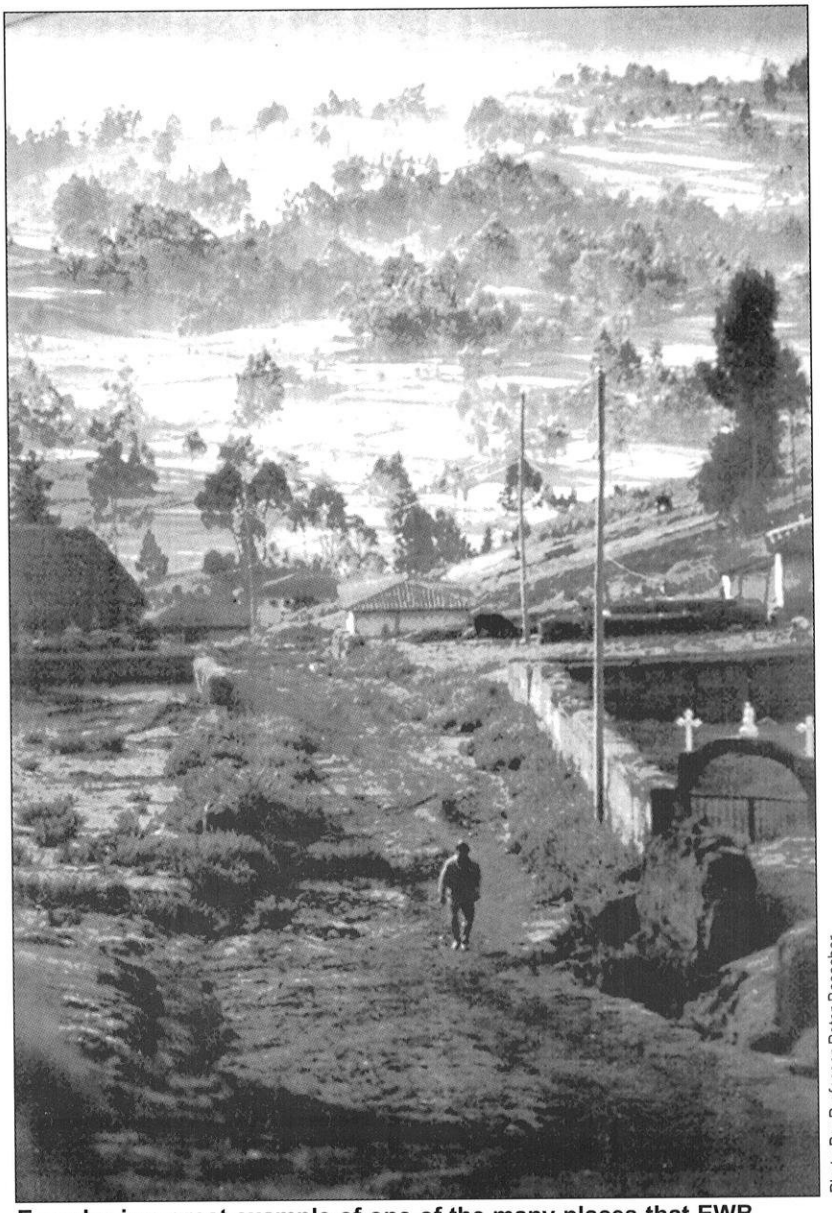


Photo By: Professor Peter Bosscher

Ecuador is a great example of one of the many places that EWB visits to try to make a difference.

LEED Scholars Bridge . . . the GAP

By Jenny Tang

Gabriel Martinez-Diaz was walking to class on the first day of his college career with excitement and anticipation. However, after entering his first class, he began to notice that he was one of only a few minority students, and the only Hispanic male in the class. His excitement quickly declined and he started to feel uncomfortable. Two weeks later he went to his first LEED meeting, and found he was surrounded by many other students who looked like him and had encountered similar situations.

The Leaders in Engineering Excellence and Diversity program (LEED) place one stone in the bridge between students of underrepresented backgrounds and the University of Wisconsin-Madison community as a whole. LEED, formally known as Diversity Affairs Office (DAO) scholars program, is a community of dedicated engineering students who are given access to financial, academic and personal support.

The first step in building a bridge is to draw up the blue prints and determine the purpose of the structure. According to Gwen Ebert, the advisor of LEED, the goals of the program are to bring in a diverse group of students (students of color and women) to the engineering school. Ebert says, "However, we cannot bring them in unless they feel comfortable and have a community of students to be part of and can relate to. We are pretty aware of the climate on campus and the rigors of the engineering curriculum. We are here to help with academic, social, and financial support. We want students to stay, graduate and be cared for and supported."

Most engineering students can understand the rigors of engineering curricula, but not all students are aware of the campus climate for underrepresented students at UW-Madison. Martinez-Diaz and Carrie Haver attest to issues of campus climate and inequalities on the UW-Madison campus. Martinez-Diaz, a senior in Biomedical Engineering and LEED scholar, points out, "The scholarship helps individuals obtain opportunities that our predecessors did not have; this in turn, allow us to reach educational equality."

