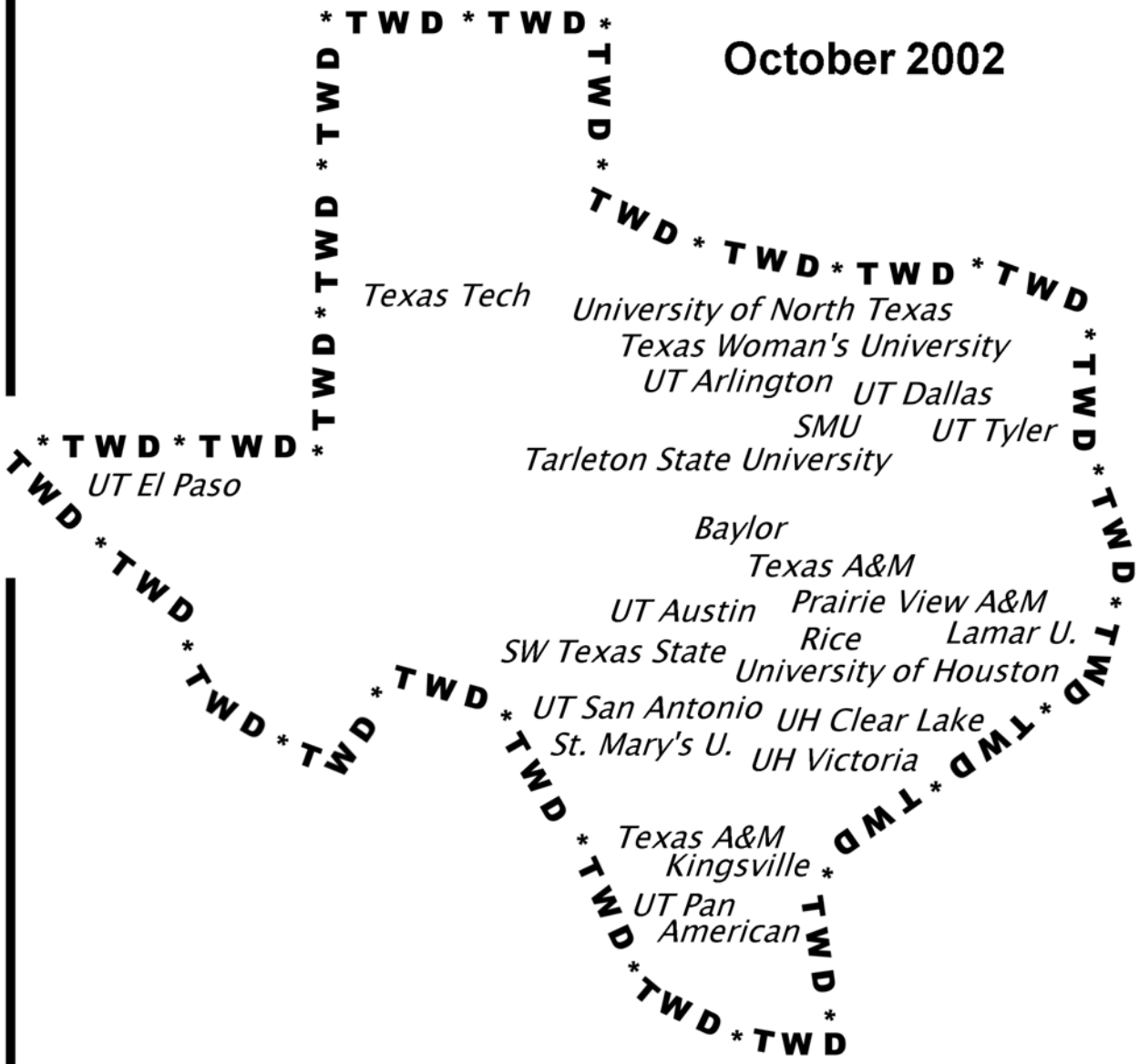
Texas Higher Education Coordinating Board

Technology Workforce Development Grants Program

Annual Report

October 2002



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Executive Summary

In 2001, the 77th Texas Legislature passes Senate Bill 353, the Technology Workforce Development Act, in response to requests by industry to increase the number of electrical engineering and computer science graduates from higher education institutions in the state. This legislation created the Texas Engineering and Technical Consortium (TETC) and the Technology Workforce Development Grants Program. The TETC is composed of representatives of university engineering and computer science programs throughout the state as well as representatives from donor industries. The TETC seeks to raise cash and in-kind donations that will be matched by state funds for the Technology Workforce Development Grants Program. The Coordinating Board is charged with administering the grants program.

