Prospecting for Gold: Strategies for Recruiting and Retaining Students in Emerging Technologies

SAME-TEC Pre-Conference Workshop

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Dr. Margaret Semmer
Dean of Career and Technical Education, Joliet Junior College
msemmer@jjc.edu

Ann-Claire Anderson
Sr. Research Associate, CORD
anderson@cord.org

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Acknowledgments

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About the Gender Equity Collaborative

The Collaborative for Gender Equity is a partnership between staff at the nonprofit educational organization CORD (**www.cord.org**) and Moraine Valley Community College's Center for Systems Security and Information Assurance (**www.cssia.org**). This workshop on recruitment and retention is offered as part of a multi-faceted approach to encouraging non-traditional students to pursue careers in cutting-edge technologies. The goals of the larger project are to dispel myths about girls' abilities in science and technology, provide the tools for mentoring programs to take root, disseminate information about high-tech careers and the coursework needed to succeed in them, create a climate of support through mentoring programs, provide opportunities for networking, foster the development of a classroom culture conducive to gender equity and encourage life-long learning.

Ann-Claire Anderson, Project PI
Sr. Research Associate, CORD
anderson@cord.org

Dr. Margaret Semmer, Project Co-PI
Dean of Career and Technical Education, Joliet Junior College
msemmer@jjc.edu

Erich Spengler, Project Co-PI
Director/Principal Investigator, NSF Regional Center for Systems Security and Information Assurance, Moraine Valley Community College
spengler@morainevalley.edu

Recruitment into Postsecondary STEM Programs—A National Issue

The Need

Community colleges are often an important and relatively inexpensive gateway for students entering higher education. Associate's degrees in STEM or engineering technology accounted for about 12% of all associate's degrees in 2005. Over twenty years the number of associate degrees awarded in science and engineering rose from 26,500 to 45,700. This increase was due primarily to the number of IT degrees earned during the dot.com boom years. By 2005, associate degrees awarded in the computer sciences alone grew from 12,800 to 27,641 while the number of engineering technology degrees declined from 53,667 to 28,769. [1]

Women earned 40% of science and engineering associate's degrees in 2005, down from 45% in 1985 and less than their percentage of science and engineering bachelor's degrees (50%). As is the case with men, the largest number of science and engineering associate's degrees earned by women are in computer sciences. Students from underrepresented groups earn a considerably higher proportion of associate's degrees than they do of bachelor's or more advanced degrees. In 2005, they earned more than one-third of all associate's degrees in social and behavioral sciences and almost one-quarter of all associate's degrees in mathematics and computer sciences. The percentage of computer sciences associate's degrees earned by these students almost doubled since 1985.[2]

Change in Earned Associate's Degrees, By Field and Sex Over Twenty Years[3]

Sex/field	1985	2005
Both sexes		
All fields	459,087	640,910
Non-S&E	432,601	595,224
S&E	26,486	45,686
Engineering	3,923	2,072
Aerospace	18	0
Chemical	21	2
Civil	114	41
Electrical	1,077	244
Industrial	50	79
Materials	11	13

[1] "Persistence, Retention and Attainment in Higher Education S&E." *Science and Engineering Indicators 2008*. National Science Board, 2008. http://www.nsf.gov/statistics/seind08/c2/c2s3.htm

[2] "US Higher Education Degree Awards." *Science and Engineering Indicators 2008*. National Science Board, http://www.nsf.gov/statistics/seind08/c2/c2h.htm#c2sh4

[3] "Earned Associate's Degrees, by Sex and Field: Selected Years, 1985–2005." *Science and Engineering Indicators 2008*. (Appendix, Table 2-25), National Science Board, http://www.nsf.gov/statistics/seind08/append/c2/at02-25.pdf

Mechanical	80	64
Other	2,552	1,629
Science	22,563	43,614
Natural sciences	18,001	34,040
Agricultural sciences	2,023	1,875
Biological sciences	1,233	1,985
Earth, atmospheric, and ocean	63	182
Atmospheric sciences	1	139
Earth sciences	60	23
Oceanography	2	20
Mathematics/computer sciences	13,680	28,442
Computer sciences	12,890	27,641
Mathematics/statistics	790	801
Physical sciences	1,002	1,556
Astronomy	1	3
Chemistry	153	301
Physics	68	162
Other physical sciences	780	1,090
Social/behavioral sciences	4,562	9,574
Psychology	983	1,927
Social sciences	3,579	7,647
Anthropology	36	118
Area/ethnic studies	32	100
Economics	85	292
Linguistics	3	6
Political science/public admin	1,229	1,510
Sociology	356	497
Other social sciences	1,838	5,124
Engineering technologies	53,667	28,769
Male		
All fields	204,325	245,677
S&E	14,695	27,343
Natural sciences	9,588	22,837
Mathematics/computer sci	7,128	19,880
Physical sciences	658	932
Social/behavioral sciences	1,606	2,722
Engineering technologies	47,946	24,265
Female		
All fields	254,762	395,233
S&E	11,791	18,343
Natural sciences	8,413	11,203
Mathematics/computer sci	6,552	8,562
Physical sciences	344	624
Social/behavioral sciences	2,956	6,852
Engineering technologies	5,721	4,504

The Challenges

- Increasing local and regional awareness of the opportunities that community colleges offer
- Reinforcing the idea that community colleges are a good value and provide high-quality academic experience
- Improving guidance counseling in high schools
- Providing developmental coursework for underprepared students
- Soliciting the help of alumnae who could serve as role models and mentors
- Tracking program graduates and demonstrating the employment (and academic) opportunities following completion
- Creating explicit program articulation agreements with 4-year institutions to illustrate the academic path students could pursue
- Accommodating working students through flexible course schedules
- Offering scholarships
- Simplifying registration, advising and financial aid processes (so that first-generation college students can navigate the process easily)[4]

Recruitment Strategies: Dual Enrollment

The most common types of recruitment programs begin recruiting secondary students through dual enrollment or dual credit agreements; technology-related competitions; and school, weekend, or summer clubs. Dual enrollment programs allow students to enroll in college courses and earn college credit that is documented on a college transcript. (In some cases, students earn both high school and college credits simultaneously—dual *credit*.) The courses that they take under this arrangement are a step within an articulation agreement between the high school and the college. The articulation agreement outlines a curriculum framework for progression from secondary (sometimes grades 9 -12, sometimes grades 10-12) to postsecondary (2 years of college, sometimes followed by transfer to a four-year institution) education within a career pathway.

Career pathways are supported at both the state and federal levels. The U.S. Department of Education, through the Perkins IV legislation, has mandated the implementation of Programs of Study in career and technical education. States generally carry out the goals of seamless transition from secondary to postsecondary education required by Programs of Study through career pathways. To model effective career pathway development, the Office of Vocational and Adult Education (OVAE) has funded the College and Career Transitions Initiative (http://www.league.org/league/projects/ccti/index.html), a project which is developing partnerships between community colleges, high schools and employers. Another group working to further the implementation of career pathways is the States' Career Cluster Initiative (http://careerclusters.org/index.php) which provides resources and information for organizing programs and guidance activities around clusters of similar occupations. (See also: National Career Pathways Network http://www.cord.org/ncpn-index.cfm.)

