Summer School

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It is the age-old first week of school assignment: “Write a short paper describing what you did over your summer vacation?” For the general public, it is presumed that, even at the college-level, educators get the “summer off,” i.e., that we get a two-month vacation. Neighbors and parents of my children’s friends still regularly act astonished that I have to continue to work over the summer. So we changed this assignment and handed it out to a number of people on campus. Our request: “Write a short paper describing what you did over the summer semester, and how this has helped to renew and reinvigorate you for the coming academic year.”

It is well-known that we can not keep doing the same things over and over and over again without feeling the stress of a run on the treadmill. It is necessary for each of us to find a way to renew our passions for our work, to find new resources and new colleagues, to investigate new interests, to change the view once in a while. We were interested in hearing how people on campus do this - whether it is through living in different locations, going to conferences, hosting people in their labs, or redesigning their courses. Read on and enjoy learning how your colleagues spent their summer months, and hopefully you can be inspired by them for next year. And, for those of you who do manage to take a vacation, we have included a list of novels related to the academic life so that next summer you can read about the campus you have left behind while you relax and enjoy yourself.
I accepted a position of professor in CEE at Georgia Tech in January of 2001. Located at Georgia Tech Savannah (GTS) where all classes are in some form of Distance Learning (DE), I found myself presented with a huge challenge of learning how to effectively teach DE classes. Prior to joining GTS, I started and was President of my own structural engineering consulting firm for over thirty years. Although having been an adjunct professor at Vanderbilt University, teaching classes every now and then, including professional seminars, short courses and lectures, I was not fully prepared for effectively teaching entire courses, and especially DE classes. Actually having no preconceived ideas on teaching allowed me to start with a completely un-biased attitude of what constituted effective teaching. Having no real full time university teaching experience was actually a blessing rather than a handicap!

Since that first class in 2001, I have been researching and developing a class model to improve teaching and facilitate learning of students. My start-up funds were used to purchase streaming hardware and software to use with this model. This past summer not having a teaching load gave me time to concentrate on improving my teaching. Even though the class model was progressing well, I felt something was missing. I contacted CETL for help and arranged to travel to meet with Debra Fowler and Melissa Bachman of CETL to discuss the model, seek their input on how to improve it, and help find that missing piece. CETL was delighted to spend time with me and were very encouraging. They supplied the missing facet to the model that was needed! This missing piece was found in two books, *Understanding by Design*, (Wiggins McTighe) and *How People Learn: Bridging Research and Practice*, (National Research Council). These books were read and studied over the summer and allowed me to refocus my teaching style by using a Backward Design Approach as described in *Understanding by Design*.

Over the summer and with CETL’s assistance, I improved the model and prepared for fall teaching using what had been learned from reading the above mentioned books. The model that has evolved incorporates streamed asynchronous on-time, on-demand lectures that replace conventional class “chalk and talk” lectures. Synchronous (live) class time is then spent solving problems, interacting with the students, discussing aspects of the previously viewed lectures – similar to a problem-based learning
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- Requires uncovering,
- Has potential for engaging the students

Once the content is set, then individual units are determined that specify detailed course materials.

Also as part of the model, CETL helped me to prepare assessments of student learning and performances. A performance rubric was developed as a tool to assist in the assessment process. Tests, exams, answers to questions in the live classes, and performance on homework are used along with the rubric to assess student learning and understanding.

Without having time this past summer to work with CETL on this approach to teaching, it would have been much harder to incorporate CETL’s suggestions in the class model. This past summer’s work has been put to full use this semester in a graduate class. To date, using the model and teaching according to Understanding By Design, more material has been covered, and covered in more depth than when the course was taught not using the model. Assessment of students’ work shows that they truly understand what is being taught. Also the students like having on-time, on-demand lectures. They also like the live class time that allows discussion and deeper understanding of the material.

I have found that using the model and approach as suggested in Understanding by Design has improved my ability to reach and teach my students. The combination of a synchronous, on-time, on-demand lectures plus interactive class time works well. It allows students to view and understand material before coming to class. Class time is spent “going deeper” into the material and applications of the material. Even though this model was conceived for DE classes, I am finding it works with conventional classes equally as well.
Summer for high school teachers is typically thought of as a time for rest and relaxation. After teaching bell to bell for ten long months with usually just one period per day for planning, and concurrently dealing with the academic troubles and personal crises of at least 100 teenagers and their associated parents, dedicated teachers need a complete change of pace during the summer in order to rejuvenate themselves for the upcoming year. However teachers also need the summer to stay abreast with current research and cutting edge technologies, and to plan new and fresh ideas for the classroom. So, instead of heading to the beach or mountains, every year some adventurous Atlanta-area teachers come to Georgia Tech to spend 4-8 weeks in a research lab as part of the Georgia Intern-Fellowships for Teachers (GIFT) program, run by Georgia Tech’s Center for Education Integrating Science, Mathematics and Computing (CEISMC).

What do they gain by trading their summers for academic laboratory work?