Similarly, Haver, a senior in Chemical Engineering and fellow LEED scholar, is often confronted by Caucasian students who complain to her that it's not fair that minorities get scholarships. She does not think these students realize how difficult it is to be in a field dominated by men. She responds, "Statements like that just prove why the scholarships for minorities are necessary."

Ebert also feels strongly about misconceptions surrounding why scholarships and other services are provided for underrepresented students. "Some people think of these things as special treatment, when really what looks like an unfair advantage is really only a leveling agent. Students sometimes do not realize the playing field is not level and never has been."

"The scholarship helps individuals obtain opportunities that our predecessors did not have; this in turn, allow us to reach educational equality"

- LEED Scholar

While building this bridge, there seems to be a shortage of workers. According to the Office of the Register at UW-Madison, there are 28,583 undergraduate students enrolled in the Fall 2003 and only 2880 (ten percent) of those students are minority students.

Colleen Atakpu, a junior in Industrial Engineering, believes many minority students entering the college of engineering or any other college at UW-Madison have an automatic disadvantage. Atakpu states, "Some minority students feel that people are going to stereotype them and they have to go above and beyond to prove themselves worthy."

Photo By: Justin Novshek

The staff of the Diversity Affairs Office strives to make the college experience the best possible for all students. In the back row left to right is Kelly Burton, Prof. Douglas Henderson and Signe Knudsen. In the front row left to right Tivona Ali Hill, Gwen Ebert and Melissa Harrell Robinson.

Photo By: Justin Novshek

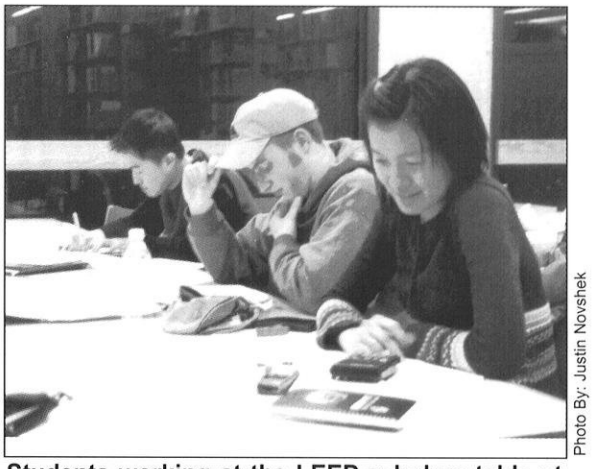


Photo By: Justin Novshek

Students working at the LEED scholars table at the Library.

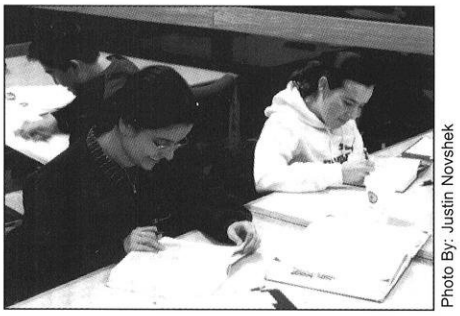


Photo By: Justin Novshek

LEED attempts to bridge the gap by recruiting more high school students of different ethnicities and then keeping those students here. LEED scholars are supported through having more access to tutoring and other resources. The difference is LEED helps funnel a very large campus into a smaller community.

There are a little less than 700 underrepresented students in the college of Engineering, 91 of which receive the LEED scholarship. The amount of money each scholar receives varies, however, the typical amount is $1000 per year. There are a few large scholarships designated for students with certain backgrounds, majors and GPAs.

Universities are not the only institutions dealing with diversity issues. Industry actually strongly supports the LEED program because it complains that Madison does not prepare its students to work in an environment with all types of people that come from different status of life, ethnicities, and classes. In fact, all the funding for the LEED scholars is private.

In an engineering student's college career, there are a few milestones, such as surviving the first year, getting into a department and receiving a co-op opportunity. The LEED program helps students achieve these milestones, and over the past few years more and more underrepresented students reach far and beyond the expectations established by the program. According to Ebert, the percentage of LEED Scholars retained through graduation is comparable to that of the college as a whole.

Students in the program they are required to attend all monthly meetings and maintain at least 2.5 GPA. The monthly meetings usually include speakers, resume building workshops or networking among fellow scholars. Freshmen students are required to attend "study tables" at Wendt Library two or three times a week, where they have the opportunity to receive tutoring and work with other scholars. This can help students make a smoother transition from high school to college during their first year at UW-Madison.

There are a little less than 700 underrepresented students in the college of Engineering, 91 of which receive the LEED scholarship.

Ebert believes the diversity effort on campus is an interesting and difficult problem. In a conversation with Professor Henderson, College of Engineering Dean of Diversity Affairs, Ebert complained about long work hours. The Dean responded, "Well, you have to work until you get the job done." Ebert exclaimed, "It's diversity! When will this job ever be done!" She believes, along with her coworkers, that it will be a good day when they are no longer needed. Until then, Ebert says, the most significant change to the campus climate will come with a much larger percentage of underrepresented students. We

Author Bio: Jenny Tang is a junior in Industrial Engineering. Jenny specifically thanks Gwen Ebert, Advisor, UW Madison and the DAO Staff for their time. Also, this article is a result of some excellent teamwork and collaboration on the part of Justin, the photographer, Aravind and Heather, the production-editors and desginers.