The TETC is composed of representatives of 22 computer science programs, 17 electrical engineering programs, and 6 electronic industries. The TETC's fund raising efforts were hampered by the serious economic downturn in the high tech sector during the latter half of 2001 and throughout 2002. Despite this setback, the TETC was able to raise $2.55 million during FY 2002, for distribution to the institutions in this first round of grants competition. Texas Instruments was the largest donor.

The Coordinating Board distributed a solicitation for proposals in November 2001. The institutions submitted 55 proposals in December. In March 2002, the TETC forwarded funds to the Texas Comptroller of Public Accounts. On April 1, 2002, Governor Rick Perry announced awards for 33 projects at 23 institutions. This report is based on the institutions' annual reports submitted at the end of Fiscal Year 2002, as well as the September 2002 TETC financial report.

To increase graduation rates in electrical engineering and computer sciences, the institutions are using strategies that improve the effectiveness of outreach, recruitment, retention, mentoring, and placement efforts as well as securing participation from under-represented groups.

Although it is too early to determine the success of these projects, the institutions are projecting a 13 percent increase in total student numbers in these programs for fall 2003.

Program Outline and Award Announcement

The 77th Texas Legislature passed the Technology Workforce Development Act (Senate Bill 353) in 2001. The purpose of this legislation is to increase the quantity and quality of baccalaureate-level electrical engineers and computer scientists produced by Texas universities. The legislation created the Technology Workforce Development Grants Program (TWD), to be administered by the Texas Higher Education Coordinating Board, and mandated the creation of an advisory committee comprised of industry and academic members to provide oversight to the grants program. The roster of the 2002 Technology Workforce Development Grants Program Advisory Committee approved by the Commissioner of Higher Education is listed inside the back cover of this report. The legislation also required a peer review process for making the awards.

Another part of the legislation authorized the creation of the Texas Engineering and Technical Consortium (TETC), made up of Texas public and independent universities that offer engineering and computer science programs and technology companies that employ graduates of those programs. The consortium fosters cooperative relationships and activities involving technology companies and universities that offer engineering and computer science degrees.

The Coordinating Board approved a program announcement to expedite implementation of the Texas Technology Workforce Development Grants Program in October 2001. It was distributed to all academic TETC members on November 8. Academic TETC members include 22 computer science departments of public institutions and 17 electrical engineering departments of public and independent institutions which are accredited by the Accreditation Board for Engineering and Technology. By the December 14, 2001 due date, 55 proposals were submitted. (A time line of events is included as Table 1.)

Two panels of experts from industry, government, and out-of-state academia representing the Electrical Engineering (EE) and Computer Science (CS) program areas evaluated the proposals. For the evaluations, the panels used a process reviewed and approved by the Technology Workforce Development Grants Program Advisory Committee. Two reviewers independently studied each proposal in preparation for the panel meetings.

Each panel considered all proposals assigned to its area and assigned each proposal to the "Fund" or "Do Not Fund" categories. All proposals marked as "Fund" were ranked relative to each other after in-depth panel discussions. Both panels made recommendations for budget changes, which usually led to lower funding levels. However, increases were recommended for two grant awards.

The Program Advisory Committee recommended dividing the total funds anticipated to be available for awards by a 60 to 40 ratio between the EE and CS program areas. The Advisory Committee selected proposals for funding in rank order by program area (EE or CS) until the funding allocation was exhausted. The Committee also recommended apportioning one grant to a large joint proposal, which combined EE and CS departments, by the 60 to 40 ratio.

The Texas Higher Education Coordinating Board authorized the Commissioner of Higher Education to make awards according to the available budget at the time of the awards announcement. Thirty-three proposals, representing 29 departments at 23 institutions, received TWD awards. On April 1, Governor Rick Perry announced the awards at a press conference in Austin, Texas.

Table 1

Time Line of Events for the Technology Workforce Development Grant Program

2001		The 77th Texas Legislature passed Senate Bill 353 to "increase both the quantity and quality of baccalaureate-level engineers and computer scientists"
October	26	The Coordinating Board approves a program announcement to expedite implementation of the Texas Technology Workforce Development Grants Program
November	8	Program announcement published
December	14	Texas universities submit 55 proposals
December		The Commissioner of Higher Education appoints the Grant Program Advisory Committee
2002		
January	12	Proposal review with eight reviewers from industry, academia, and government
January	24	Coordinating Board adopts rules for the grant program
January	31	The Grant Program Advisory Committee recommends funding at the anticipated funding level, while splitting the funding for the Electrical Engineering and Computer Science program areas by a 60 to 40 ratio
March	11	Comptroller's office receives Texas Engineering and Technical Consortium (TETC) funds
March	15	Advisory Committee recommends revised, "current" funding levels: $4.5 million of funds derived from $2.25 million raised by industry and $2.25 million matched by State
April	1	Governor Rick Perry announces grants
April		First installment distributed to institutions: $1.5 million
Summer		New TETC industry memberships allow amendment of awards for a funding level of $5.1 million.
August		Second installment distributed to institutions: $1.4 million
		Remaining installments (expected): $2.2 million

