Answers to these questions vary from one environment to another, and new faculty should consult colleagues regarding expectations and practices. Faculty and administrators also might collaborate to formulate institutional policies, establish practices when questions and complaints arise, and identify appropriate responses to common circumstances. Here are some examples.

Class Attendance: Students often have the responsibility to attend classes and tackle assignments. However, sometimes students become ill, time conflicts arise, students address problems of over commitment by skipping classes, or students may not feel like attending. If faculty serve at the pleasure of students, faculty should accommodate these circumstances. If faculty present a smorgasbord, students have full responsibility to attend class and should not expect faculty to duplicate classes or make other accommodations If faculty serve as local parents, more analysis may be needed. When absences can be anticipated, students might be expected to take some responsibility, checking in advance about what will be missed, working to make up missed work, getting class notes, and reading material covered in textbooks. However, when students have been ill or missed a class due to circumstances beyond their control, other adjustments may seem appropriate. Personally, I have little sympathy for a student who misses a class without good justification, but I make great efforts to help a student who experiences unforeseeable circumstances (as verified by the Office of Student Affairs). If student indicate they missed my class because they were working on an assignment for another instructor, I tell them catching up is their problem; they need to take responsibility for their choice. Only after they have class notes and done the reading can they come to office hours to ask specific questions. Not only does this reinforce students understandings regarding choices, it also may help them grow and mature as they learn to take responsibility for their actions.

Extensions for Assignments: Students may ask for extensions on assignments or request that a test be taking at a later time. Again, the teacher's response may depend upon perceived roles. Depending upon the model, it may be appropriate to distinguish situations of high stress, illness, family emergency from other cases. In this regard, it also may be useful for the instructor to consider what long-term messages are being sent to the student. For example, if students consistently request and receive extensions, they may not learn to budget time and take responsibility. In one case, I know of a student who failed to turn in a polished thesis before the institution's deadline for graduation. While this school's policies were well publicized and known to be beyond the discretion of faculty, the student then blamed the instructor for not enforcing assignment deadlines earlier.

Missing a Test: Some instructors try to telephone a student's room if the student is absent when a test starts. This approach fits with *in loco parentis* and can solve the problem of a student sleeping through an alarm clock. Further, some instructors prefer this type of effort to handling later debates if the student later wants another chance. Alternatively, responsibility could lie completely with the student, yielding a grade of zero. Allowing a student to make up a test may be a middle ground, although this approach raises many questions of fairness and test security.

Poor Student Performance: If a student performs poorly in class, what actions should an instructor take? First, suppose the student is not trying, does not attend class, ignores offers for tutoring, etc., Then a viewpoint emphasizing student responsibility suggests an instructor need take little action, while an *in loco parentis* perspective might investigate the root causes for this non-productive behavior. If, however, the student is trying, the instructor may be willing to work with the student, perhaps at length, to help overcome obstacles and provide guidance. The extent and nature of this help, however, may relate to the roles of both the instructor and student.

Space limitations prevent an extensive discussion of these circumstances here, although a later column could incorporate reader feedback. I hope this discussion will stimulate readers to consider how the view of instructor and student roles can clarify faculty responsibilities and guide instructor responses to common circumstances.

Acknowledgment: Many thanks to Professor Pamela Ferguson and to the Science Teaching and Learning Group at Grinnell College for helping me clarify and refine my thoughts on this topic.

Community College Corner

Update on Two-year College Activity

Robert D. Campbell

In December of 2003, I had the pleasure of participating in a discussion arranged by the staff of the United States House of Representatives Committee on Science regarding the impact of community colleges on the development of a technological workforce. Recognizing the natural relationship between the two-year college setting and the need for a national effort to ensure a properly trained and prepared body of employees, the National Science Foundation (NSF) established in 1995 the Advanced Technology Education (ATE) funding program. This USHR forum provided an opportunity to highlight some of the exemplary programs funded by the NSF ATE program.

As noted by NSF, “with an emphasis on two-year colleges, the ATE program focuses on the education of technicians for the high-technology fields that drive our nation's economy.” The ATE program “promotes improvement in technological education at the undergraduate and secondary school levels by supporting curriculum development; the preparation and professional development of college faculty and secondary school teachers; internships and field experiences for faculty, teachers, and students; and other activities. The program also promotes articulation between programs at two-year colleges and four-year colleges and universities, and the program invites proposals focusing on research relating to technician education."