EN&INEERING FOR A BETTER TOMORROW

By Martin Grasse

The sight of handicap accessible accommodations to public building entrances, sidewalks, parking ramps and telephones are usual sights to most people today. It may be somewhat surprising to realize, however, that many of these commonplace adaptations did not exist 12-13 years ago.

On July 26, 1990, Congress passed the Americans with Disabilities Act (ADA). Its purpose is to provide handicapped individuals with access to employment, housing, public accommodations, education, transportation, communication, recreation, health services and voting. This law served as a major impetus for a wide range of engineering innovations that address the accessibility needs of millions of Americans.

The mission of Trace is to advance the ability of elders and people with disabilities to live independently and productively using technology.

Here at UW-Madison, the issue of handicap accessibility is gaining awareness in the engineering community. Two programs, Trace and the University of Wisconsin-Center for Rehabilitation Engineering and Accessibility Technology (UW-CREATe), have been formed with the mission of reengineering designs and processes to improve the lifestyles of the disabled.

The Trace Center was founded in 1971 by a group of undergraduate students including the present director of the program, Dr. Gregg Vanderheiden. "The mission of Trace is to advance the ability of elders and people with disabilities to live independently and productively using technology." Since its inception, Trace continues to thrive. Kate Vanderheiden, program manager of the organization, says that one of the goals of Trace is to develop new accessibility products that are "marketable and profitable."

According to an article written in 1990 by Dr. Vanderheiden, there were more than 30 million people with disabilities in the United States. As the population ages, this number is growing rapidly. Until recently, only a small percentage of engineering teams took this statistic into account during the design process. Instead of endeavoring to make new products as accessible as possible, add-ons were designed later to meet accessibility standards. Consequently, engineers are taking measures to remedy the situation by moving accessibility to the forefront at the point of product conception.

Photo By: Phil Wilkes

Senior Design students demonstrate the previous generation of the plane wheelchair that they are working to redesign and improve.

Over the years, Trace has pioneered technology in many fields, including augmentative communication, computer access, and telecommunications. In fact, Trace was one of the first organizations nationwide to work in the field of augmentative communication. The organization developed a device to help a child with cerebral palsy communicate more effectively.

Trace has also led the way in developing many accessibility features used today in mainstream computer operating systems (OS) such as Windows and Apple. These features are included on every operating system package sold, and are designed so that if a user does not need them, they are not noticeable. One of the most prominent of these OS features is known as "StickyKeys," which permit the computer user to press each key separately when performing a multiple key operation. However, if any two keys are simultaneously pressed, the function disables itself. This innovation allows individuals with motor impairments to use keyboards effectively.

Today, Trace is involved with many other projects, including an accessible cell phone design, a PDA-type remote control that will be able to control almost all electronic devices within the home and around the community, a new voting system using a tablet interface to simplify and increase the accuracy in voting and new accessible ATM machines. With all of these projects,

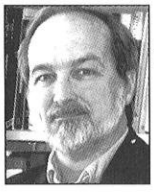
Trace is interested not only in coming up with new technology, but with developing new standards to be implemented industry-wide. Vanderheiden says, "We keep pushing the envelope, showing industry how to do better in terms of accessibility."

Photo By: Philip Wilkes

Students working to redesign the exercise machine (in foreground) used by bed ridden patients.

Similarly, the original mission of UW-CREATe was "to help children and adults with disabilities improve their quality of life while regaining independence, control and productivity." The organization was founded in 2000 by UW-Madison mechanical engineering professors Nicola Ferrier, Frank Fronczak, Jay Martin and the late Terry Richard. UW-CREATe continues to grow and participate in a wide variety of projects, including the addition of mechanical and biomedical engineering professors Heidi-Lynn Ploeg and Darryl Thelen to extend the program to include muscle biomechanics and orthopedic implant design.

One project that the center is involved in is a new design to get wheelchair-bound customers on and off of commercial airlines. "This is the single biggest liability problem that airlines have today," says Dr. Martin, who is working with several sections of the mechanical engineering senior design class.



"We keep pushing the envelope, showing industry how to do better in terms of accessibility."

- Dr. Gregg Vanderheiden

The current design used by airlines consists simply of a chair designed to fit in the aisle of the plane. It involves a risky transfer of the customer from chair to seat. This design has caused numerous lawsuits for airlines across the country. The new design implements a harness system that fits around the torso and waist of the customer. It eliminates the need to "muscle" the passenger back and forth between seats. According to Dr. Martin, multiple airlines are expressing interest in this new design, and UW-CREATe is negotiating with several different corporations about partnerships.

Another new UW-CREATe project could provide a possible solution for individuals with balance problems, especially people with poor vision or blindness. Developed by Professor Paul Bachy-Rita, Dr. Kurt Kaczmarek and Mitch Tyler, the idea is to utilize a "tongue display unit," a device consisting of 144 electrodes placed on the user's tongue.

An attitude sensor is fitted to the user's head. This feeds tilt data to the "display" on the tongue, letting the individual know if they are off-balance. In many of the trials conducted, the user's balance improved significantly. Studies show that if the device is worn for longer periods of time, the effect is a "retraining," so that the individual's balance is improved even when not using the device.