Funding of Grants

At the time of grant announcement, it became clear that TETC would fall short of the expected fund raising goal. The serious economic downturn in the high tech sector during the latter half of 2001 and throughout 2002 severely hampered TETC's fund raising efforts. The TWD Grants Program Advisory Committee decided to continue funding all programs, but at a reduced, or "current," funding level compared to the full, or "potential," grant amount: each grant will receive a minimum of 54 percent of the potential amount. If additional funds become available, the funding level would be increased proportionally to all awardees. All numbers and estimates in this report are based on the 54 percent funding amount.

The total "54 percent funding level" dollar amount is $4.5 million. Over the summer, additional contributions made it possible to increase the funding level to 62 percent. The total "62 percent funding level" dollar amount is $5.1 million, which includes in equal parts ($2.55 million) funds raised by industry (Figure 1) and funds matched by the State of Texas. By the end of Fiscal Year 2002, $2.2 million were distributed to the institutions.

The average grant is $134,943, but they range from $20,527 to $459,256. The average payment to a department is $153,556, while the average distribution per institution is $193,614.

Figure 1

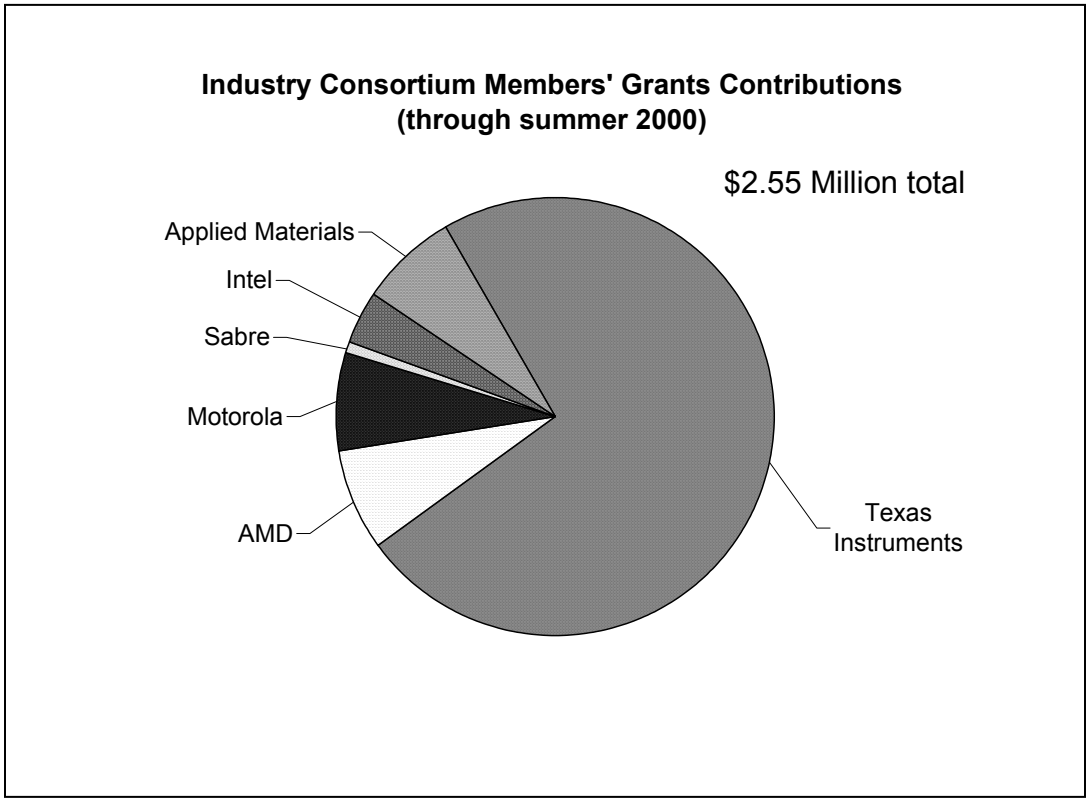


Table 3

TETC Roster Data Fall 2001 and Two-Year Goals

			2001						2003 estimated increase in student numbers					
Funded?			E	P	A	G	E+P+A 2001	Total 2001	E	P	A	G	E+P+A 2003	Total 2003
yes	Baylor University	EE	28	38	39	13	105	118	10	6	0	0	121	134
yes	Lamar University	CS	155	17	18	0	190	190	9	4	2	2	205	207
yes	Lamar University	EE	15	25	34	12	74	86	15	15	20	25	124	161
yes	Prairie View A&M University	EE	90	90	70	23	250	273	49	19	14	22	332	377
yes	Rice University	EE	0	38	83	52	121	173	0	7	0	0	128	180
no	Sam Houston State University	CS	11	47	62	32	120	152					120	152
yes	Southern Methodist University	EE	23	67	32	23	122	145	27	49	38	32	236	291
yes	Southwest Texas State University	CS	113	255	188	61	556	617	39	29	23	17	647	725
yes	St. Mary's University of San Antonio	EE	38	29	21	7	88	95	10	11	12	5	121	133
yes	Tarleton State University	CS	9	3	0	0	12	12	20	9	4	1	45	46
yes	Texas A&M University	CS	532	301	259	188	1092	1280	20	30	10	10	1152	1350
yes	Texas A&M University	EE	475	269	340	127	1084	1211	122	66	52	14	1324	1465
no	Texas A&M University - Commerce	CS	25	106	55	28	186	214					186	214
no	Texas A&M University - Kingsville	CS	6	9	16	8	31	39					31	39
yes	Texas A&M University - Kingsville	EE	22	39	46	23	107	130	4	6	3	3	120	146
yes	Texas Tech University	CS	236	82	34	32	352	384	19	6	3	2	380	414