Testing the Waters
For the past two years Ms. Solona Hollis, chemistry teacher at Miller Grove High School in DeKalb County, has conducted research in Dr. Martial Talliefert’s lab in the School of Earth and Atmospheric Sciences. In 2003 she became familiar with the lab’s research on water quality and soil analysis, including participating in water sample collection off the Georgia coast. This past summer she returned, bringing along three of her high school chemistry students to study both the effect weather has on the fluctuations of metro-Atlanta watersheds and the long and short-term effects of pollution on these watersheds. The Siemens Foundation supported the expenses of this summer’s project as part of an initiative to encourage minority students to consider science and engineering as a career, and to increase the number of minority students submitting research projects to the Siemens-Westinghouse Competition in Math, Science and Technology.

Ms. Hollis described her experience as an “exhale from kids” and an opportunity to bring true applications of science into her classroom. Each GIFT teacher creates an Action Plan, which is essentially an implementation plan to translate the summer experience into changed classroom practice. After last summer’s experience with high school students in the research lab, Ms. Hollis plans to implement a class research project on local water quality. GIFT also provided her with the opportunity to interact and create an e-mail network with other teachers as motivated as she, and to establish close ties with faculty and students at Georgia Tech. These ties are invaluable for teachers who are constantly scrambling for resources and approachable content experts.

Japan, Math and the Brain
In a GIFT experience much further from home, Ms. Ursula Gordon, a math teacher at Clayton High School in Clayton County, spent six weeks in Japan as a part of her “Materials World” GIFT Fellowship through the School of Materials Science and Engineering. Her research mentor investigates how brain aneurysms can be detected with CT scans, and develops 3-Dimensional models to predict them and allow for intervention before a rupture occurs. Ms. Gordon, who teaches Algebra II and III, plans to integrate the fluid dynamics of physics, anatomy and physiology into her classroom, and has designed...
activities that will place students as a part of a team that studies aneurysms. These activities will bring more of an inquiry-approach to learning in her classroom. According to Ms. Gordon, it is easy for a teacher to “become mundane and stagnant within their training of thought, almost forgetting applications of their subject matter and forgetting how to connect it to real life. Thank you for stimulating my mind, again – this is why I started studying math.”

Microbes and Inquiry
For the second summer in a row Dr. Patricia Sobecky from the School of Biology hosted a GIFT teacher from Tri-Cities High School in Fulton County—biology teacher Mr. Larrando Alexander. During 2003, Mr. Alexander gained an understanding of the microbiological lab protocols used by Dr. Sobecky’s research group, and this summer he supervised a Siemens team of three high school students who were conducting research on antibiotic resistant bacteria in water sources. The experience was a challenge for his students since they were accustomed to “cook book” laboratories at school, whereas in Dr. Sobecky’s lab they were required to develop their own experimental procedures through a process of trial and error. For Mr. Alexander, the “hands on nature of his experience” was GIFT’s most valuable component, as it reinforced the importance of using inquiry-based instruction in the classroom. Inquiry learning requires that teachers have ample patience, since most students have been taught to look for the one “correct” answer, and resist the hard critical thinking required by inquiry-based instruction. GIFT provided Mr. Alexander with the “extended planning period” required to plan classroom exercises that connect his students in an active way with the real world of science.

Mentoring a GIFT Teacher
The GIFT program provides teachers with the opportunity to interact with faculty mentors, experience cutting-edge research, establish relationships with other motivated educators and develop inquiry-based activities for students. Through GIFT, Georgia Tech faculty assisted 35 teachers with their necessary 2004 summer rejuvenation. At the same time, faculty mentors gained insight into the issues of K-12 education, and formed relationships with teachers and schools that promote productive educational outreach projects. Over the last fourteen years, more than 900 teachers have participated in GIFT, working in either academic or corporate positions and returning renewed to the classroom. For more information about the program, please contact Donna Barrett, Program Director at 404 894 7530.
Q & A:
An Interview With Deborah Smith
Associate Vice Provost of Enrollment Services
Georgia Institute of Technology

In her current position, Deborah Smith oversees the offices of Undergraduate Admissions, Graduate Admissions, Registrar, Student Financial Planning and Services, and the President's Scholarship Program. She was named Director of Admissions at Georgia Tech in November 1992, coordinating the recruiting and admission of all undergraduate students. After more than 25 years of working in higher education, Deborah continues to enjoy her involvement with college bound students and parents. She has served in leadership roles for professional educational associations and is often called upon to make presentations at professional meetings related to the college enrollment process. In 1977, she earned her M.Ed degree in Student Personnel Services in Higher Education from the University of Georgia in Athens.

Q: Tell us about Enrollment Services what is it responsible for, and what does it do?
A: The offices of Undergraduate Admissions, Graduate Admissions, Student Financial Planning and Services, the President Scholarship Program, and the Registrar make up Enrollment Services. The goal of Enrollment Services is to recruit and enroll the best qualified, most diverse student body as directed by senior administration. Further, Enrollment Services seeks to financially assist needy students and to recognize merit and leadership by providing targeted financial assistance and information concerning alternative financial strategies. Through the Registrar’s Office, we support the mission and the educational programs of the Institute.