The UW-CREATe team has big plans for their future, including the possibility of a complete overhaul of the powered wheelchair. Today's electric wheelchairs weigh as much as four-hundred pounds. If they break down, they are very difficult to maneuver. This problem is due mostly to battery weight, so the solution will utilize some sort of gas-electric hybrid motor. It will include many state-of-the-art components, including two-wheeled movement and traveling up and down stairs.

Martin sees the work of UW-CREATe as an exciting branch of his field. "This is the human side of mechanical engineering. We are applying ME design to humans as biomechanical systems."

Both Trace and UW-CREATe are actively working to enhance the lifestyles of the elderly and disabled. However, there is still vast potential for more to be done in this field. Each organization has plans for future expansion and ambitious dreams for future work. Says Martin, "It is fun and quite amazing for us to see how much our engineering skills can add to this field. WE

Author Bio: Martin Grasse is a freshman from Woodbury, Minnesota majoring in Biomedical Engineering.

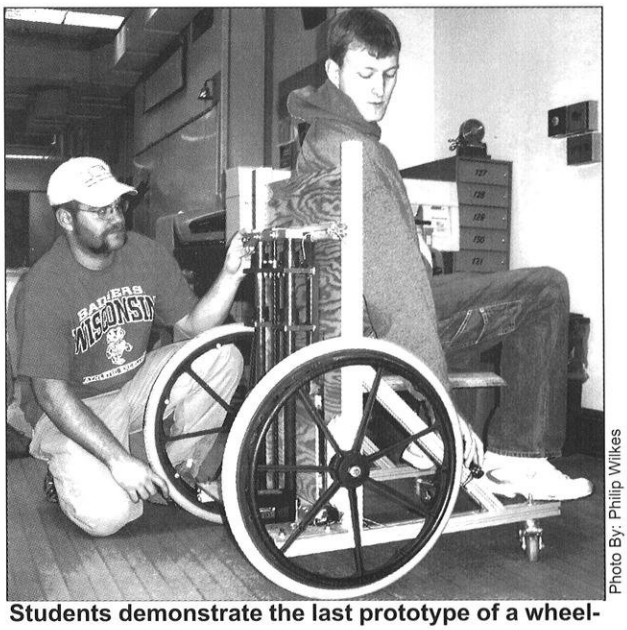


Photo By: Philip Wilkes

Students demonstrate the last prototype of a wheelchair that helps its user stand up.

∫ Math The Universal Language dx

By Sonny Suciawan

Picture this: An international student, "Kevin," attended his first semester at UW-Madison, taking four classes including calculus and literature. He put forth his best effort and worked hard to tackle any obstacles in both classes. At the end of the semester he earned an A in calculus but only a B in literature. What does this mean?

For one, it could mean that language was not a very significant factor when it came to learning math. The situation above illustrates how the language barrier might have little or no effect in the calculus class. Kevin confesses that even though he tried his hardest in the literature class, he struggled to get that B. He could understand what he was supposed to do, but he had a tough time expressing his thoughts in writing. However, calculus seemed intuitive to him and he had an easier time going about it.

Marco Loskamp, a UW-Madison Ph.D. candidate from Germany, says, "You can sit in math classes and, without a profound understanding of the language, follow the lecture." He recalls that during his first few weeks in the United States, it was difficult for him to fluently form sentences in English. However, he quickly overcame that language obstacle in his classes, because he had recognized many of the mathematical symbols and could follow the lecture easily. He is currently a Teaching Assistant in Math 221. Another reason why many international students find it easier to take math classes here is because of greater exposure to advanced math in their home countries at a younger age. UW-Madison student Takako Ichinomiya says that in Japan, most high school graduates already have a very high aptitude in math because they prepare for the university entrance exams every year.

The entrance exam's standard is high and the competition tough. To prepare for it, most students receive advanced math education when they are in their teens.