[4] Adapted in part from "Chapter 3: Recruitment and Retention." *Enhancing the Community College Pathway to Engineering Careers*, NAP, 2005. http://www.nap.edu/catalog.php?record_id=11438

A dual credit system benefits students in myriad ways, among them, it:

- Encourages career exploration
- Outlines the coursework needed within a particular career pathway
- Provides a taste of the college experience, and
- Jumpstarts their progress along the degree plan

The benefit to colleges? As the credit-granting institution with whom the students and their schools have a relationship, you are a known quantity. Students have enrolled and experienced the quality of instruction at your institution and are already enrolled and transcripted there. And by passing these courses, the students have proved that they're ready for more advanced courses. These students should be low-hanging fruit ripe for recruitment into postsecondary science, technology, engineering and mathematics programs.

Secondary and postsecondary partners in this endeavor will need to determine whether their dual enrollment program will follow a single-course, comprehensive, or enhanced model. In a single-course model, students take one course as an elective. A comprehensive program consists of a series of dual enrollment courses, usually encompassing much of students' junior and senior years of high school. The enhanced model is comprehensive but adds student support services designed to help students succeed in higher education: counseling, assistance in applying for financial aid internships, etc.[5]

Designing a Dual Enrollment Program: Program Committee Discussion

In designing a dual-enrollment program, coordinators will need to take many factors into account.

1. TARGET STUDENT AUDIENCE and RECRUITMENT: Do programs target a specific type of student, and if so, which type?
2. ADMISSIONS REQUIREMENTS: What criteria must students meet to be eligible for participation?
3. LOCATION: Are dual enrollment courses offered at the high school, the college, or both?
4. STUDENT MIX: Do dual enrollment students take courses with regular college students or do they have their own, separate course sections?
5. INSTRUCTORS: What credentials must dual enrollment teachers hold?
6. COURSE CONTENT: Are dual enrollment courses identical to regular college courses? If not, are processes in place to ensure that their content is college-level?
7. CREDIT-EARNING: How do dual enrollment students earn credit? Is it dual credit? Is this regulated by the state or institutionally determined?
8. PROGRAM INTENSITY: Does state policy encourage or mandate single-course, comprehensive, or enhanced comprehensive programs?
9. FUNDING: How are dual enrollment programs funded? What happens to full-time enrollment and average daily attendance funding for dual enrollment students?

[5] Dan Hull. "Dual Credit/Dual Enrollment: Its Role in Career Pathways," *Career Pathways: Education with a Purpose*, CORD, 2005.

10. MANDATORY NATURE OF STATE DUAL ENROLLMENT POLICY: Are dual enrollment programs required by state policy or simply permitted at an individual institution's discretion?[6]

Recruitment Strategies: Out-of-School Experiences

Another way to recruit students into your programs is to start early. Creating an after school, Saturday, or summer experience makes your program visible to a host of potential allies: teachers, parents, guidance counselors, administrators...and students! When programs succeed, students have increased motivation to achieve academically and the skills they need to realize their goals. Research has shown that in order for these programs to succeed, they must follow some general guidelines. Programs should, at a minimum:

- Fit the interests, values and norms of students from diverse cultures
- Be less formal than school
- Expose young people to the world beyond their immediate experience;
- Raise their expectations of themselves and their ability to improve their lives and their communities
- Provide supportive relationships.[7,8]

Blueprint for a Recruitment Program

Your ultimate goal is obvious—to enroll more students in your technology program. It's an ambitious goal that should be broken into more manageable tasks. Here are some suggestions to get your started on the path. Note that these items are not sequential; you will need to multitask and/or form a committee to accomplish them

Identify characteristics of potential recruits. How old are they? What holds their interest and motivates them? What needs must be met or special circumstances addressed in order for them to enroll? Are you targeting recruitment of traditionally underrepresented populations?

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[6] Melinda Mechur Karp, Thomas R. Bailey, Katherine Hughs and Baranda Fermin. *State Dual Enrollment Policies: Addressing Access and Quality*. U.S. Department of Education, OVAE, 2004. http://www.ed.gov/about/offices/list/ovae/pi/cclo/cbtrans/statedualenrollment04.pdf

[7] Beth Miller. *Critical Hours: Afterschool Programs and Educational Success*. Nellie May Educational Foundation, 2003. http://www.nmefdn.org/uploads/Critical_Hours_Full.pdf

[8] R. Granger and T. Kane. "Improving the Quality of Afterschool Programs." *Education Week*, 2004.

Locate potential students. Where can they be found? Who could refer them to you? (List specific regional middle schools and high schools, clubs, secondary and postsecondary STEM-related courses, faculty who could recommend students, current program students, industry contacts, local workforce development board representatives, etc.)

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Determine how many potential students you wish to reach through recruitment activities and how many new students you hope to gain as a result. Recognize that some target audiences—middle-school students, for example—will not yield immediate results but should support your long-term recruitment efforts.

Year 1:_____
Year 2: _____
Year 3: _____
Year 4: _____

Procure baseline enrollment and retention data about the program for evaluation purposes. Which office at your campus collects this information?

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_____

Seek the assistance of your program's Advisory Board. Get employers and program faculty involved early in the process. Spend time building the relationship from the beginning and make sure that they are connected to what's happening in your program. List employers and faculty whose support you will need:

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_____
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Identify other supporters/stakeholders. (program graduates, faculty, parents, current program students, satisfied employers, business and industry councils, state and local education agencies, non-profit organizations, secondary administrators, faculty and counselors, 4-year colleges and universities, federal project staff, etc.)

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Develop marketing strategies. Your program probably uses some generic materials (advertisements, posters, videos, public service announcements) designed to increase awareness of the program. You could build on this content to promote the program to key stakeholder groups. Altering or augmenting them to target specific populations is even better. How will you reach your target audience(s)?

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Plan and deliver recruitment activities. Does your program current offer any? What types of activities would you like to add? (e.g., dual enrollment in courses offered by your college, worksite tours, field trips, hands-on lab experiences, open house, summer or weekend camps, technology forums, mentoring for dual enrollment students, traveling exhibit/poster session, sponsored competitions, etc.)

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For more ideas about organizing your recruitment program, see the "Recruitment Toolkit" developed under the NSF Pathways to Technology project.
http://www.pathwaystotechnology.org/recruitment/basics.html

Model Recruitment Programs for Inspiration or Duplication

Successful recruiting programs at the middle school and high school levels employ many strategies, such as:

- Implementing programs early—start by middle school, if possible. Career exploration is often required in these grades. It is also the time at which STEM interest begins to wane in girls, so it's important to foster their interest and reinforce their abilities at this age.
- Dual credit or dual enrollment programs
- Student support services such as academic and career counseling and assistance with financial aid
- Partnering with Career and Technical Education coordinators and faculty
- Strengthening relationships between secondary schools and your college
- Offering teacher professional development opportunities
- Educating counselors about emerging technologies
- Providing fun activities that engage students in learning and capture their interest in STEM applications and potential careers/fields of study

Example Recruitment Programs for Secondary Students

American Society for Engineering Education K-12 Outreach Program Database
http://www.engineeringk12.org/outreach/making_engineers_cool/search.cfm

Organized by state, grade level and STEM discipline, the ASEE database contains links to a variety of replicable models.