Q: This Fall Georgia Tech saw the largest freshmen class in its history. What was involved in getting ready for their arrival? Was anything different this year due to the larger group of incoming freshmen?
A: Last fall, Dr. Chameau set the freshman enrollment target at 2,400. Throughout the year, the Registrar’s Office and Undergraduate Admissions worked with faculty and staff on campus to prepare for 2,400 new freshmen. In the spring, more freshman acceptance deposits began to come in than we had expected. After the May 1 deposit deadline, we began to plan for a freshman class of 2,600. The Registrar’s Office worked closely with the academic departments to schedule additional sections of freshman course work. Undergraduate Admissions made telephone calls throughout the summer to students who didn’t register for FASET or who did register but didn’t attend the sessions trying to find out
if these students’ plans had changed and they were no longer planning to attend Tech so other students could have their classes.

So, in answer to your question, this year was different for Enrollment Services and it was different for other administrative and academic areas on campus such as Housing and FASET. Even though a number of areas were greatly affected by the increase in the number of new freshmen, I think we all came together and did a remarkable job to accommodate all of the new students.

Q: What is the decision process that determines how many new students are admitted? Is there a target “cut-off” number?

A: The process begins in the fall of each year with an undergraduate enrollment goal established by Dr. Chameau. We determine the number of students to be admitted based on a yield rate calculated on the previous year’s number of accepted students who matriculate at Tech. We use this yield rate to determine how many students we will be able to accept for the upcoming year to achieve the enrollment goal.

Q: In preparing for each new academic year, what do you see as the most important part of your job? The most challenging part?

A: I believe that my primary responsibility is to support the offices within Enrollment Services and work to do all that I can to eliminate the road blocks that get in their way. My greatest challenge is to find the resources to enable the staff to continue to improve the services provided to students, faculty, and staff and to meet the enrollment goals of the Institute.

Q: What does Enrollment Services do to communicate/coordinate with other campus units to ensure a successful academic year for both students and faculty?

A: Enrollment Services hosts the Communications Group which meets once a month and is made up of campus representatives who work with or have contact with new students. Each semester, the Registrar’s Office hosts the Registrar’s Information Sessions that target faculty and staff. Finally, Enrollment Services is now hosting a Graduate Information Session that meets every two months and focuses on graduate student issues. Graduate coordinators and departmental staff participate.

Q: How do you judge whether or not your department is performing successfully?

A: Each office has a strategic plan with goals and objectives. These documents help to keep track of...
these successes. There are also a number of ways that our customers can provide feedback regarding their experiences with our offices.

Q: Have you seen any changes in enrollment trends during the last few years. What are they? What factors impact changes in enrollment trends?

A: With the downturn in the economy, it has been more difficult to recruit and enroll out of state students without the benefit of financial aid and scholarships. Due to financial circumstances, more students nationally are choosing state universities in their home states rather than pay out of state or private school tuition. Over the past few years, we have seen more Georgia residents accept our offer of admission and fewer out of state students accept our offer.

This spring, the Institute was able to increase the amount of funding used by the Office of Student Financial Planning and Services to make financial aid awards to students with financial need. Because most of these students are out of state students, the financial aid awards made it possible for these students to choose Georgia Tech. This helped to increase the yield of out of state freshmen accepting our offer of admission and reverse the previous declining trend. The Undergraduate Admission Office implemented some new recruiting strategies that obviously affected the outcome of the new class.

Q: What is the most significant change you have seen since you first came to Tech?

A: I came to Tech in 1981 and in addition to just the physical change in the campus, there seems to be more of a focus on undergraduate education. Undergraduate students and teaching have become priorities with the administration.

Q: During the year, is there ever a lull or break during which your work load is lighter or the pace slows down?

A: For me personally, the lull is a few weeks after the fall semester begins. The remainder of the year is fairly constant due to the peak work loads of the offices within Enrollment Services.

Q: Is there anything special you do during the summer (or at another time during the year) that helps rejuvenate you, and that re-invigorates your enthusiasm and excitement for your job during the coming year?

A: I usually take a couple of weeks of vacation during the summer. However, the beginning of the fall semester signals the end of one recruiting cycle and the beginning of another which is usually enough to re-invigorate me for another year.

Q: In what ways does Enrollment Service contribute to successful teaching and learning at Georgia Tech?

A: We contribute by recruiting and enrolling some of the best and brightest students for our faculty to teach.
Summer Reading
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For those who might be looking for a “summer reading” novel—something to take on vacation, to the beach/pool, on a long airplane ride—CETL asked some colleagues with special talents to put together suggestions of novels in which the story line has a strong connection to academics: either the principal character(s) is/are faculty members, or the main setting is a college campus or research area, or the subject matter relates to the academy in a direct way.

Here is a short list of possible selections; to see the whole list, check out the link at CETL’s website: www.cetl.gatech.edu/resources/summerreading.html:


Make your plans for next summer’s reading!

Special thanks to Kathy Tomajko, Mary Axford, and Leslie Madden from the Georgia Tech Library, as well as Janice Kragness and the staff of the University of St. Thomas Libraries, for their help in compiling this list.

Visit the CETL Library for books on teaching and learning. Books are grouped into categories such as The Practice of Teaching, Faculty Development, Assessment of Teaching, Assessment of Learning, Discipline Specific Education, Distance Learning, Instructional Technologies, and others.