yes	Texas Tech University	EE	272	55	109	20	436	456	40	10	5	5	491	516
yes	Texas Woman's University	CS	34	2	36	28	72	100	5	6	6	2	89	119
yes	University of Houston (Main)	EE	297	296	131	80	724	804	33	44	69	65	870	1015
yes	University of Houston - Clear Lake	CS	0	117	59	42	176	218	0	14	7	5	197	244
no	University of Houston - Clear Lake	EE	0	31	19	3	50	53					50	53

Table 3 (continued)

			2001						2003					
									estimated increase in numbers					
Funded?			E	P	A	G	E+P+A 2001	Total 2001	E	P	A	G	E+P+A 2003	Total 2003
yes	University of Houston - Victoria	CS	0	84	40	34	124	158	0	12	24	6	160	200
yes	University of North Texas	CS	303	321	227	47	851	898	25	0	60	80	936	1063
yes	The University of Texas at Arlington	CS	133	179	125	114	437	551	25	17	8	8	487	609
yes	The University of Texas at Arlington	EE	32	144	94	87	270	357	26	33	21	16	350	453
yes	The University of Texas at Austin	CS	724	930	471	280	2125	2405	50	50	0	0	2225	2505
yes	The University of Texas at Austin	EE	512	891	386	286	1789	2075	73	90	15	0	1967	2253
no	The University of Texas at Brownsville	CS	10	43	44	8	97	105					97	105
with EE	The University of Texas at Dallas	CS	362	550	469	159	1381	1540					1381	1540
yes	The University of Texas at Dallas	EE	236	311	261	84	808	892	60	0	80	30	948	1062
yes	The University of Texas at El Paso	EE	12	127	168	54	307	361	15	15	0	0	337	391
no	The University of Texas - Pan American	CS	215	68	71	0	354	354					354	354
yes	The University of Texas - Pan American	EE	135	90	71	10	296	306	22	19	6	4	343	357
no	The University of Texas - Permian Basin	CS	24	50	48	11	122	133					122	133
yes	The University of Texas at San Antonio	CS	220	61	195	52	476	528	25	0	10	8	511	571
yes	The University of Texas at San Antonio	EE	80	71	170	47	321	368	3	3	3	1	330	378
yes	The University of Texas at Tyler	CS	29	73	33	28	135	163	14	15	7	6	171	205
no	Stephen F. Austin University	CS	74	54	44	0	172	172					172	172
no	West Texas A&M University	CS	35	38	50	7	123	130					123	130
		sums					16136	18246	760	2588	502	369	17983	20462
													111%	**112%**

Projected Student Increases

To study the program's success over time, student counts will be categorized four ways:

E	"*entering students*"	EE/CS major in good standing or Grade Point Average greater than 2.0
P	"*progressing students*"	30-89 hours towards degree, including two courses in science and two in calculus
A	"*advanced students*"	more than 90 hours towards degree
G	"*graduated students*"	graduated in previous fiscal year

After the awards were reduced to the 54 percent funding level, the institutions projected a combined increase of 1,847 students and an increase of 369 graduates for the funded biennium (Table 2). The increase of all students within the funded programs is 13 percent[1]. This data is graphed in Figure 2.