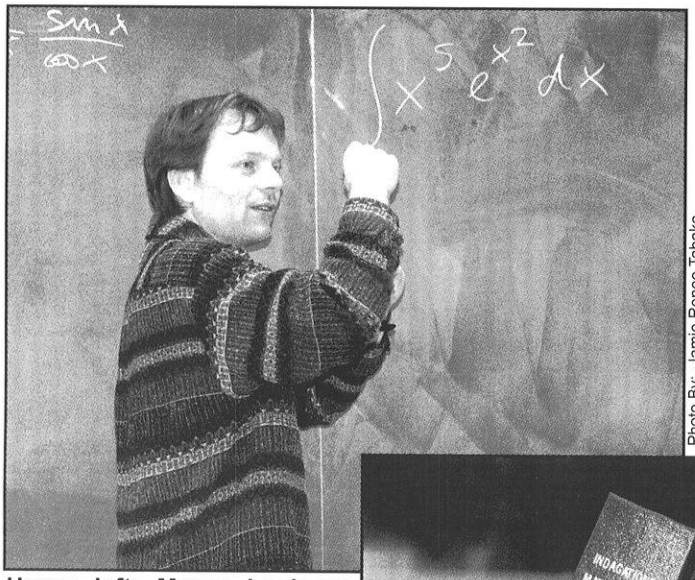


Photo By: Jamie Renee Tabaka

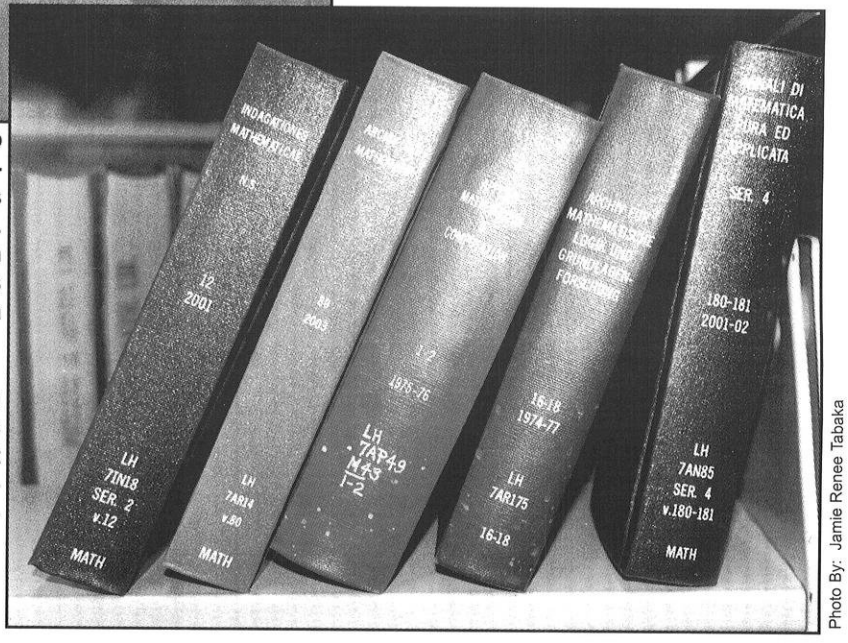


Photo By: Jamie Renee Tabaka

Upper left: Marco Loskamp stands poised at the chalkboard ready to instruct his students about integration. Although he was born in Germany and English is his second language, he is a capable TA for Math 221.

Lower right: The Stephen Cole Kleene Mathematics Library houses many different types of mathematics textbooks including many in different languages.

The reason why many international students find it is easier to understand a math class rather than a history class in a foreign language is that one can view math as a separate language. It has its own symbols, vocabulary and sentence structure. Formulas cannot be rearranged in any order and still make sense. They have to follow certain rules, order and structure so that the person reading them understands what is being conveyed.

The language of math is unique in that it is incorporated into languages around the world. For the simple equation 1 + 1 = 2- read as "one plus one equals to two" in English - there are hundreds if not thousands of ways to write or say it in other languages. In Mandarin it is pronounced "yi jia yi deng yu er," in Spanish it is "uno más uno iguala a dos" and in Indonesian it is "satu tambah satu sama dengan dua." Hence, the simplest equation has an identity in four different languages. Though the way it is pronounced and written in different languages may not be similar, when written mathematically it is the same throughout the world. This makes math a very common knowledge that people from different cultures share.

Ichinomiya was my classmate in calculus when I was a student at Edgewood College. One thing that always fascinated me about the way she went about her class work was that instead of buying the textbook the instructor recommended, she used a Japanese calculus textbook as reference. She says that the textbook seemed to explain the concepts more clearly compared to the one that the instructor recommended. She also had little or no difficulty applying what she had learned from her Japanese textbook to the exams.

One way to explain the relative ease of transitioning math between different cultures is to note that it has been important worldwide. From the Babylonians' use of the sexagesimal number system to record financial transactions in 30 000 BC to the abacus used in China in the 14th Century Yuan Dynasty to the current use of math in engineering in basically every civilized society in the world, math has always had a significant role in society.

The advancement of a society and its technology heavily depends on math and science. In fact, without math, the world today would be very different. Trade would be nearly imposible, the global economy would be nonexistent and our way of life would be unrecognizable.

Math's integral role in the world has prompted many to call it the universal language. However, Loskamp disagrees, referring to it as an international language rather than a universal one. He jokingly noted, "If math were universal, then I would like to see someone teach a cow to divide."

With the increased diversity of the population on the Engineering campus, it is important to notice that some people are not used to the way of life around here. However, as someone who was in that position three years ago, I'd have to say that it was easier to make that crossover in math. After all, 1 + 1 is still equals 2 everywhere. we

Author Bio: Sonny Suciawan is a senior in Industrial Engineering. He fights an uphill battle daily against the temptation of not attending class and keeping awake when he does. You can spot him nodding off at an IE class near you.