A Guide to High School Programs in Science and Engineering
http://tbp-highschool.mit.edu/highschool/
Links to national and international STEM camps, internships, experiences, and competitions.

Discovery Science Challenge
http://youngscientist.discoveryeducation.com/
A national science competition for students in grades 5 – 8.

HMTech Summer Science Program
http://hmtech.sandia.gov/index.htm
A free program offered by Sandia National Laboratory, HMTech offers hands-on science and engineering experiences as well as pre-college academic courses designed to increase students' academic rate of success and personal self-esteem. The program targets African American middle and high school students, but students from all backgrounds are welcome and encouraged to enroll. Parents of student participants are encouraged to volunteer and assist course instructors in the classroom.

San Antonio College Early Development of General Engineering Program (EDGE)
http://www.asee.org/acPapers/2004-1266_Final.pdf

The EDGE program was initiated during an eight-week summer session at the college in 2003. Twenty to twenty-five tenth- and eleventh-grade students were enrolled in two college courses: college algebra and introduction to engineering. The two classes met from 9 a.m. to noon, Monday through Friday. Afternoon activities consisted of supervised study (SS1) and student success sessions (SS2) from 1 p.m. to 4 p.m. In the SS1 sessions, groups of about 10 students worked together on homework and group projects, received assistance with assignments, and built a sense of community and shared success under the supervision of a leader or mentor. Key elements of the program were collaborative learning, peer support, workshops on study techniques, test taking, guest speakers, and special presentations on engineering. Four field trips introduced students to engineering in two private companies, one agency, and one university. Program results were compiled from the paper, "Getting an EDGE in Engineering Education" by O'Connor and Dimitriu (2004),.

California Mathematics, Engineering, Science Achievement (MESA) School Program http://www.ucop.edu/mesa/home.html
The MESA School Program assists students in middle schools (grades 6–8), high schools (typically grades 9–12), and some elementary schools to boost their performance in mathematics and science and become eligible to enroll in a college/university program in mathematics, engineering, or science. MSP offers individual academic plans, academic excellence workshops, training in study skills, day academies, career and college exploration (e.g., guest speakers and field trips to show students different college and career opportunities, including engineering), parent leadership development sessions, and teacher training opportunities. The MESA program has grown to include eight organizations nationwide, including the "Lunchtime Science" program, a project of the Northwest Girls Collaborative (http://www.nwrel.org/nwedu/10-03/lunch/).

Girls Tech Summer Camp at Moraine Valley Community College
http://www.cssia.org/girlstech/MVCCGirlsTech.pdf
Funded by the Center for Systems Security and Information Assurance and The Gender Equity Collaborative, GirlTech includes sessions on animation, computer networking, robotics, auto mechanics, welding and law enforcement for 6th-9th grade girls.

MATC Girls Tech Camp
http://it.matcmadison.edu/WomenInIT/summercamp.aspx
Summer Camp at Madison Area Technical College for girls in 6th-9th grades with sessions in Electronics, Computer Security, Biotechnology, Computer Networking, Civil Engineering, Computer Programming, Architectural Tech, and Computer Systems Administration.

Tech4UNow
http://technow4u.com
An initiative established by North Orange Community College District and local education agencies as a regional approach to the preparation of a skilled workforce in California. The project partners work to strengthen linkages between secondary and postsecondary institutions through closer course alignment and articulation while providing high school students with exposure to advanced manufacturing and industrial design technologies careers. Each participating camp offers three mini-courses consisting of five Saturday classes. The final Saturday includes a graduation activity at which students display their project with the prototype for their families.

The Computer Clubhouse Network
http://www.computerclubhouse.org/
Established in 1993 by The Computer Museum (now part of the Museum of Science, Boston) in collaboration with the MIT Media Laboratory, the Computer Clubhouse helps youth acquire the tools necessary for personal and professional success. Intel supports a network of 100 clubhouses around the world. The programs offered include a teen summit, career planning and exploration activities, an invention workshop for girls and a workshop on scientific inquiry.

Girls E-Mentoring in Science, Engineering and Technology (GEM-SET)
GEM-SET is a demonstration project developed by the Women's Bureau, U.S. Department of Labor, in partnership with the Center for Research on Women and Gender at the University of Illinois at Chicago. The GEM-SET web site is maintained by the University of Illinois at Chicago Center for Research on Women and Gender and the UIC Women in Science and Engineering Program (WISE).
http://www.uicwise.org/outreach/gem-set-mentoring-for-success.html

Botball
http://botball.com
A project in which students are given about seven weeks to design, build and program a team of mobile, autonomous robots as well as document the engineering process online. Participants compete against each other on a 4' x 8' playing field in a fast paced, non-destructive regional tournament. The robots are student built and programmed to maneuver on the game board without the need for remote control. Tournaments are held in fourteen regions throughout the U.S.

Technology Student Association
http://www.tsaweb.org/
TSA's membership includes over 150,000 middle and high school students in 2,000 schools spanning 47 states. Chapter members work on competitive events and attend state and national conferences. TSA helps teachers meet the criteria for STEM education goals through exciting programs that include technology activities, competitions, leadership and teamwork for students.

Tech Apprentice Summer Internship Program
http://www.batec.org
BATEC, a regional NSF Center focusing on IT, in collaboration with the Boston Private Industry Council and TechBoston/Boston Public Schools, offers a Tech Apprentice program for 75 students in high-level technology positions. This program pairs highly-qualified students with local technology or technology-enabled companies to gain valuable workplace experience.

Scholarships in a Technology Program
http://www.carcam.org/scholarships.html
The Alabama Automotive Manufacturer's Association provides a scholarship for newly graduated high school or GED students who will pursue an automotive manufacturing education at two-year colleges in Alabama.

High School Cyber Defense Competition
http://survey.iac.iastate.edu/HSCDC/
Sponsored by Iowa State University, several state agencies and technology organizations, the High School Cyber-Defense Competition is open to any Iowa high school. Students in teams of 3-10 play the role of the Blue Team, or Information Assurance community, under fire from the Red Team, "the hackers" on a network.

National Chemistry Week
http://www.acs.org/ncw
A community-based annual event that unites American Chemical Society local sections, businesses, schools, and individuals in communicating the importance of chemistry to our quality of life. As part of this celebration, students are encouraged to enter a poster contest or the ChemVention competition. Local section members often perform demonstrations at schools, in mobile labs, and at shopping malls in honor of the week.

Future Scientists and Engineers
http://www.fsea.org
A national program started by the Discovery Science Center in California, FSEA encourages students from grades 4 through 12 work together in teams with local scientists, engineers and technicians to design, build, test and compete hands-on projects.