Table 3, on pages 7 and 8, shows the "baseline" student roster tabulation for the fall of 2001 by participating departments. Students are separately counted as *Entering*, *Progressing*, *Advanced*, or *Graduated*. Participating TETC member institutions had a total of 16,136 students and 2,110 graduates in the fall of 2001.

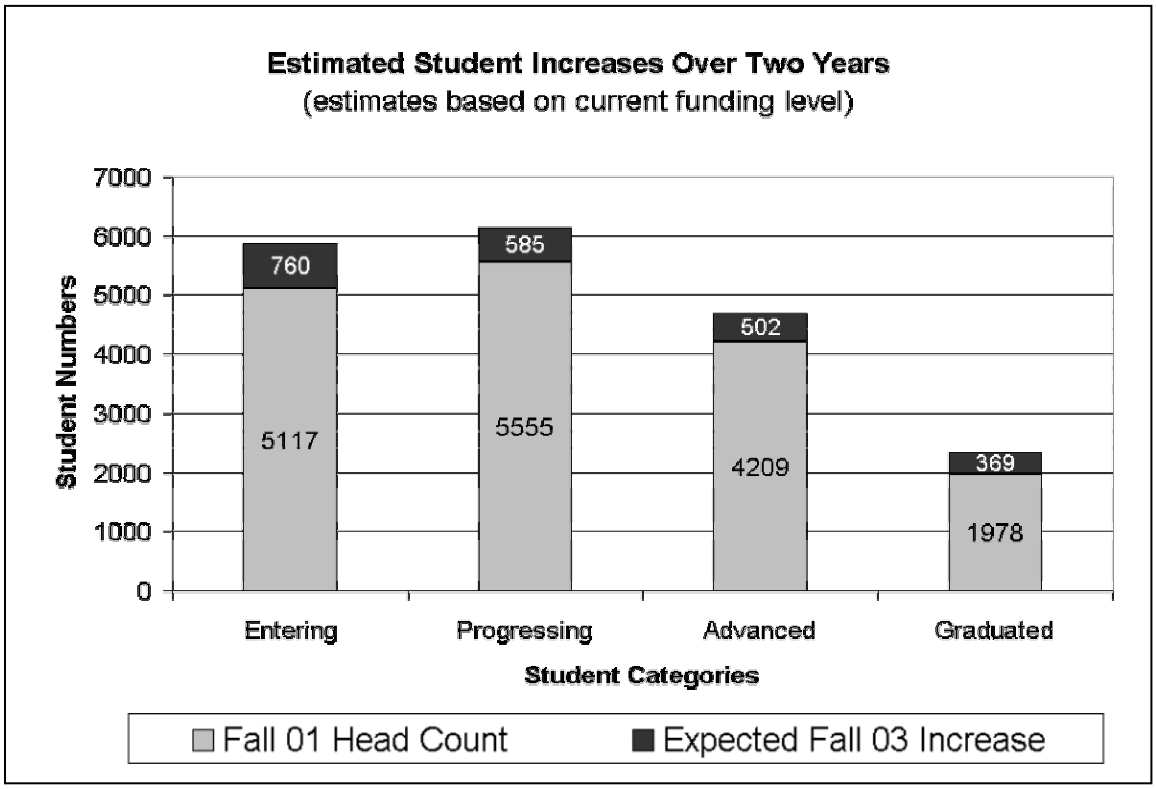
Table 2

Expected Result of 2002 TWD Grants Program

Students, fall 2001	(E+P+A)	14,881
Graduates, fall 2001	(G)	1,978
Additional Students, fall 2003	(E+P+A)	1,847
Additional Graduates, fall 2003	(G)	369
Combined Percent Increase:		13%

[1] Originally, institutions forecast a 23 percent increase in the number of students enrolled and graduated, based on 100 percent funding from the beginning of the two-year period. If additional funds are raised by TETC throughout the grant period, the institutions' awards will be amended proportionally. As a result, student increases might be higher, under optimal conditions, than the revised 13 percent figure.

Figure 2



Project Strategies and Early Successes

A wide variety of strategies were funded. Most strategies involve financing student-led mentoring programs, or competitive scholarships and improved student retention by improving the curriculum. Strategies also include funding a new departmental program, financing endowed scholarships, or establishing an off-campus facility to help employed students. A large part of the strategies deal with outreach programs to area high schools and community colleges. Table 4 provides a qualitative listing of applied strategies.

Most departments spent the remainder of Fiscal Year 2002 preparing improvements to their programs for the fall of 2002. They used the initial months of the grants program for curriculum development, lab set-up, and pilot projects. Since the grants were announced late into the spring 2002 semester, most direct effects of the effort would not become visible before the fall semester. Nevertheless, the design of some projects allowed some institutions to report first "success stories" to the Coordinating Board. Table 5 is a synopsis of those first results.