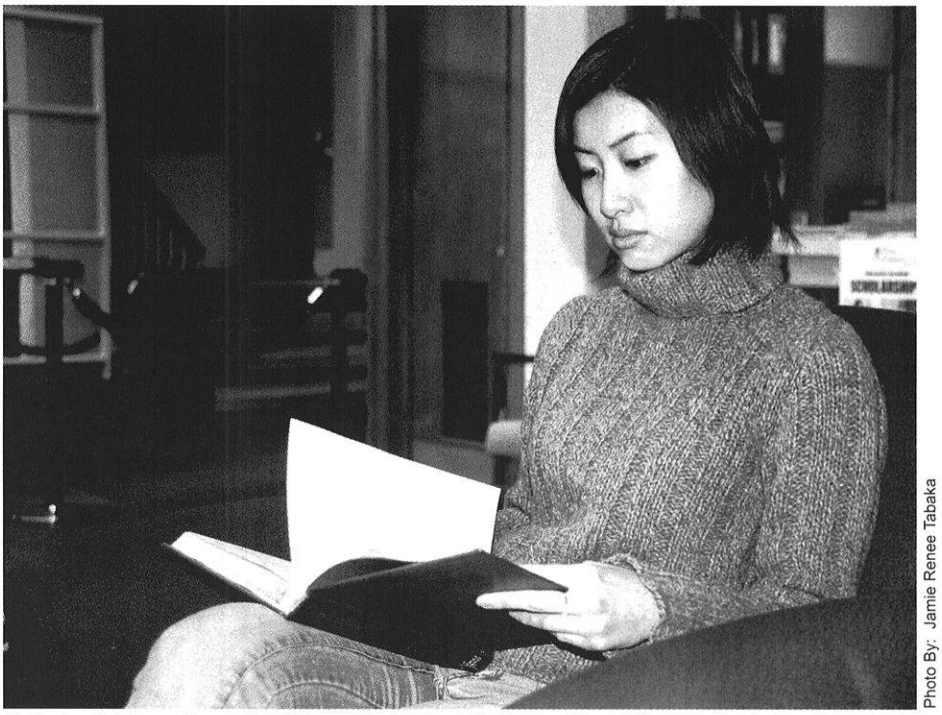


Photo By: Jamie Renee Tabaka

Takako Ichinomiya sits diligently in the Mathematics Library studying her textbook which happens to be in Japanese. There are many students just like Ichinomiya who use textbooks in their native language.

Study Abroad in the USA

Two Students Share Their Experiences

By Nate Altfeather

At any given time inside the buildings of the engineering campus, there are students from all around the globe. Often, however, this environment goes unappreciated amongst the rigors of engineering curricula. The conversations that take place between many American and international students are limited to questions regarding tomorrow's homework.

Hopefully this article will make up for some of that. This article stems from an interview of two students, Stephanie Budijono, a Chemical Engineering student from Indonesia, and Edwin Chiu, a Nuclear Engineering student from Hong Kong. In the next few paragraphs, both students share their experiences being away from home while studying abroad in the USA.

High School

Stephanie's family is from Indonesia, but she attended high school in Singapore. When asked about her reason for leaving home to attend high school, Stephanie said, "The English courses are better there." English is a very normal part of primary and secondary education overseas. "We knew our ABC's by the time we were 4 or 5," Edwin said.

Both students thought their pre-college education seemed to prepare them best for mathematics. Regarding college entrance exams such as the ACT or SAT, both Edwin and Stephanie agreed that the English sections are toughest. Such difficulty is often reflected in the distribution of the scores.

"It is not uncommon for students to score 800 [perfect] on the math and 400 on the English," Edwin said.

Why the United States? Why UW Madison?

At the end of high school, students at Edwin's school in Hong Kong take an "A-level" exam. The score of this exam determines students' options for higher education. "The score restricts students' options for what university they can attend. Also, once you choose a major you cannot change your mind."

This is one of the reasons that Edwin chose to come to study in the United States. "When I graduated high school, I was undecided, and I did not want to choose," Edwin said. He likes that higher education in the United States is structured so that one is able to try many things before committing to a major.

"It used to be that a parent sends their child to the United States for college expecting they won't come back," Edwin said. In the past, the most common reasons for attending college in the United States were quality of education and job security after graduation. However, both Stephanie and Edwin agreed that times are changing. Many students now return home for work, especially since many engineering jobs are heading over seas.

Stephanie said that she looked on the Internet for engineering schools in the U.S. and saw that Madison was one of the top four. "One of my sister's friends came here, and she liked it," she said.

It is expensive to come to school in America from another country. Stephanie and Edwin agreed that it is a luxury to be able to study in the U.S. "We are very lucky to have such good parents," Stephanie said.

It is important to recognize, though, that not all international students are here because their families can afford it. Some students are on state-sponsored scholarships, while others have worked hard to get here on their own.

What are the hardest things to get used to?

Edwin finds it strange that everything is closed by 9 p.m. in Madison. "In Hong Kong, people work from nine in the morning until nine at night," he said. "At 9 p.m. things just begin to pick up. There is no such thing as bed time. On weeknights people stay out until one or two in the morning. If you say you are going home to bed at eleven, people will think you are