Under the ATE program, several regional and national Centers have been established; these include the following specifically in the area of Information Technology (IT). We urge everyone to take advantage of these considerable resources.

1. Center for Information Technology Education of Tennessee (http://www.cite-tn.org/), a project headquartered at Nashville State Technical Community College in Nashville, Tennessee.

   CITE is a consortium of two-year colleges, universities, secondary schools, businesses, industries and governmental organizations responding to the region's need for well-prepared IT workers having adaptable skills. The Center is dedicated to improving the workforce pipeline through education reform, re-skilling of educators and workers, and dissemination of information about IT jobs and skills, curricula, and education and training opportunities in the region. Goals include: the Corporate Scholar Solutions program, designed to partner educational institutions and their IT students with area businesses and industries to provide a "real-world, real-time" issue/problem as the context for IT learning; and Secondary School IT Academies that will serve as regional models for community and educational partnerships for the reform of technical education programs and teaching methods.

2. Information Technology Education Center of Florida (http://www.itecfl.com/), a project headquartered at Daytona Beach Community College in Daytona Beach, Florida.

   iTEC was established to promote the development of curricula, processes, and infrastructure that will improve programs and create a statewide delivery system to educate and train technicians, which will in turn will help area business and industry meet workforce shortages in the disciplines of computer networking and information technology. Goals include: adapt, integrate and develop networking and information technology curricula which incorporates industry certifications; provide seamless K-16 articulation with multiple occupational exit points; provide in-service training and professional development for faculty; and leverage industry partnerships to set requirements, create and validate curricula through incumbent working training, and provide student and faculty internships.

3. Kentucky Information Technology Center (http://www.kitcenter.org/), a project headquartered at the University of Kentucky Lexington Community College and Kentucky Community and Technical College System in Lexington, Kentucky.

   The KIT Center is a collaborative project of the Kentucky Community and Technical College System and the UK-Lexington Community College that will enable two-year colleges in the to prepare highly skilled information technology workers needs to fill high-paying jobs with existing and new Kentucky companies. Goals include: increase IT enrollment and completion rates with more IT jobs filled; implement widely the new Kentucky IT curriculum; enhance the expertise of high school, community college, and technical college IT faculty; support and enhance IT initiatives across the Commonwealth; and increase the support and participation of business, government and industry.

4. Midwest Center for Information Technology (http://www.midwestcenterforit.org/), a project headquartered at the Applied Information Management Institute in Omaha, Nebraska.

   The MCIT is a partnership of ten community colleges in the four-state region of Iowa, Nebraska, North Dakota, and South Dakota working in collaboration with K-12 school districts, four-year colleges and universities, and employers to strengthen and expand the region's IT workforce. Goals include: faculty professional development leading to industry certification in one or more areas and/or advanced degrees in information technology; program development based on the needs of the region's employers; special initiatives to recruit more women and people of color into the IT field; expanded articulation agreements between high schools and community colleges and between community colleges and four-year colleges/universities that allow studnts to earn credits and time-shorten their postsecondary education; cutting-edge continuing education programs for the region's current IT workforce; and special initiatives to deliver short-term IT training for rural populations.

5. National Center of Excellence for High Performance Computing Technology (http://highperformancecomputing.org/), a project headquartered at Maui Community College in Kahului, Hawaii.

   The NCEHPCT is a consortium of four community colleges and respective supercomputing center and industry partners that develops educational programs in high performance computing technology. The mission is to provide business and industry with an educated, qualified and certified workforce in HPC technology in order to enhance and advance national educational, research, and economic strengths. Goals include: provide skilled personnel in HPC technology; establish and administer a national certification program for HPC technical personnel; create and implement Associate Degree and Certificate programs in HPC technology that will articulate with four-year college information science, computer science, and high performance computing technology programs; establish a 2 + 2 agreement with regional high school Tech Prep Programs; develop strategies for student recruitment, retention and placement; create a national repository of PC-cluster software and training materials and information on HPC technician educational programs; provide professional development activities; disseminate HPC program information through web-sites, presentations and publications; and evaluate National Center activities and products.