Table 4

Top Strategies for Texas Technology Workforce Development Grants, 2002

- Faculty outreach: Recruitment through innovative high school mentoring programs for students and teachers, high school summer camps, and teacher training for new high school curricula. Increasing diversity by targeting first-generation college students through career development counseling.

- Student involvement: Expanded scholarship programs as well as student-employment programs in on-campus and off-campus (high school) outreach, tutoring, or mentoring. May involve special, new lab facilities.

- Curriculum and technology improvements: Faculty conferences. Specialty student workshops for increased retention of high risk or minority students. Time management training and web-based quality-of-learning management for students. Combined sophomore through senior level R&D (applied problem solving) program.

- Retention through increased preparedness: A combination of restructured freshmen course offerings (e.g., higher faculty/student ratios, targeted tenured faculty freshmen-level teaching, or project-based, holistic introductory courses, etc.) with selected admission to the major program through higher entry requirements.

- Increasing student work experience: Efforts to raise undergraduate participation in faculty research projects and industry sponsored development partnerships or career exposure. Increased alumni-student interaction through career counseling or seminar series.

- Collaboration with community colleges: Curriculum and technology assistance to increase transfer rate into four-year institutions.

- Non-traditional student recruitment: Establishing off-campus facilities and after-hour programs for professional (employed) students.

- Increase of adjunct faculty: Increase in summer course offerings; increase of faculty/student ratios.

- Permanently endowed scholarships: Using grant money for matching funds from challenge grant to establish principal for permanent need-based scholarships.

Table 5

Technology Workforce Development Grants Program Success Stories

Lamar University, CS: "…even though the research program is only just beginning, it has already created a lot of interest among our students… Five students decided to continue with advanced studies or the pursuit of graduated degrees in the scientific area supported by the grant… the funding for five women has been leveraged to involve five additional students in research in this area…"

Prairie View A&M University, EE: "We estimated that we will have 10 additional graduates during the 2001-2002 academic year. We exceeded our expectations…"

Southwest Texas State University, CS: "Growing student enrollment has led to the need for rapid growth in faculty, classrooms, laboratories, and staff. These challenges could not have been met without … grants obtained from … the TETC to offer the undergraduate degrees in computer science to Austin-area working professionals."

Texas Tech University, CS: "Over 1,200 people have used the website [Electronic College Optimal Advisor & Career Helper] to date. The University administration is also excited about the success and continuation of this … concept. Perspective students and parents have provided positive feedback…"

Texas Tech University, EE: "[One student was stimulated to pursue graduated studies] ,continuing the research he started this summer. The research topic he worked on during the summer will serve as the basis for his Master's thesis. A paper concerning his research will be submitted for presentation at an international conference on antennas."

University of Houston, EE: "A vast majority of participants [of the Redshirt Camps] indicated that group work was the best aspect of the Redshirt Camps… One student wrote 'I will plan to go every Friday starting August 30th to the ECE 2300 workshop. I am really looking forward to this year.' The high school teachers, who served as consultants for our GRADE program, gave unanimously positive feedback about GRADE Camp… One teacher wrote 'I am very excited about sharing this [GRADE Camp] program with my students and I really hope it is successful.'"

University of Houston-Victoria, CS: "Our 'success Story' is the six Open Houses we conducted this Summer. …everyone, … greatly enjoyed the discussions at these sessions as well. Such good questions! …We also used these opportunities to mention other related programs such as the BAAS program with Computer Information Systems concentrations, which generated some interest from the many Vocational-Tech students who were in attendance."

The University of Texas at Dallas, EE: "The summer of 2001 we taught 646 students in 19 classes for an average class size of 34. In the summer of 2002 we taught 1536 students in 52 classes for an average class size of 34."

Table 5 (continued)

University of Texas – Pan American, EE: "Most of the top students from the Rio Grande Valley are heavily recruited by out-of-state schools as well as the Texas 'flagship' institutions. Through TETC support, this year we were able to recruit the valedictorian of a local high school into the electrical engineering program. TETC support also allowed us to extend our recruiting range to Laredo Community College and Del Mar College, two institutions that we had little contact with previously."

Univer*sity of Texas at Arlington, EE*: *"*Other instructors at UTA are excited about using the Infinity kits in more advanced courses, such as Data Signal Processing and communications courses…"

University of Texas at Arlington, EE: "The enthusiasm demonstrated by student officers of the Institute of Electrical and Electronics Engineers (IEEE) Student Branch has been most encouraging. They have entered into this effort with creativity and youthful enthusiasm. It is a joy to work with students of this caliber."