The CETL Library is located on the ground floor of Tech Tower inside the CETL Conference Room.
Draw an illegible squiggle on the board and ask them what that is. Thirty hands shoot up: “A Space Shuttle on the launch pad!” The smell of burning jet fuel, the heat, noise and vibrations of an engine test cell or a supersonic wind tunnel, can all light up their eyes and bring on the 1000-watt smiles. Welcome to my undergraduate class.

Aerospace engineering is as much about imagination, daydreaming and enthusiasm as it is about “hard math” and science. Every commercial or military aircraft or spacecraft built in the US, and nearly every combat mission involving aircraft, has Georgia Tech aerospace engineers involved in its development and operation. The students I teach this Fall will be ten years out of school and beginning to turn dreams into engineering marvels, between 2015 and 2018. To understand how to help educate those super-competent, confident, caring professionals, I first look back at how much things have changed in the the past fifteen years.

As a friend pointed out during this summer in industry: “We see them for 4 years, you (industry) see them for the next forty.” My perception of the teacher’s job at a top-notch aerospace engineering school is that I must guide, motivate and help students to develop an understanding and enthusiasm for the subject, the discipline, work ethic and ability to learn the subject on through life, and the independence and confidence to solve problems within and across disciplines. However, the learning and thinking must be done by the student – not for the student at this level.

We’ve always wondered about the model where students are supposed to learn something perfectly, then leave it behind and move on to the next course. Thus, students “master” Calculus and Physics before moving to engineering? How much do they really learn that first time through? We rationalized that there was no alternative, and no time to spare, in a packed curriculum. We were so wrong.

In the 1980s, the advent of the computer enabled us to pose more “realistic” and “open-ended” problems in classes – even in large classes. This was a real deviation from the model of individual students working out strictly compartmentalized problems in theory classes. Teams of two became the norm in these assignments.

By the early 1990s, technology enabled us to impart some simulated “experience” to students. Under NSF grants, I experimented with bringing digital images of flow dynamics into interactive problem-solving. I developed courses spanning several topics, with the learning proceeding in a “time-shared” fashion on several topics, synchronized with lab projects. Part of the deal with getting NSF grants is a command appearance at ASEE national meetings to “showcase” results – and this introduced me to a new world where “research” was a bad word – and “aerospace engineering” was worse. I found that our expectations of Georgia Tech students – based on their predecessors’ performance – were indeed rather special. What we take for granted in student performance is far beyond what most engineering faculty can expect of their students.

Learning by Iteration
Expanding on the NSF project, we tried bringing iteration into the learning process, allowing students to revisit concepts and methods several times in different contexts (without having to take the course over!) For example, students gained experience with aerodynamics using a wing design code early in the quarter, and became much more
The Classroom

receptive to the theory of aerodynamics that followed. This exercise showed that one could indeed take one of the most “crowded” courses in our curriculum, and redesign it so that students learned deeper and broader, and gained more confidence, and learned more material, all in the same time.

Portal to the Knowledge Base
In the mid-90s we faced high attrition in the first two years, as the most energetic students moved to the “larger” schools along with the majority of their freshman study groups. The idea of teaching conceptual design starting in the first week of college was tried in 1997, with a “design-centered introduction to aerospace engineering”. It was an eye-opener. Soon, freshmen were going into spacecraft and rotorcraft design teams, and getting credit for project participation.

Internet Learning: Horizontal and Vertical Integration
The idea of learning through iteration, and looking at material from different perspectives, demanded the next step – the creation of nonlinear arrangements of knowledge material. The internet posed the solution, allowing us to create course resources with material from many different sources. Using the Introduction course as the portal to a web-based collection of technical knowledge (hyperlinked course notes, links to databases, simulations, theses, papers, digital libraries in other fields, and anything else which was useful) we developed the “Aerospace Digital Library”. Today, www.adl.gatech.edu has over 2GB of material, and links to thousands of other resources around the world. Our students “fly” far from Georgia Tech every day in finding ideas and solutions to problems – and the site gets 70% of its usage from outside GT. Nothing unique here – our students learned to do this in high school. This resource allows vertical and horizontal integration, in that students can conveniently revisit course material at other levels, and across subject areas. We have only begun to explore such capabilities.

Technology in the Classroom
In the mid-90s, NSF’s SUCEED Coalition, one of 4 nationwide, poured resources into technology for experiential learning and design in the curriculum. Our mandate from alumni, however, includes a “do no harm” caveat – technology must only be used as appropriate. Prof. Marilyn Smith and I explored the role of technology in our classrooms across a variety of undergraduate and graduate course involving experiments, team projects, theory and computations. We backed off from some of the more exotic ideas, where technology is not justifiable (yet) as enhancing learning. Besides, in the Real World, the best-laid plans of professors get dashed when a high-tech syllabus gets scheduled for teaching in an ancient classroom with no screen, projector or window-shades.