Example Programs for Secondary Teachers

Biotechnology Teacher Support Network
http://ppge.ucdavis.edu/Teacher/08_BTSN_registration.cfm
Offered free to secondary teachers by the Partnership for Plant Genomics Education, UC-Davis, the BTSN provides training in Basic Biotechnology and Transformation and and Introduction to PCR along with industry tours throughout the summer.

techCamp
http://www.floridahightech.com/pressroom/manatee2005.html
Sponsored by the Florida High Tech Corridor Council, this program delivers a 1-2 day workshop for secondary teachers in a different regionally significant technology each year. Participating teachers have the opportunity to experience technologies such as semiconductor manufacturing, optics and photonic, simulations, aerospace, and IT through hands-on activities.

Summer Institutes
http://www.npt2.org/SFIFlyer2008.aspx
The National Network for Pulp and Paper Technology Training presents regional workshops for high school faculty, community college instructors and counselors that introduces them to the paper industry through lab experiences and site visits. CEUs are available.

Example Programs for Counselors

Counseling Workshop for Careers in Biotechnology and Medical Devices
http://biotechsystem.ucdavis.edu/Documents/careercounselorFLYER08%20do.pdf
Industry overview, review of web resources, an industry panel discussion of career options and a plant tour provides for career counselors at all levels and one-stop career centers. This program is sponsored by a partnership between the San Diego Workforce Partnership, BIOCOM, and the Southern California Biotech Center.

Tech Trek
http://www.tcc.edu/news/press/2004/0719tech.htm
A project of Tidewater Community College, the Tech Trek tour takes 40 school system counselors to local businesses that represent business, information technology, health sciences, engineering and industrial technology, enabling them to see high-tech careers in action.

Resources for Developing Secondary Recruitment Programs

Sample Documents Supporting Tech Camp Marketing and Implementation
http://www.scate.org/Educators/FInfo/SummerTechnologyCamp.asp
The website for the SC ATE Center of Excellence Summer Engineering Technology Camp houses student applications, camp brochures, a guidance counselor letter, schedule, budget and closing ceremony flyer that may serve as useful models. The camp is designed to introduce 6th, 7th and 8th graders to the fun of engineering technology, the four day camp offers sessions on robotics, computer-aided drafting, electronics, and hands-on mathematics.

Sample Articulation (Secondary to Postsecondary) Agreement for IT Programs
http://www.doe.virginia.gov/VDOE/Instruction/CTE/IT_Articulation_Agreement.pdf
The purpose of articulation agreements is to avoid duplication of instructional efforts. If a high school student has taken and mastered a course that has mirror content in a community college course, that student will receive college credit and progress directly to the next applicable course in the program sequence.

After-School Program Toolkit
http://www.cisnet.org/working_together/after-school.asp
Communities in Schools provides a comprehensive, research-based guide for establishing, managing and evaluating a youth program.

Essential Elements of Quality After-School Programs
http://www.cisnet.org/library/download.asp?file=CIS-NDPC_2006_01-30.pdf
A research monograph from Communities in Schools.

Outreach-in-a-Box
http://www.ncwit.org/resources.res.box.outreach.html
The National Center for Women in Information Technology provides the materials needed to introduce middle-school students to the world of computing. Outreach-in-a-Box includes everything for preparing for and delivering an engaging class presentation at a local middle school -- including a presentation, hands-on robotics activity, and program guide for how to use the materials

A Cooperative Approach to Work-based Learning and College Transitions: University, College, and High School Partnerships
http://orise.orau.gov/sep/files/stwfinalreport.pdf
This report from the Oak Ridge Institute for Science and Education summarizes key strategies, challenges, and lessons learned from nine higher education partnerships established to enhance work-based learning. Includes a helpful glossary of terms, mini case studies and an analysis of the effects of career or work-based learning activities on persistence, GPA, and remediation.

Accelerating Student Success through Credit-Based Transition Programs
http://www.ed.gov/about/offices/list/ovae/pi/cclo/cbtrans/products.html
This website from the U.S. Department of Education Office of Vocational and Adult Education provides links to statistics, case studies, research and recommendations for policymakers, practitioners, and researchers.

Example Recruitment Programs for Postsecondary Students

Biowork
http://www.ncbionetwork.org/index.cfm
An introductory course taught at community colleges within the North Carolina Community College System, Biowork prepares entry-level process technicians for the biotechnology, pharmaceutical, or chemical manufacturing industries. Students must have at least a high school diploma and competency in math and reading. Units included in this short course are introduction to bioprocessing, safety, quality, measuring variables, transforming materials, process machinery and controls, sterile processes, growing living cells, and marketing the smart worker.

Model Institutions for Excellence (MIE)
http://www.huliq.com/35897/blueprint-for-recruiting-minorities-to-science-and-engineering
http://www.systemic.com/mie/
The Model Institutions for Excellence (MIE) Program, funded by the National Science Foundation (NSF) and the National Aeronautics and Space Administration (NASA), was designed in the early 1990s as a long-term initiative to empower institutions of higher education to serve as models to improve the quantity and quality of America's science, technology, engineering, and mathematics (graduates at minority-serving institutions. Five minority-serving institutions--Bowie State University in Maryland, Spelman College in Atlanta, Universidad Metropolitana in Puerto Rico, the University of Texas at El Paso, and Xavier University of Louisiana in New Orleans--plus the Oyate Consortium, representing three tribal colleges in the Midwest, are MIE's participating institutions. Among the keys to the MIE program's success are helping to bridge the transition from high school to college through training of elementary, middle school and high school teachers and offering summer orientation programs. Once students are in college, mentoring programs, tutoring, opportunities for group study, and advice on financial aid options help students stay engaged in science and engineering studies. With the help of faculty and the business community, students are encouraged to become directly involved in ongoing research.

Bridge Program
http://www.mdc.edu/Kendall/biology/grant.htm
The Bridge Program was developed and funded by the National Institutes of Health through the National Institute of General Medical Sciences. The University of Miami and Miami-Dade College have collaborated on a Bridge Program since 1994. The long term goal is to encourage students from underrepresented minorities to enter research careers in the biomedical sciences. The immediate goal of our program is to encourage our students to complete an AA program and transfer into a baccalaureate degree program in the sciences at a four-year college or university, preferably the University of Miami. The three key components of the Bridges program are: Student Development & Enrichment, Faculty Updating & Training, and Curriculum Development.

Summer Bridge Program
http://montgomery.lonestar.edu/112995/
Lone Star College offers a 3-week Summer Bridge program for students who need extra academic work to place into college credit courses. This accelerated program offers developmental English, writing, reading; or math and is open to graduating seniors who passed the high school exit test but did not score high enough to place into college courses. Students take one of these courses during the three-week sessions and are matched with mentors throughout the program and into the fall semester. Useful information about career success, time management, and study skills are also integrated into the courses. As an additional incentive for completion, the first 40 students who register and complete the course receive a $100 scholarship to be used at the college the following fall semester.

Retention Strategies: Learning Communities

What are Learning Communities and Why Create Them?