6. National Workforce Center for Emerging Technologies (http://www.nwcet.org/), a project headquartered at Bellevue Community College in Bellevue, Washington.
   The mission of NWCET is to build upon the foundation of the IT Skill Standards in order to design innovative IT educational programs, provide national thought leadership to education, business, and government and contribute to the development of a skilled US IT workforce. Goals include: establish model partnerships linking business, education, and government to advance IT education; design and promote pathways, products, and services that increase student diversity and improve opportunities in IT programs; create and update the Skill Standards, curriculum, courseware, and professional development projects and services; and provide national leadership by contributing to the development of public policy through the dissemination of "Best Practices" in IT education.
7. National Center for Telecommunications Technologies (http://www.nctt.org/) headquartered at Springfield Technical Community College in Springfield, Massachusetts
   The mission of the NCTT is to contribute to scientific and technological innovation in telecommunications education with a primary thrust in two areas: Curriculum Development and Program Improvement. Goals include: a 5-book textbook series for community colleges in telecommunications technologies; participation with the National Skills Standards Board in Washington DC in setting national skills standards for the telecommunications industry; and developing telecommunications technology curriculum, in partnership with Project Lead the Way.

Math CountS

Modeling Mania

Peter B. Henderson

Invited Mike Huth, Imperial College London to be the guest editor for this column. What started as a simple idea evolved into a complete paper. I encourage you to read Mike's insightful article "Mathematics for the exploration of requirements" in this *inroads* issue. Below is a little background to ease you into an area that is becoming relevant and important in software systems development – *modeling*.

The noun model means "a miniature representation of something; *or* a pattern of something to be made". In engineering there are both physical models and mathematical models. Indeed, mathematics is a key tool for modeling in most disciplines. Evidence for this in undergraduate education comes from the MAA CUPM Curriculum Foundations Project (http://www.maa.org/cupm/crafty/) in which only one topic, 'modeling' was found to be significant for all client disciplines - engineering, economics, computer science, physics, chemistry, biology, business, manufacturing, statistics, mathematics, etc.

Engineers often construct both physical and mathematical models, and compare these to help validate the models. Modeling building and tweaking are fundamental for validating the desired features and behavior, before design. Software is abstract in nature so physical models are usually not constructed. The models our students build are usually intuitive and mental. They often don't have the mathematical and/or software tools required for model building, testing, tweaking, experimenting and validation prior to design. Indeed, the software system they develop is frequently the "first executable model" available for experimenting, testing, tweaking, etc. This "model" is overly prescribed, detailed and unwieldy.

A key role of mathematics in CS and SE education is modeling. The simple task of understanding an informal requirement such as "the compiler responds with an error message when a variable is not declared" is modeling – making it precise is mathematical modeling. Mathematics is an important tool for constructing a working compiler where it is an integral part of lexical analyzers, parsers, code generators, etc.

Mathematically based system modeling tools for developing executable and verifiable models are beginning to evolve, and I predict will become standard practice for the development of software based systems which exhibit a high degree of reliability. Two articles addressing these issues are in the Frontiers in Education conference series: "Logic in Computer Science: tool-based modeling and reasoning about systems" by Mike Huth, FIE 2001, (http://fie.engrng.pitt.edu/fie2001/ Session T1C) and "The Role of Modeling in Software Engineering Education" by yours truly, FIE 2003 (http://fie.engrng.pitt.edu/fie2003/ Session S1C).

With the waterfall process of software engineering, requirements, which are one way of capturing a model of a system, need to be completely specified. However, for many software systems being developed or maintained, it is difficult to completely specify the requirements. Software evolution is often incremental, requiring extensive feedback. Accordingly, a tool for specifying, experimenting with, analyzing, testing, etc. an incompletely specified model of the system requirements would be nice to have. This is the thrust of Mike Huth's article "Mathematics for the exploration of requirements" and I encourage you to read it.

More on the important relationships between mathematics and modeling in the next Math CountS column. I hope everyone has had a chance to see the excellent movie "To Dream Tomorrow" about the life and contributions of Ada Lovelace**.** Ada is considered by many to be the first computer programmer. I encourage your institutions library, or your college or department, to purchase this 52-minute movie. It is well worth the $100 - see <http://www.mith.umd.edu /flare/lovelace/> for details. Show it every year to your students.