Learner Styles
We believe that if we don’t keep the challenge level high, we are wasting the time of students who come to us with the best credentials in the world. Integrative assignments allow students to use their imagination and initiative. They demand that each student develop a decent level of comprehension and skill in problem-solving and creative integration. Immediate student reaction varies from exhilaration to resentment – but analysis of the reasons reveals a diversity in learning styles. We realized that we were not the first to whom this occurred. This issue has received a great deal of attention from educational psychologists – but little is known about engineering students, and almost nothing about how undergraduates’ learning styles evolve at a top-notch engineering research institution. A related issue is the significance of the variance in student opinions in any given class – an issue which receives no positive attention in our “Teacher Grading” system. More on this for another day…

Undergraduate Participation in Research
Undergraduate participation in research and other projects now routinely exceeds the ambitious goals of AE’s Strategic Plan, and is supported through official Institute programs. We have more students seeking research opportunities than we can handle, but they now have many options. This is a huge attitude change from the prevailing superstitions of a decade ago, when research and undergraduate education were supposed to be in conflict.

Learning Across Disciplines
Today it is evident that engineers must learn to learn “across” disciplines as projects, customer background and markets change almost weekly. Our challenge goes far beyond developing “short courses” – we must develop resources, and a culture, where such learning can be done essentially in real-time. Today this is coming within reach, as large entities such as NASA come around to this realization. The ADL resource is tailored to this objective. We can send Aerospace engineers out to other disciplines now through the introduction portal. We need similar portals in other disciplines, developed by experts in those disciplines.
Aerospace engineering is as much about imagination, day-dreaming and enthusiasm as it is about “hard math” and science. Every . . . aircraft or spacecraft built in the US . . . has Georgia Tech aerospace engineers involved in its development and operation. The students I teach this Fall will be . . . beginning to turn dreams into engineering marvels between 2015 and 2018.

Large-System Integration and the Role of the Aerospace Engineer

All these are preludes to a major shift in the education of aerospace engineers (and probably all engineers). The present trend among large aerospace companies in the US is to change from the traditional low-margin business of actually manufacturing hardware, to the more elegant, high-margin business of being “large-system integrators”, farming out the manufacturing to different entities worldwide.

Leaving aside the concerns and debates about the merits and viability of this approach, there are some lessons to universities implied here. For instance, if most engineering development and manufacture are going to be done elsewhere, why should US universities be educating large numbers of engineers? From my ground-level perspective, what I must do is to assume that the Powers recognize the true breakthrough potential of being Large-System Integrators, able to perform “full-life-cycle simulation” of immense architectures. This will bring on an era where truly massive projects can be undertaken – addressing all those items with people in all walks of life the full scope of our dreams.

Companies today find these prospects scary – and they wonder whether university faculty even begin to understand the nature of the challenges. Industry managers demand more “Systems Engineering” in the curriculum – countered by other engineers telling us to focus on “in-depth understanding of the core disciplines.” The real answer appears to be that for the short term, industry needs specialists in Systems Engineering, and specialists in “in-depth understanding of core disciplines”, but that the successful engineer of the future will thrive in both these worlds.

This then is the aerospace engineer of 2017, whom I must start educating now. The pieces are already here to build the resources that those engineers will take for granted. But as before, I have to do my best to understand the changing outlook, skills and expectations of my students. I must tailor their education to guide and encourage, rather than to limit their horizons on what they can do.

Documenting Progress in Engineering Education

I have referred to several ASEE national conference papers, following CETL’s suggestion that I discuss the issue of presenting papers at ASEE national conferences. These conferences are annual events, in June. The Sunday Society-wide Picnic is a great event if you have an iron stomach for the cookout, and the Exhibition free ice-cream booth draws huge crowds of professors. You may find yourself in line ahead of some of the top names in engineering. Paper submission is through a 3-step electronic process: abstract submission, full paper submission, and submission of the final revised paper. Abstracts and then the full papers undergo peer review, generally by three reviewers – senior engineering faculty. The NSF and ASEE have declared repeatedly that these are hence, “peer-reviewed publications.”

If you depend on that, dear Assistant Professor, I have a few bridges across the Chattahoochee to sell you. After all, ASEE is only the American Society for Engineering Education, and NSF the National Science Foundation. College RPT committees and School Chairs are mostly filled with superstar faculty who know much better than these. Papers at such conferences are not weighted as much as papers in “paper journals” – because the latter are “prestigious.” In fact, I hear they are not “counted” at all! Given that most libraries can’t afford to subscribe to most paper journals any more, I asked for the reasoning. Let me explain what I learned. First is the rejection rate. Apparently, a journal’s prestige depends on how much they waste by reject-
ing papers. Thus a journal which cannot be found in libraries is second in prestige only to one that rejects 100% and thus does not exist. Second is concern about reviewer quality and assured uniformity thereof – apparently not a concern with journals. The reviewers of ASEE papers being mostly Engineering School Chairs and Deans, I’d rather not comment on that. Thirdly, ASEE papers are reviewed under a firm deadline. No prestigious journal would dream of this – the editors and reviewers losing papers is key to a high attrition rate as would-be prestigious authors may die waiting hopefully. Anyway, since I greatly love what I do at Georgia Tech, let me leave this topic with the advice: Caveat Assistant Professor! Love teaching, but also make sure you have the Recommended Allowance of prestigious journal papers in whatever is prestigious to your environment.