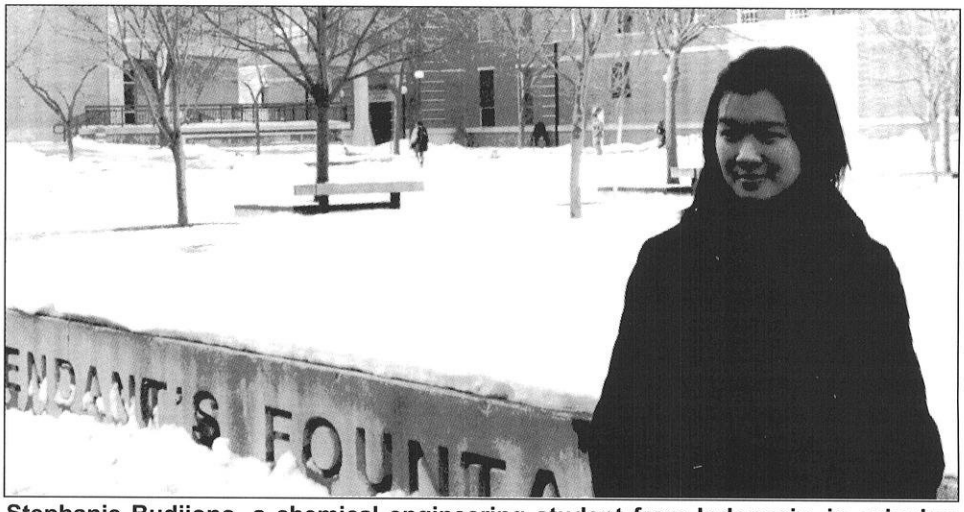


Photo by: Jon Newell

Stephanie Budijono, a chemical engineering student from Indonesia, is enjoying another cold Wisconsin winter.

sick." Such a difference in bedtime routine explains the large number of international students at the computer lab at 1 or 2 a.m. on weeknights.

The biggest shock for Stephanie was the workload. She felt quite overwhelmed when she first arrived. "At first I was nervous about going to ask help from a professor. I was afraid I would ask about something I should know, or I would bother him," Stephanie said. "But when I did go get help, the professors were so open and happy to meet with me."

Both students have experienced difficulties with the language differences. "I usually understand the main point, but I don't get analogies or expressions that we don't learn in English class," Edwin said. He relies quite heavily on studying the textbook and notes after lecture. He also finds it difficult when other students laugh at something in lecture, and he doesn't understand the humor.

Both Stephanie and Edwin say that sometimes they are nervous about hanging out with American students because they are afraid they won't be able to follow the conversation and "get the jokes." They are also concerned about asking questions that might sound silly.

"I never had a fortune cookie until I came to America"

-Edwin Chiu

Another result of language differences is the fact that many international students have an American name as well as their birth name in their native language. "Some children have both an English and Chinese name on their birth certificate, but this only happens in more English-influenced places," Edwin said. "Some students don't use an American name to preserve their culture. Those of us with American names are used to them because we have used them in English classes back at home. On exams we must write our real name because that is how we are registered at the university."

According to Edwin, learning cultural lessons is just as valuable as what is learned from the textbook. When he was a freshman, it took him a while to adjust to the speed of conversation as well as the "Wisconsinite" accent. "Adjusting to the different accents is an important part of the learning experience of studying abroad," he said. "If I were to travel to Britain I would not understand them, now that I have gotten used to the Wisconsin accent."

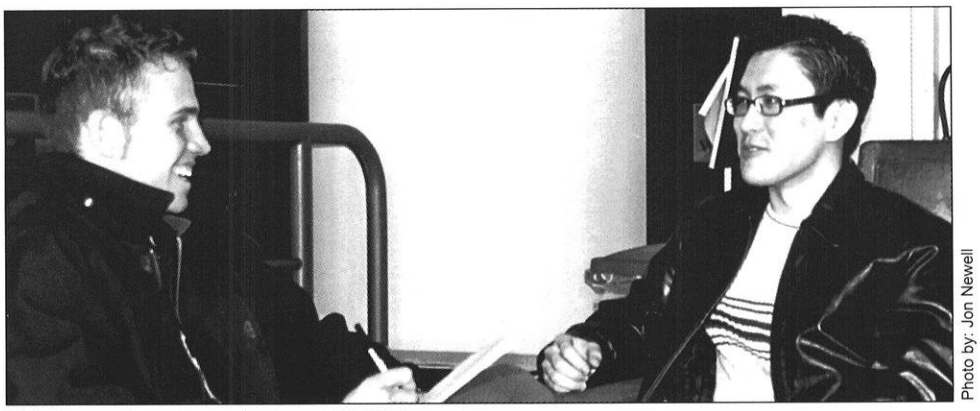


Photo by: Jon Newell

Edwin exchanging stories with Nate.

Socializing and Entertainment

Edwin and Stephanie agree that it is not part of their culture to party as much as many American students do. Edwin added, "It is also a feeling of responsibility to my parents. They are supporting me to be here and I don't want to waste it." Instead of going to the bars, Edwin and his friends usually get together for dinner and conversation. "Sometimes we do go to the bars, just not as often," he said.

Edwin encourages other incoming international students to ask for help when they are struggling. "It is hardest the first time to ask for help but it gets easier each time, and your confidence grows" he said. Still, getting together with others who speak the same language helps Edwin relax. Consequently, he tends to spend his free time with other international students.

Stephanie said most of the international students she knows date people from their own cultural group, adding that if she called home and told her mother that she had an American boyfriend, her mom would say, "Are you sure?"

However, Edwin points out that American and international students face many of the same dating issues. "In Hong Kong you can find people who are very traditional when it comes to dating, and you can find people who are more westernized," he said.