In analyzing the weaknesses of higher education in the U.S., student engagement and retention researcher Dr. Vincent Tinto observes that:

> *The experience of learning in higher education is, for most students, still very much a "spectator sport" in which faculty talk dominates and where there are few active student participants. Just as importantly, students typically take courses as detached, individual units, one course separated from another in both content and peer group, one set of understandings unrelated in any intentional fashion to what is learned in other courses.*[9]

His proposed solution—one that is supported by many other education theorists (e.g. Alexander Astin, Parker Palmer, Patricia Cross, Jean McGregor)—is the creation of

[9] Vincent Tinto. "Learning Better Together: The Impact of Learning Communities on Student Success." *Journal of Institutional Research*, 9 (1), 48-53 2000.
http://www.pellinstitute.org/journal/Pell_OppMattersv1_EngstromTinto.pdf

Learning Communities. To implement this strategy, a program will need to revise courses and build connections between participants, as a learning community is:

> *...any one of a variety of curricular structures that link together several existing courses—or actually restructure the curricular material entirely—so that students have opportunities for deeper understanding of and integration of the material they are learning, and more interaction with one another and their teachers as fellow participants in the learning enterprise.*[10]

What does this mean in terms of retention? In his analysis of student retention and graduation data, Tinto has found that:

> *Students who are actively involved with peers, faculty and staff—especially in learning activities—are more likely to learn, persist, and graduate. The focus on the classroom is important, because for the many students who commute or work while enrolled, the classroom time is the only time they are likely to be on campus.*[11]

Potential Benefits

- Address perceived problem of student underpreparation for higher education
- Ease the transition from high school to college
- Increase faculty to student interaction
- Increase student to student interaction
- Improve retention to sophomore year
- Increase program completion/graduation rate
- Improve student academic performance as measured by grades
- Improve student cognitive development
- Serve as an advising tool
- Increase faculty collaboration
- Offer programmatic advantage over institutions competing for the same students
- Make connections between the subjects studied
- Promote active learning strategies
- Promote faculty professional growth
- Infuse skills, such as writing, speaking, and computation across the curriculum
- Foster an academic climate of innovation

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[10] Gabelnick, MacGregor, Matthews, and Smith. *Learning Communities: Creating Connections Among Students, Faculty and Disciplines*, Jossey-Bass, 1990.

[11] Vincent Tinto. *Student Retention and Graduation: Facing the Truth, Living with the Consequences*. The Pell Institute, 2004. http://www.pellinstitute.org/tinto/TintoOccasionalPaperRetention.pdf

Learning Community Structures: Variations on a Theme

First-Year Experience/Freshman Interest Groups

These are learning communities in which a small cohort of students enrolls in larger classes that *faculty do not coordinate*. Intellectual connections and community-building often take place in an additional integrative seminar.[12] Typically, characteristics include:

- A cohort of new college students taking two or more courses together
- Development around an interdisciplinary theme, a need (such as developmental studies), or a technology program
- Guidance by an upper-level peer mentor or faculty advisor
- Weekly study groups and social gatherings

Linked or Paired Courses—more faculty involvement

This type of learning community involves two classes linked thematically or by content, which a cohort of students takes together. The *faculty do plan* the program collaboratively but teach separately.[13] Programs with linked or paired courses feature:

- Student co-registration for two or more courses
- Program design as 1 content course + 1 skills course
- Faculty co-creation syllabi so that content in each course reinforces concepts in the linked courses and permits opportunities for cross-course application of skills
- Faculty not usually team-teaching

Learning Clusters—a variation on the linked/paired course model

- Designed around clusters of 12+ credit hours of courses
- Limited to 30 students per cluster
- Students take the same courses at the same time
- Requires intensive coordination by faculty teams
- Often used as a way of covering core curriculum requirements
- Sometimes thematic

Team-Taught Learning Communities

- Combines 2-3 courses
- Fully team-taught
- Limited to 20-25 students per instructor
- Usually block scheduled
- May be thematic
- Interdisciplinary; course content is integrated
- Requires faculty planning time and ongoing collaboration

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[12] Adapted in part from "Learning Community Models" Jean McGregor, et. al. The National Learning Communities Project. http://www.evergreen.edu/washcenter/resources/lcmodels/sld001.htm

[13] Adapted in part from "Learning Community Models" Jean McGregor, et. al. The National Learning Communities Project, 2000. http://www.evergreen.edu/washcenter/resources/lcmodels/sld001.htm

Coordinated Studies Model
This model require learning community participants—both students and faculty—to be engaged "full-time" (all courses) in interdisciplinary, active learning around themes. Faculty development occurs through co-planning and team-teaching across disciplinary boundaries.

- Designed around a theme or around skills that require mastery
- Emphasizes interdisciplinary learning
- Coordinated and team-taught by 3-4 faculty
- A full-time learning community—students enroll in this learning community as their entire course load for the semester and faculty teach only in the learning community courses
- Scheduled in blocks of time that can be arranged for various activities (e.g. labs, field trips, extended discussions, collaborative projects, etc.)[14]

Designing a Learning Community: Interdisciplinary Collaborative Exercise

The purpose of this exercise is for your group to engage in some boundary-crossing curricular brainstorming. It requires each of you to "leave your syllabus at the door" (but not your disciplinary background!) and to engage in some intellectual bridge-building with your colleagues. [With thanks to the Washington Center for Improving the Quality of Undergraduate Education for this idea.]

Step 1: Focus your own thoughts about learning communities then answer the following questions.
If you had the opportunity to teach in some sort of learning community format, what THEME or THEMES might intrigue you?

_____
_____
_____
_____
_____
_____
_____

What larger interdisciplinary questions, issues, ideas or problems might be intriguing for you and for students to explore?

_____
_____
_____
_____
_____
_____

[14] Adapted in part from "Learning Community Models" Jean McGregor, et. al. The National Learning Communities Project, 2000.
http://www.evergreen.edu/washcenter/resources/lcmodels/sld001.htm

Step 2: Introduce yourself to your group—include the courses you teach. Next, describe what larger interdisciplinary questions, issues, ideas, or problems are intriguing to you right now.

Step 3: Once everyone in the group has shared their ideas, look for areas of interest or topics that overlap. These overlapping areas might inspire you to choose a theme for your group's learning community. Try to reach consensus on a common theme, question, or topic that could conceivably be the organizing idea for a learning community. List the possibilities here:

Step 4: Given an imaginary quarter or semester in which your group were teaching collaboratively around this theme, what might you and your students do?

Flesh out the substance of your program in brainstorm fashion -- that is, GENERATE particular sub-themes, concepts, authors or titles of texts, films, field experiences or research projects which might illustrate the theme.

Step 5: Give your program a thematic title and make a note of the disciplines involved, e.g.:

"American Dreams, Lost and Found"	English Composition: Research Writing History: 20th Century America Introduction to Film Studies

Designing a Learning Community: Program Committee Discussion

1. TARGET STUDENT AUDIENCE and RECRUITMENT: Who is the student audience we want to involve in our LC effort first? How will we identify these students? Who else on the campus can help us with this?
   - ♦ academically underprepared students
   - ♦ student athletes
   - ♦ undecided majors
   - ♦ students in specific majors
   - ♦ ethnic minority students
   - ♦ honors students
   - ♦ ESL students
   - ♦ evening/weekend students
   - ♦ returning adult students
   - ♦ early-entry college students
   - ♦ part-time students
   - ♦ students preparing to transfer to 4-year school
   - ♦ freshmen

2. LC MODELS/STRUCTURES: Given the different types of LC models, which ones seem most doable for us? (Remember that some campuses run a variety of LC models simultaneously, and it's perfectly okay to pilot more than one type.)