Progress

The remaining part of this report lists all grant recipients, with project title and funding amount at the 54 percent funding level (Table 6). Several projects are combined into a "joint" proposal with the title "Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide." (The Infinity Project is a partnership between leading research universities, industry, government, and K-12 educators to help school districts incorporate modern engineering and technology in their high school curricula.) These grants are thematically linked in that they employ the "Infinity technology" and emphasize strong outreach to high schools and community colleges. They are awaiting additional funds from the Governor's Office.

Table 6 contains a listing of strategies for each department, classified into seven categories: "*Outreach,*" "*Recruitment,*" "*Retention,*" "*Mentoring,*" "*Under-represented Students,*" "*Placement,*" or "*Other.*" In addition, those strategies are described by the specific methods they employ.

The progress reported in the institutions "annual progress reports," submitted September 1, 2002, was summarized by Coordinating Board staff into three to four line-item lists by institution to convey a concise overview of progress. However, they do not reflect every aspect of the effort and every achieved target.

Self-described goals for student increases for fall of 2003 are listed as absolute numbers as well as percentages relative to the departments' present sizes.

Table 6

Texas Technology Workforce Development Grants
Funded Awards: Progress, September 2002

Budget numbers represent the current funding level.
All strategies are grouped into following seven categories: *"Outreach," "Recruitment," "Retention," "Mentoring," "Under-represented Students," "Placement,"* or *"Other."*
Methods of implementation are summarized in brackets.

Total amount of grants funded at the "current," or 54 percent, funding level is $4,453,128.

One grant is funding a large "joint proposal" with the title "Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide." Eleven electrical engineering departments and four computer science departments are participating in this project. The total grant amount is $551,163. The strategies and progress of each participating department is listed separately in this table.

Electrical Engineering Awards

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Baylor University Department of Engineering

Fall 2003 Student Increase Goal: 16 (14%) $20,527

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Student Involvement: Student/Teacher Meetings)
5. *Mentoring* (Curriculum Development)

Progress:

- ✓ Curriculum modifications implemented
- ✓ Six additional scholarships as additional recruitment effort
- ✓ Current funding available for Strategy 1 (retention) only

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Lamar University Electrical Engineering Department

Fall 2003 Student Increase Goal: 75 (87%) $38,353

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Student Involvement: Student/Teacher Meetings)
5. *Mentoring* (Curriculum Development)
6. *Retention* (Undergraduate Research and Senior Project Activities)

Progress:

- ✓ Infinity-based summer course was more popular than expected
- ✓ Enrollment up 10% due to aggressive recruitment
- ✓ Laboratory readied for upper-level research projects

Table 6 (continued)

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Prairie View A&M University Department of Electrical Engineering

Fall 2003 Student Increase Goal: 30 (11%) $41,918

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Student Involvement: Student/Teacher Meetings)
5. *Mentoring* (Curriculum Development)

Progress:

- ✓ Infinity-based course is being offered
- ✓ Current funding available for Strategy 1 (retention) only
- ✓ Success: 2002 graduation rate exceeded expectations

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Rice University George R. Brown School of Engineering

Fall 2003 Student Increase Goal: 7 (4%) $16,077

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)

Progress:

- ✓ Preparations for Infinity-based course, to be offered in Spring 2003
- ✓ Targeted recruitment for Infinity-based course from existing student population
- ✓ Decline in Progressing Student number observed due to draw from new bioengineering major

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Southern Methodist University School of Engineering

Fall 2003 Student Increase Goal: 146 (101%) $52,234

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (Student Involvement: Student/Teacher Meetings)
4. *Mentoring* (Curriculum Development)

Progress:

- ✓ Hired faculty for outreach and under-represented student programs
- ✓ Hosted program for 250 inner-city middle school students
- ✓ Initiated meetings with K-12 community educators

Table 6 (continued)

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

St. Mary's University of San Antonio Department of Engineering

Fall 2003 Student Increase Goal: 38 (40%) $26,831

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)
2. *Outreach* (High School Teacher Training)
3. *Outreach* (Summer Courses for High School Students)
4. *Recruitment* (Curriculum Improvement for Freshmen)
5. *Outreach* (Meetings with Teachers)
6. *Mentoring*

Progress:

- ✓ Extensive recruiting through high school visits, presentations, and open houses
- ✓ Two scholarships given through competitive robotics contest (32 schools participated)
- ✓ Two new courses for Fall 2002; faculty and student mentors assigned to each freshman
- ✓ Success: Enrollment increased by 22 percent; average SAT score increased by 5 percent

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Texas A&M University Department of Electrical Engineering

Fall 2003 Student Increase Goal: 144 (12%) $31,330

1. *Recruitment* (Curriculum Improvements)
2. *Outreach* (High School Teacher Training)
3. *Outreach, Recruitment* (Training, Curriculum Development)