Just to reassure you – the ASEE does reject papers. I’ve got a few rejected (just to prove the quality, of course!) By the way, the abstract deadline for ASEE’s Portland meeting in June 2005 was October 6 – and GT papers are of course among the best. Progress always requires documentation – as with all systems, schools also tend to “relax” to states of greater entropy, so what you demonstrate at great pains this year, will be forgotten next year unless you write it up and publish it. ASEE is a great place to show off your work to very interested audiences who regard Georgia Tech as a “Powerhouse” driving innovation.

Concluding Remarks
The past ten years have seen rapid and accelerating change in undergraduate engineering education. Today’s student takes for granted a huge bank of resources that simply did not exist a decade ago. Today’s professor takes for granted a range of student perspectives, initiative and skills, unimaginable a decade ago. Though the classrooms do not look very different yet for the most part, what goes on in a course (in and out of class) is very different from what was done a decade ago. However, the depth and breadth of understanding that the student attains, remain firm metrics of success. All these resources, and close understanding of the dynamics of student expectations and industry realities, are needed to educate the engineers who will build the future - of our dreams and theirs. ■

7 Komerath, N.M., Davis, J., College of Engineering project: “Cross-discipline learning inspired by example”. http://www.adl.gatech.edu/research/xdisc/
The use of instructional technology at Georgia Tech has increased in the last three to five years. Many faculty have a course website and use course management tools provided by the Institute, such as BuzzPort and WebCT, or other course management tools available at the School or College level. In the last few years, CETL’s instructional technology services have focused on uses of technology that improve course management and course communication. Our goals have been to help faculty utilize such tools by providing one-on-one assistance, setting up WebCT courses, and digitizing instructional materials.

In recent months, our interests have shifted towards instructional development that improves student understanding of concepts through the use of instructional technology as a cognitive tool. We want students thinking with technology rather than learning from technology. Instructional technology can be used to promote problem solving and critical thinking. For instance, Dr. Haizheng Li uses economics statistical analyses programs, SAS and Eviews, in his Econometrics and Economic Forecasting courses. The students combine theory and application by using real-world data to conduct economic analyses.

With expertise in instructional design, development, and human-computer interaction, we want to build on current practices and offer services that encourage uses of technology as problem solving tools. How can we support faculty efforts to move towards uses of technology for critical thinking, beyond course management and basic communications? This summer we began an informal investigation of instructional technology on campus.

In our drive to support the use of technology as a cognitive tool, enhancing critical thinking and problem solving, we are looking for insight regarding what faculty already do and intend to do. What are the factors that hinder or facilitate the use of technology as cognitive tools? What should be our priorities? Who is assessing the use of technology to determine if learning is enhanced? The purpose of our summer project was to answer some of these questions and identify interests among departments, schools, and colleges. By knowing the goals of individuals among various units, we hope to improve networking and communication among units and individuals and, ultimately, support the goal of developing and supporting effective uses of technology. Faculty and instructors typically do not want to recreate the wheel when they can learn from the mistakes and successes of others. Connections can be developed and maintained between neighboring units and peers. Further, creating a stronger learning community will allow us to leverage the strengths and successes of the early adopters.

Our investigation encompassed informal interviews of faculty who are interested in and successful at using
We want to support the use of technology as a cognitive tool, enhancing critical thinking and problem solving. We are looking for insight regarding what faculty already do and intend to do. What are the factors that hinder or facilitate the use of technology as cognitive tools? What should be our priorities?

We met with individuals from the Ivan Allen College, the College of Engineering, the College of Computing, and the College of Sciences. We met with administrators, assistant professors, associate professors, and instructors, as well as staff who provide instructional support. Our questions pertained to types of technologies used, related opportunities and obstacles, future goals, and assessment efforts.

Reflection on the findings thus far has been both discouraging and exciting. Through our interviews we learned about efforts to use a variety of simulation tools including MatLab, FEMLAB, and HYSYS. Some simulation tools are designed specifically for industry, and because these tools are intended for highly complex investigation, they do not lend themselves to timely, efficient instruction. Often, it takes weeks to learn the basics of the software before students know enough to experience the intellectual benefits. However, such tools have tremendous potential for learning, requiring critical thinking and understanding of the dynamic relationships in a given system. Students can model real-world phenomena and study these dynamic relationships. Ideas or solutions can be visualized. Misconceptions can be clarified as students test their own theories. How can we harness the learning potential without risking huge amounts of time spent learning the tools? Other obstacles mentioned throughout our interviews include the lack of available computers for students to work during class time. However if more computers were available, more resources would have to go into maintenance of computers and software. Is the intellectual benefit of such tools worth the resources required?

Our investigation is still underway. Thus far, we see an opportunity to increase communication among units and individuals regarding the use of simulation or visualization software. We can offer development assistance of small scale web-based simulations or modelling for investigating less complex relationships, thereby avoiding large amounts of student time spent learning complex software. If, in fact, there are not enough resources, then we can encourage and support more inquiry and research regarding the effectiveness of such tools. Requests for additional resources to maintain computers and software and to install more computers in classrooms can be supported with evidence of the intellectual benefits. Are students developing better mental models of the complex systems or concepts that they are trying to learn? CETL can provide support for assessing the learning outcomes and documenting the learning that occurs.