Food

The lack of "fresh" food is a significant change Edwin has had to get used to while studying here. He asked, "Do you know what I mean by fresh chicken? When I was a kid I remember going to the market with my grandma and seeing a live chicken. One hour later I was eating it."

Edwin said that American food is much higher in calories than his traditional Cantonese food. "Hong Kong is very unique in the fact that it is right next to the ocean but also has a lot of livestock," he said. Hence Edwin eats a lot of fresh fish and chicken.

He added that his diet might surprise many Americans. "American Chinese food is not the same as Chinese food in China, but food is always different around the world. Even McDonalds is different in China because it caters to the differences in market tastes," he said. Interestingly, Edwin had never had a fortune cookie until he came to the United States.

Both Stephanie and Edwin are very happy with their education at the UW and their time in the U.S. In the end, when I asked about the number one thing each would change, both replied, in unison, "The cold!"

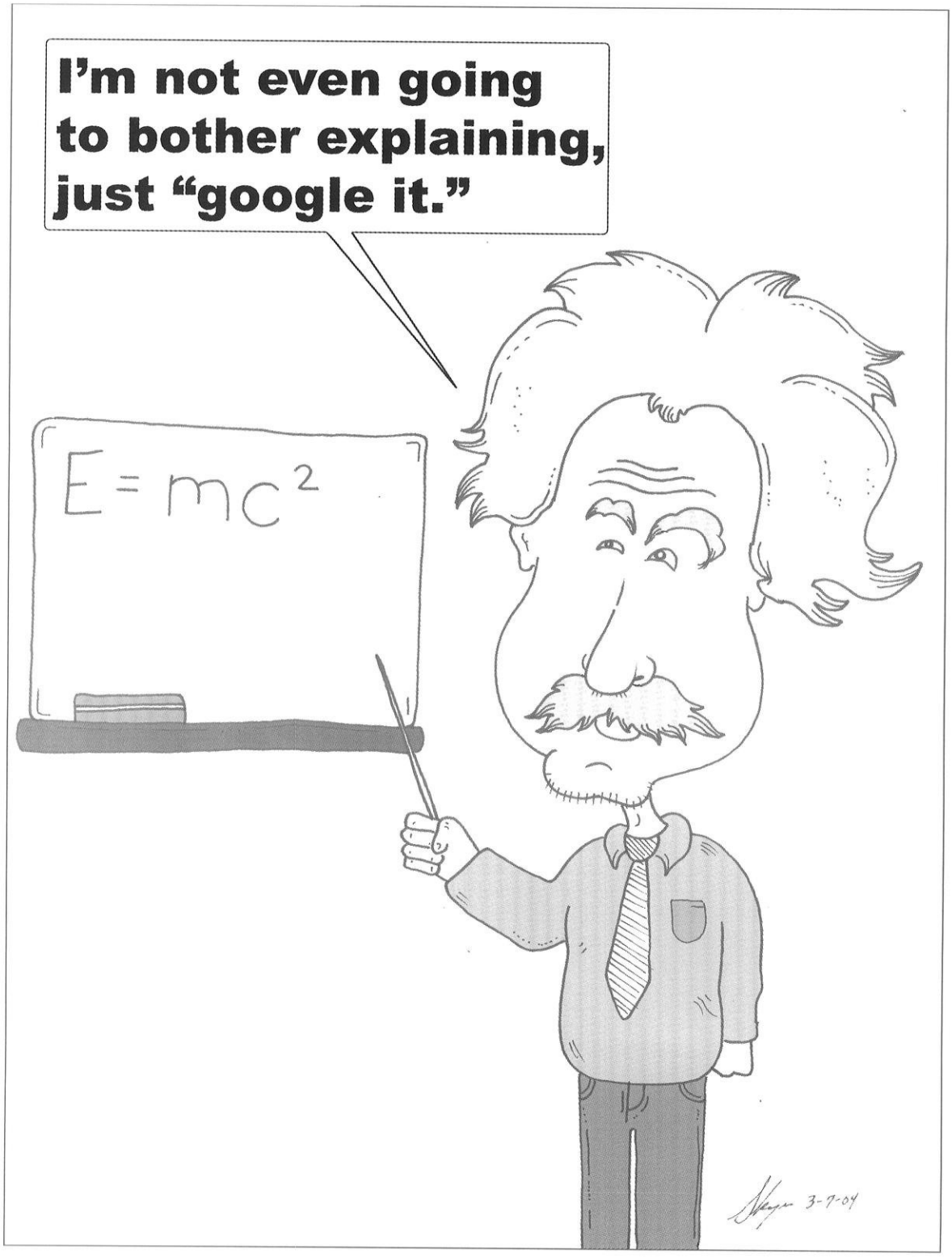
I really enjoyed talking with both Edwin and Stephanie. In some ways it was like traveling to new places without the price of a plane ticket. I encourage every engineering student to take the time to allow their next conversation with an international student to involve more than logarithms and variables. we

Author Bio: Nate Altfeather is a graduate student studying renewable energy technology in the Biological Systems Engineering Department. Nate will graduate this semester from the Technical Communication Certificate Program. This is his first article for Wisconsin Engineer Magazine.

Just One More

the finest in eclectic humor

By: Skye McAllister



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