3. THEMES: What themes, if any, will provide the focus for the learning community?

4. COMMUNICATION: Which faculty members will be involved? How will broad involvement be encouraged? Do those who are involved represent leadership on campus? Who will coordinate the effort in the short and long term?

5. INITIATIVES ON CAMPUS: What are the current initiatives on campus? How might learning communities fit with initiatives already under way, such as general education reform, student affairs/academic affairs partnerships, diversity, writing across the curriculum, critical thinking, or others? Are any of the members of the learning community effort connected with these initiatives? Will the learning community be seen as furthering these initiatives?

6. IMPLEMENTING THE LEARNING COMMUNITY: Who needs to be involved with implementing the learning community? Which administrative and support service people should be brought together to discuss implementing the learning community? How can key administrators support this effort? Where are the obstacles?

7. RESOURCES: What resources are available to support the project? What is a reasonable time frame if outside funding is needed?

8. SUPPORT: Whose help will we need in order to do this successfully?
   - Department Chair
   - Academic and Technical Deans
   - Student Development personnel (counselors, advisors, LRC staff, etc.)
   - Registrar's Office
   - Instructors

9. INSTRUCTORS: To successfully coordinate and teach in this program, what qualities do they need? What support will you provide to them?

10. MARKETING: How will learning community be promoted and marketed? How will the students be recruited? What are the appropriate media to use in recruitment? Who needs to be involved now on our planning team, to assist in this effort?

11. INSTITUTIONALIZATION: How will the learning community effort be institutionalized? Who will lead the long-term effort in the faculty and in the administration? How will future programs and teams be selected? How will the learning community be evaluated?

12. FEEDBACK: What kind of feedback loops can be put in place so that the work is evaluated and improved? What kinds of mechanisms are there for disseminating efforts within the institution?[15]

Resources for Developing Learning Communities

Learning Communities: Getting Started
http://www.mcli.dist.maricopa.edu/ilc/monograph/preface/0_1.html
Gateway Community College and Maricopa Community Colleges.

Frequently Asked Questions about Learning Community Initiatives
http://www.evergreen.edu/washcenter/lcfaq.htm
Washington Center for the Improving the Quality of Undergraduate Learning

Metropolitan Community College's Learning Communities Proposal Form
http://www.mccneb.edu/formsbank/forms/LearningCommunityProposal.doc
For faculty who would like to develop a learning community. (Over 50 have been implemented.)

Example Postsecondary Learning Communities

Case Study: Two-Year Effects of a Freshmen Learning Community Program at Kingsborough Community College
http://www.mdrc.org/publications/473/execsum.pdf

[15] Adapted from 'Planning Questions for Developing Learning Community Initiatives", by Jean MacGregor and Roberta Matthews. Learning Communities National Resource Center, http://www.evergreen.edu/washcenter/natlc/docs/planning_Qs.doc Used with permission.

Purdue Learning Communities in the College of Technology
http://www.purdue.edu/sats/documents/Technology.pdf

Learning Communities at LaGuardia College
http://www.lagcc.cuny.edu/LC/academies.html

Residential and Curricular First-Year Experience at Minnesota State University - Mankato
http://www.mnsu.edu/fye/communities/types.html

Learning Communities at Skyline College
http://www.smccd.net/accounts/skyinstruct/docs/Learning%20Communities%202006.pdf
Rather than serving particular themes, these learning communities are focused on specific student groups. (e.g. African Americans, student athletes, Filipino Americans, Women in Technology, Honors transfer students, etc.)

Transitional Bilingual Learning Program at Truman College, City Colleges of Chicago
http://www.trumancollege.cc/tblc/

Retention Strategies: Mentoring

What is Mentoring?

In general terms, mentoring involves committed, supportive individuals assisting others in personal, academic, or professional growth. Mentoring also includes: providing role models; providing positive, fun experiences with science and technology; providing information about career pathways in emerging technologies, including the courses needed and potential employment opportunities; providing both academic and emotional support for students in community college programs; arranging professional networking sessions and much more. In other words, **mentoring** is a developmental, caring, sharing, and helping relationship where one person invests time, know-how, and effort in enhancing another person's growth, knowledge, and skills, and responds to critical needs in the life of that person in ways that prepare the individual for greater productivity or achievement in the future.[16]

Potential Benefits

- Improved academic performance by at-risk students and students in prerequisite mathematics and science courses
- Increased ethnic and gender diversity in STEM courses
- Better adaptation to the college culture
- Recruitment of students into college technical programs
- Persistence to graduation
- Skills development and career preparation
- Provision of more program graduates for local industry

What Does a Mentor Do?

A mentor works on two levels, both supporting the student protégé (sometimes referred to as a "mentee") in meeting essential academic requirements and envisioning a successful future. A mentor:

- Advocates – Offers sponsorship, provides exposure and visibility within the organization
- Acquires resources – Brings critical readings, opportunities, or experiences to the attention of the mentee
- Acts as a role model – Offers insight on how he or she "made it" in the organization
- Advises – Shares institutional and professional wisdom, critiques performance, makes suggestions
- Coaches – Helps a mentee learn new skills and practice new behaviors
- Protects – Helps a mentee find new and challenging opportunities within the organization while protecting her from adverse forces and "dead-end" job assignments

[16] Oak Ridge Institute for Science and Education. Quoted in CWIT Mentoring Tool Kit.

- Supports – Listens with a sympathetic ear, explains unwritten rules, and acknowledges disappointments and triumphs.[17]

Designing Your Mentoring Program

This is the first—and the key—element in building your program, because the design is the blueprint you will follow to carry out all other aspects of the program.

What are the goals of your mentoring program? (Think in terms of addressing specific problems—under-representation of young women in emerging technologies, retention in the nanotechnology program, etc.—and providing services such as academic enrichment, social support, and career exploration.)

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Which student populations will your mentoring program serve?

_____
_____
_____
_____

Who are the stakeholders? (Think in terms of all those—on and off campus—who have a vested interest in the success of your program or can contribute to its success in some way.)

_____
_____
_____
_____
_____
_____
_____

[17] NCWIT Mentoring-in-a-Box. National Center for Women & Information Technology, 2006. http://www.ncwit.org/resources.res.box.html

Types of Mentoring

The type of mentoring program you offer will shape your program's structure and operation. The following definitions of mentoring types are based on those in the *Elements of Effective Practice*, a set of guidelines developed by the National Mentoring Partnership.

- Traditional One-to-One Mentoring—places one mentor in a relationship with one student. At a minimum, the mentor and student should meet regularly at least four hours per month for at least a year. There are exceptions—such as in school-based mentoring, which coincides with the school year—and other types of special mentoring initiatives. In such special circumstances, students need to know from the outset how long they can expect the relationship to last so they can adjust their expectations accordingly.