We want to continue talking with individuals, learning more about the interests and efforts of faculty in every college and school at Georgia Tech. As we gather more information, we are considering ways that it can direct our services. Obstacles such as a lack of resources will remain unless we can provide research-based evidence for the value of using instructional technologies. If you are interested in sharing with us your experiences using instructional technologies as cognitive tools, or consulting with CETL on developing a research plan to assess learning outcomes associated with your use of technology, please let us know. We will conclude our investigation with a report for the purposes of planning our work at CETL, and we will be happy to share what we learn.
“Summer,” for many of us, conjures up images of baseball, the ice cream truck, cookouts, swimming in a pool, and watching fireworks on the 4th of July. And like most faculty members at Georgia Tech, I try to carve out time during the summer to relax and experience a change of pace wherever possible, while still remaining focused on research and project development as a primary endeavor. But my own summer experiences in preparing for the upcoming academic year and slicing out time to relax take a very different shape from the more typical images I described above. The Global Classroom Project, our online project that links students from Russia, Sweden, America (and sometimes Kyrgyzstan) to collaborate on jointly developed analyses, is central to my work during the regular school year, and no less so in the summer. In fact, my work on the project frames my summer experiences every year.

As has been the pattern since 2001, when I married Yuri Tretyakov, my Russian collaborative partner in the project, I spend every summer in Russia. Because he lives in Russia and I live in America during the regular school year (he is also a professor and administrator), much of our professional and personal communication and collaboration occurs online. So we are particularly happy to take advantage of our time during the summer (and the 2 months that he can be here during the winter) to catch up on our personal lives as well as to focus our efforts on the Global Classroom Project more efficiently.

This summer provided no less opportunity for both. We were invited to Karlskrona, Sweden for its Authority, Intellectual Property Rights, and the Digital Culture Symposium to deliver papers on intellectual property law issues (my initial research area). Our participation in the symposium also allowed us to further our work with the Global Classroom Project by meeting with our Swedish student participants, assessing with administrators our past project experiences, and meeting with new faculty and administrative participants to determine new directions for Swedish participation. Having the opportunity to meet our students face to face and to work directly with our colleagues across the ocean always allows more fruitful personal and professional connections. Our online work is supported further when we are able to sit down to dinner with people we may have only known online. We advance our pedagogy and our project goals during face to face meeting times in a way that would not be possible in a purely virtual environment, so we are always thankful to have opportunities to meet in real life.

As is usually the case, we were also able to add an element of relaxation to the trip when we had time off to explore the island of Aspö and discovered a terrific restaurant in the dungeon of the old Kastellec fortress, and later to spend some time enjoying Stockholm during the Taste of Stockholm festival. Later that summer, we were also able to relax and enjoy a weekend in Tallin, Estonia, an incredibly well preserved medieval city with a long history of foreign rule, including occupation by both the Soviets and the Nazis.

But beyond the other efforts to get away from our usual lives, every summer we follow the longtime Russian tradition and go to the country to live in our
“... every summer we follow the longtime Russian tradition and go to the country to live in our dacha (summer house) for a month ... Our local village neighbors have one cow per family and the cow is the main source of subsistence for the year ... If we want fresh milk, we walk down a path through the woods, about 2 miles to the next village, where we can buy milk that comes straight from their cows.”

...idyllic; we listen to nightingales and look over the hills and fields while we visit together over great food straight from the garden and just enough vodka.

But our work and relaxation is never quite severed from one another, so we encounter strange contradictions with the different kinds of reality we experience in our village life. On a cool night after our physical work is done and we’ve built a fire in the stove, we sit down to work on our computers. With books and other materials for research that we’ve brought from St. Petersburg or downloaded from the Web, we work together to plan our classes and other project work for the upcoming year, and write articles and

Although life at the dacha is supposed to be relaxing, we undertake hard physical work every day, cutting the fields with a scythe, hauling water, building on the house to maintain it or renovate it, tending the gardens, cooking, cleaning, and generally living the way we might have lived 100 years ago. We have friends in the village who are also summer inhabitants, professors from St. Petersburg State University, and our real relaxation comes when we get together with them for the banya, a steam bath created by burning wood in a small wooden structure to heat boulders, then pouring water over the boulders. An invitation to the banya implies a big dinner afterward with late night talks and playing with the kids. The setting is work on our most current book devoted to the project. Our only interruptions come from a quick appearance by Fedya, our little house mouse, the woodpeckers, storks, or a rainstorm drawing our attention outside, and every once in awhile an incongruous beep from the cell phone, a text message from our friend down the road; “Banya tmrw 7pm brng tomatoes.”
How often can one talk with experts on 18th century beef, pre-20th century bear baiting, and even contemporary “botched taxidermy” art installations? This summer a group of Georgia Tech students in the study abroad program at Worcester College, Oxford got to do all three. Student conversations with leading scholars in these far flung fields was part of a course I put together called “British Animals.” The goal of the course was to leverage the specificity of place toward thinking about the history of cultural interaction with nature’s fauna. How we treat nature tells us much about our own culture. So, as the students navigated the local streets, museums, and shops to get a sense of Britannia, I also asked them to explore the farm fields, butcher shops, and natural history centers. The study abroad program at Oxford allowed me to advance my research interests in animal studies while providing a hands-on arena for student learning.