- Group Mentoring—involves one mentor forming a relationship with a group of up to four students. The mentor assumes the role of leader and makes a commitment to meet regularly with the group over a long period of time. Most interaction is guided by the session structure, which includes time for personal sharing. Your mentoring program might specify certain activities that the group must participate in, or in some cases the mentor may choose or design appropriate activities. Some group mentoring activities may be intended as teaching exercises, while others may simply be for fun.

- Team Mentoring—involves several mentors working with small groups of students, ideally with mentor-to-student ratio no greater than one to four.

- Peer Mentoring—provides an opportunity for an older or more experienced student to develop a guiding, teaching relationship with a younger or less experienced student. For example, a college student taking advanced courses in a technical program might mentor a student who is new to the program. Female peer mentors serve as positive role models for incoming female students.

- E-mentoring (also known as online mentoring, or telementoring)—connects one mentor with one student. The pair communicates via email at least once a week over a period of six months to a year. Some programs arrange two or three face-to-face meetings, one of which is a kickoff event. Often the mentor serves as a guide or advisor in school- or career-related areas; for example, helping the student complete a school project or discussing future education and career options. During the summer months, e-mentoring can serve as a bridge for mentors and students in traditional one-to-one relationships.[18]

[18] *How to Build A Successful Mentoring Program Using the Elements of Effective Practice*, MENTOR/National Mentoring Partnership, 2005. http://mentoring.org/find_resources/elements_of_effective_practice/tool_kit/

Since its inception, E-Mentoring has evolved from simple one-on-one exchanges of emails and group discussions via listservs to the use of more complex tools such as online courseware and discussion forums. If your school already has a license for Blackboard (or another course platform), you could set up a course section as a mentoring site. Mentees would access the site as if they were a student by using a password. As the mentoring program coordinator, you would need instructor access allowing you to view all online interactions within the section. For small group or one-on-one mentoring, you would use the Groups feature to limit access to those participating in the smaller discussion. Most courseware offers both real-time chat which functions like text messaging and a threaded discussion area which promotes ongoing discussions like a listserv. A free alternative[19] to this configuration might be the establishment of password-protected message boards accessed via your project or school website.

What specific type(s) of mentoring you will offer? (one-on-one, team mentoring, e-mentoring, peer mentoring, etc.)

_____
_____
_____
_____
_____
_____
_____

In what kinds of activities will mentors and students participate? (e.g., one-on-one sessions, worksite tours, field trips, hands-on lab experiences, panel discussions by experts, tutoring, pizza parties, practice interviews, etc.)

_____
_____
_____
_____
_____
_____
_____
_____

How often will your program offer activities? How often will students and mentors meet?

_____
_____
_____
_____

[19] Zorum (http://zorum.phpoutsourcing.com/) is freeware that can be used on either intra- or internet sites.

Do you have resources for mentors to use in facilitating additional activities (such as lab experiences) or do you need to obtain/develop them? List potential sources of materials and content developers:

_____
_____
_____
_____
_____
_____
_____
_____
_____

Recruiting Participating Students for Your Mentoring Program

Your best advertisement for your mentoring program will eventually be those who have participated as mentors or mentees. Until the word-of-mouth buzz starts, however, you'll need to be actively involved in the recruiting process.

- Email all instructors in appropriate departments—particularly those teaching prerequisite courses or those who have frequent contact with the targeted students—about the program and ask them to introduce the program to their students. Provide instructors with brochures to hand out.
- Don't be shy about one-on-one recruiting—a personal invitation to participate is very effective. You will probably want to create a recruitment packet to hand out to prospective program participants. The packet could include a fact sheet on your program, a description of program activities in which mentees will participate, a list of the benefits of being mentored, an application, and a parent permission form (if the prospective mentee is a minor).
- If your program targets secondary students, you will want to convey a sense of exploration and of fun. Keep their parents, teachers, and counselors in mind as well, however, as you will need their assistance.

Recruiting Mentors

Targeted recruitment—recruitment that is focused on particular attributes—guarantees not only that your program will hit its benchmarks, but that the types of individuals you recruit will also be up to the task. And while many programs use a formal screening process to weed out unsuitable volunteers, they can also save staff time and program resources by being intentional about who gets recruited in the first place. For best results, you should develop a written recruitment plan employing multiple strategies. As a starting place, answer the following questions:

How many mentors do you hope to recruit?

_____
_____

What professional qualifications and personal characteristics do you seek in mentors?

Write a brief job description for a mentor in your program.

Where are you most likely to find appropriate volunteers for your program? From what local talent pools might you recruit mentors? (e.g., industry employees, college faculty and students; high school faculty)

You will probably want to develop a mentoring application form that requests:

- A statement of the applicant's expectations (in response to the mentor job description)
- Preferred days/times for participation
- Experience related to your program's focus
- Personal references (not family members)
- Employment and academic history
- Permission to perform a background check

A face-to-face interview may also be helpful in assigning mentors to particular roles.. Suggested questions might include:

- What words would you use to describe yourself? What words would your family and friends use to describe you?
- Who has been a role model or mentor in your life?
- Why do you want to be a mentor?
- What special skills and interests do you have?
- What do you like about working with _____? (description of program students)
- What benefits do you expect to receive from your participation as a mentor?
- How much time do you have to devote to the program?
- What expectations do you have of the students with whom you may be working?
- Who or what do you think has the most influence on _____ 's (description of program students) career decisions?[20]

You may also wish to have applicants sign an agreement that commits them to:

- Attending training sessions
- Engaging in the mentoring relationship with an open mind
- Being on time for scheduled meetings
- Respecting students' rights to confidentiality
- Asking for help when needed
- Accepting guidance from program staff
- Notifying staff if they are having difficulty in their mentoring relationship
- Notifying the program coordinator if they need to miss a session
- Notifying the program coordinator of any changes in their employment, address and telephone number
- Refraining from contacting or seeing the mentee outside of the established parameters and supervised sites where the program takes place.[21]

Matching Mentors with Participating Students

In the case of one-on-one mentoring, you will be matching one mentor with one student. You will follow the same procedure if you are using small group or team mentoring in which the ratio is one mentor per four students. Decisions tend to be based on similarities between the mentor and the student.

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[20] Adapted from *Yes, You Can: Establishing Mentoring Programs to Prepare Youth for College*. US Dept of Education Partnership for Family Involvement in Education, 1998, http://www.ed.gov/PDFDocs/yyc.pdf; and Chapter 22, Section 2, *The Community Toolbox*, KU Workgroup for Community Health and Development, 2007, http://ctb1.ku.edu/tools/section_1199.htm

[21] *How to Build A Successful Mentoring Program Using the Elements of Effective Practice*, MENTOR/National Mentoring Partnership, 2005. http://mentoring.org/find_resources/elements_of_effective_practice/tool_kit/.

Which of the following characteristics will you consider in matching mentors to students?

- Gender _____
- Race _____
- Shared background or experience _____
- A relationship between the mentor's expertise and the student's interests _____
- Personality/temperament _____
- Approval of student's parents _____
- Availability for scheduling _____
- Other _____[22]

What information do you need students to provide on their program application in order for you to place them successfully with an appropriate mentor?