The United Kingdom is the center of animal studies scholarship in the liberal arts and so provided a great opportunity for a unique course. Six months before the course started, I contacted prominent animal studies authors and invited them to talk to the class about their work. Speakers included Steve Baker on contemporary art, Erica Fudge on 16th century bear baiting near the Globe Theater, Christine Kenyon-Jones on Lord Byron’s pets and Ben Rogers of the Public Policy Institute in London on British beef. As evidence of the generosity in this field of study, without exception each scholar took me up on the invitation. The hour train ride from London to Oxford made the visit easy for most speakers, and they all found it flattering to talk to a group of Georgia Tech students who had spent many long days pouring over the lecturers’ books. Scholarship came alive for students as they met the authors they had been reading and asked them questions about their research and methods. Students came to understand how professors in the liberal arts do research by making use of archives, well stocked libraries, and the work of colleagues in the field. By observing my interaction with guest speakers, students learned how scholarly exchange and debate gets formed. Furthermore, they wanted to jump in, to take part in the conversation. To do so, students had to leverage the vocabulary and ideas they had learned in class. Talking with the authors was a test of the students’ skills as well as a reward for their labors. Through their participation, they experienced how the cultural studies community develops.

In addition to benefiting the students, the visits by various authors allowed me very quickly to catch up on current concerns in the field of animal studies and to compare work done in the UK and issues in the US. Since my own area of interest is animals in the literature and culture of 19th century Britain, these scholars were able to point me in the direction of particular archives and people working on similar material. Because I was at Oxford, I could follow up on leads by making use of the Bodleian Library and by trips into London to visit the British Library. So,
concepts I was teaching and lecturing on in class quickly became material I was writing about. Upon my return to class after a long weekend, I could share my archival finds and my writing with students who then got a sense of how professors advance their own essays and research.

The finale to the British Animals class was the unexpected arrival of polar bears. Steve Baker, author of *Postmodern Animal*, had just given a lecture on contemporary British artists’ use of taxidermy to create visceral relationships between the gallery observer and art that makes use of animal parts. He then incorporated into his slide show a series of images of taxidermied polar bears and announced that images from this art show opened the very next day (the last day of class) at Oxford’s natural history museum. Bryndis Snæbjörndóttir and Mark Wilson presented photographs taken of the thirty-four taxidermied polar bears existent in the UK, from the earliest 1786 bear to the most recent one acquired by Lord Puttnam in 1999. The bears offer a look into how the British Empire has negotiated its relationship to the North Pole. Students got to see the exhibit and meet the artists as well as integrate their experience and Baker’s lecture into their final papers.

My own lively conversations with Baker, Snæbjörndóttir, and Wilson in the art gallery, classroom, and local pubs has initiated an international exchange of essays, visits, and talks. The point here is that teaching and scholarship can be wed to the specificity of place so as to generate innovative projects. Too often our work is done in isolation, and class material is enclosed with classroom walls. If we can make the walls of the classroom a bit more porous, as teachers and researchers we invite chance events and authentic discoveries that could not be predicted ahead of time. The dislocation from our familiar places that happens in the study abroad program along with a different pace of life defamiliarizes the everyday and allows for a newness in experiences and thinking.

Years of studying British picturesque landscapes has taught me how place and time change perception. Seasons produce moods and are catalysts for activities. The relaxed atmosphere that summer provides and its open-ended, lazy calendar days allows for the exploration and discovery I’ve outlined here. Real work is done but at different speeds and slownesses. Thinking percolates at different rates. In saying goodbye to the menagerie of summer, I come back to campus with tools and thoughts for the forthcoming academic year.

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“Bryndis Snæbjörndóttir and Mark Wilson presented photographs taken of the thirty-four taxidermied polar bears existent in the UK, from the earliest 1786 bear to the most recent one acquired by Lord Puttnam in 1999. The bears offer a look into how the British Empire has negotiated its relationship to the North Pole. Students got to see the exhibit and meet the artists as well as integrate their experience and Baker’s lecture into their final papers.”
# Fall 2004 Events

## IT Tuesdays (Instructional Technology Sessions)

<table>
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<tr>
<th>Date</th>
<th>Event</th>
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<tr>
<td>October 12</td>
<td>Exploring Design- Based Research</td>
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<tr>
<td>October 26</td>
<td>Using a Wireless Response System in Large Classrooms: PRS at Georgia Tech</td>
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<td>November 9</td>
<td>Usability and Accessibility Issues</td>
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## Faculty Development Seminars

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<th>Event</th>
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<tr>
<td>September 23</td>
<td>Web Portals for Engineering Education Courses, with Dr. Kurt Gramoll, University of Oklahoma and The National Science Digital Library (NSDL), with Dr. Thomas C. Reeves, University of Georgia</td>
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<tr>
<td>October 21</td>
<td>Backward Design in an Academic Setting, with Dr. David Elrod (CEE)</td>
</tr>
<tr>
<td>November 18</td>
<td>Case Teaching, Live, with Dr. William Long (INTA)</td>
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*For more information on these and other events, please visit the CETL website at [www.cetl.gatech.edu](http://www.cetl.gatech.edu) and click on News and Events.*