_____
_____
_____
_____
_____
_____
_____
_____

Nuts and Bolts: Running the Mentoring Program

There are many behind-the-scenes, practical details that you will need to consider in order to ensure a successful and sustainable mentoring program. For instance:

What means will you use to preserve student confidentiality (as appropriate)?

_____
_____
_____
_____

What factors will you use to assess whether you're meeting the objectives and goals as established?

_____
_____
_____
_____
_____

[22] Adapted from *Yes, You Can: Establishing Mentoring Programs to Prepare Youth for College*. US Dept of Education Partnership for Family Involvement in Education, 1998 http://www.ed.gov/PDFDocs/yyc.pdf

How will you fund the program initially? (e.g., as part of a currently-funded program; Perkins; employer-funded; in-kind contributions, etc.)
List potential *internal* (institutional) funding sources, and potential *external* funding sources (i.e., large corporate foundations, educational foundations, government agencies, individual donors, local employers, unions, professional societies).

_____
_____
_____
_____
_____

How will you maintain the program's financial records? Does your organization have accounting staff who can help you and/or do you have experience with this task?

_____
_____
_____
_____

List non-monetary resources that might be available (e.g., volunteer time, grant writers, donations of equipment or materials, catering of recognition event, videotaping of activities, website editing, etc.)

_____
_____
_____
_____
_____
_____

How will you gauge your community's awareness of your program?

_____
_____
_____

Example Mentoring Programs for Secondary Students

Girls E-Mentoring in Science, Engineering and Technology (GEM-SET)
http://www.uicwise.org/outreach/gem-set-mentoring-for-success.html
GEM-SET is a demonstration project developed by the Women's Bureau, U.S. Department of Labor, in partnership with the Center for Research on Women and Gender at the University of Illinois at Chicago. The GEM-SET web site is maintained by the University of Illinois at Chicago Center for Research on Women and Gender and the UIC Women in Science and Engineering Program (WISE).

Worthwhile To Help High School Youth (WORTHY)
http://bmpcoe.org/bestpractices/internal/nges/nges_41.html
WORTHY is a mentoring program that teams Northrop Grumman's Electronic Systems sector employees with Baltimore city high school students to help them achieve their dreams of pursuing technical and business careers.

Example Mentoring Programs for Postsecondary Students

Women in Technology Mentoring Group
http://www.morainevalley.edu/cad/nsfmentors.htm
At Moraine Valley Community College (IL), two mentoring groups are available to meet the needs of female students—one that allows new students entering Moraine Valley's Mechanical Design/CAD, LAN, IT Security, Computer Programming, and Networking programs to connect with experienced female students who can provide guidance and answer questions and another that connects them with corporate mentors. Moraine Valley's Women in Technology Mentoring Program Manual is available for download

New Beginnings Program
http://www.nde.state.ne.us/nce/Nontrad_Equity/documents/NECCNontradMentoring.pdf
Northeast Community College (NE) instituted this mentoring program supporting students in programs that are non-traditional for their gender.

Hispanic Outreach Mentoring Program
http://www.bluegrass.kctcs.edu/multicultural_affairs/hispanic_outreach/mentoring_program/
A program designed to develop relationships among students and mentors that will enhance the well-being, retention, development, recruitment, and success of Hispanic students at Bluegrass Community and Technical College (KY).

MentorNet
http://www.mentornet.net/
MentorNet pairs community college students in science and engineering with professionals in the field for one-on-one e-mentoring.

Resources for Developing a Mentoring Program

Creating an E-Mentoring Community
http://www.washington.edu/doit/Mentor/index_pdf.html
An extensive how-to guide from the University of Washington's DO-IT project, this handbook explores mentoring, peer support, and other activities designed to promote academic and career success, social competence, self-determination, and leadership skills for teens with a wide range of abilities and disabilities.

The Center for Women in Technology (CWIT) Mentoring Toolkit
http://genderequitycollaborative.org/pdfs/cwit_mentoring_tool_kit.pdf
CWIT was established by the University of Maryland, Baltimore County, to develop programs encouraging more women and girls to prepare for careers and become leaders in information technology.

The Gender Equity Collaborative
http://genderequitycollaborative.org
A National Science Foundation ATE project focused on dispelling myths about girls' abilities in science and technology, providing the tools for local mentoring programs to take root, disseminating information about high-tech careers and the coursework needed to succeed in them, and fostering the development of a classroom culture conducive to gender equity. The website houses a "how-to" Mentoring Toolkit.

Advisor, Teacher, Role Model, Friend: On Being a Mentor to Students in Science and Engineering
http://www.nap.edu/readingroom/books/mentor/
This guide, developed by the National Academy, the National Academy of Engineering and the Institute of Medicine, is intended for faculty members, teachers, administrators, and others who advise and mentor students of science and engineering—summarizes features that are common to successful mentoring relationships.

E-Mentor Training
http://www.mentoring.org/find_resources/ementoring_clearinghouse/
A step-by-step online module on how to mentor and many other fantastic resources.

Additional Retention Strategies and Suggestions for Implementation

Community College Inventory: Focusing on Student Persistence, Learning and Attainment
http://www.ccsse.org/publications/Community%20College%20Inventory.pdf
This inventory, developed by Kay M. McClenney and Byron N. McClenney, provides descriptions of eleven characteristics of colleges that are strongly focused on student success. Related to each characteristic is a set of indicators that more fully describe observable institutional practices. The inventory can be used as a tool for prompting institutional review, reflection, discussion and improvement.

Starting a Retention Program
http://www.cscsr.org/retention_issues_starting_a_program.htm
This brief article from the Center for the Study of College Student Retention outlines the key questions one must ask before implementation can take place successfully.

Implementing a Retention Program
http://www.cscsr.org/retention_issues_implementing_retention.htm
As a follow-up to the previous article, the Center for the Study of College Student Retention suggests measures for putting the retention plan into effect.

Best Practice *Highlights*
http://www.ccsse.org/retention/highlights.cfm
Published by the organization that conducts the Community College Survey of Student Engagement (CCSSE), these short monographs focus on exemplary practices in student retention at community colleges around the country.

Faculty-based Advising: An Important Factor in Community College Retention
http://www.nc-access.info/Faculty-based%20advising.pdf
What would happen if a department initiated an intense academic advising program designed to increase faculty-student interaction? This article by Ronald C. McArthur, Dean of Instruction, Atlantic Cape Community College (NJ), looks at data gathered following a program in which the Arts and Humanities department at the college personalized the advisement process. The survey results validate research that equates students satisfaction with retention in the community college setting.

Academic Advisement and Student Retention: Empirical Connections & Systemic Interventions
http://www.nacada.ksu.edu/Clearinghouse/advisingIssues/retain.htm
A very strong case can be made that academic advising is a crucial component for ensuring student persistence in college. This monograph by Joe Cuseo, Professor of Psychology and Director, Freshman Seminar, Marymount College (CA), provides ample evidence to support this claim, along with many practical strategies for enhancing the quality of academic advising.

National Alliance of Concurrent Enrollment Partnerships
http://www.nacep.org/
NACEP is a professional organization for high schools and colleges practicing concurrent enrollment. It serves as a national accrediting body and supports all members by providing standards of excellence, research, communication, professional development, and advocacy.