Progress:

- ✓ Infinity-based laboratory installed and tested for Fall 2002 course offering
- ✓ Preparations in progress for TAMU personnel workshop
- ✓ Preparations in progress for Summer Institute, Summer 2003

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

The University of Texas at Arlington Department of Electrical Engineering

Fall 2003 Student Increase Goal: 45 (13%) $48,452

1. *Retention* (Increased Laboratory facilities, Curriculum Improvements)
2. *Recruiting, Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Community College Curriculum Development)

Progress:

- ✓ Faculty and graduate student trained for implementation of Infinity-based courses
- ✓ Infinity-based course offering plus student help lab set up for Fall 2002
- ✓ Established network for high school teacher training with several area school districts
- ✓ Success: Other UTA instructors are eager to use Infinity kits in more advanced courses

Table 6 (continued)

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

The University of Texas at Austin Department of Electrical and Computer Eng.

Fall 2003 Student Increase Goal: 26 (1%) $49,777

1. *Retention* (Curriculum Improvements)
2. *Outreach* (High School Teacher Training)
3. *Outreach* (Student Involvement: Student/Teacher Meetings)
4. *Outreach* (Broadcast Lectures to High School Students)

Progress:

- ✓ Implemented comprehensive undergraduate curriculum reform
- ✓ Infinity-based course prepared plus Infinity-lab set up for Spring 2003 course offering
- ✓ Coordination with several area school districts for April 2003 start of Faraday Lectures

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

The University of Texas at El Paso Electrical and Computer Eng. Department

Fall 2003 Student Increase Goal: 30 (8%) $48,616

1. *Outreach* (High School Laboratory Set-up and Teacher Training)
2. *Recruitment* (Curriculum Improvement for Entering Under-prepared Students)
3. *Retention* (Graduate and Upper-level Undergraduate Student Teaching)
4. *Recruitment* (Introductory Course During Summer Orientation)

Progress:

- ✓ Infinity-based Summer 2002 orientation program conducted
- ✓ Curriculum changes implemented for Fall 2002 Pre-Engineering and Engineering courses
- ✓ Infinity-based teacher training conducted for area high schools

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

The University of Texas at San Antonio College of Engineering

Fall 2003 Student Increase Goal: 10 (3%) $48,454

1. *Retention* (Increased Laboratory Facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Student Involvement: Student/Teacher Meetings)
5. *Outreach* (Mentoring Program)

Progress:

- ✓ Three-semester, one-credit course is offered to keep attention of freshmen focused
- ✓ Infinity-based tutorial developed and tested in 'Exploring Engineering' intro class
- ✓ Contacts for Infinity-based teacher training developed and one student aide hired

Table 6 (continued)

Increasing Electrical Engineering Program Enrollment: New Program, Increased Retention and College Transfers

Prairie View A&M University Department of Electrical Engineering

Fall 2003 Student Increase Goal: 74 (27%) $208,401

2. *Other* (New Departmental Program)
3. *Recruitment* (Scholarships)
4. *Mentoring* (Student Involvement in Tutoring)

Progress:

- ✓ Proposal for the new Computer Engineering program submitted to TAMU System
- ✓ Student recruiter hired who will work on improved, higher enrollment
- ✓ Student mentors helped during eight-week summer program for incoming freshmen

Enhancing the Quality and Quantity of Electrical and Computer Engineering Graduates

Texas A&M University Department of Electrical Engineering

Fall 2003 Student Increase Goal: 110 (9%) $459,256

1. *Recruitment and Retention* (Curriculum Improvement)
2. *Retention* (Curriculum Improvement)
3. *Mentoring* (Personal Instruction and Laboratory Enhancement)
4. *Mentoring* (Student Help Desk)

Progress:

- ✓ New Fall 2002 and Spring 2003 courses with outside speakers and hands-on term project
- ✓ Revamped sophomore course and lab set-up; student aide hired with leveraged funds
- ✓ Student help desk staffed with graduate and undergraduate students

Expansion of the EE Program at TAMU-K With Scholarships and Tutoring

Texas A&M University - Kingsville Dep. of Electrical Eng. and Computer Science

Fall 2003 Student Increase Goal: 16 (12%) $34,723

1. *Outreach* (Faculty Outreach to High Schools and Community College)
2. *Retention* (Scholarships)
3. *Mentoring* (Student Involvement as Tutors)

Progress:

- ✓ Community College advertising of scholarship opportunities during Spring 2002
- ✓ Scholarship committee prepared list of needy and talented students
- ✓ Math, science, and circuits student mentors hired on competitive basis

Table 6 (continued)

Electrical Engineering Workforce Development at Texas Tech

Texas Tech University Department of Electrical and Computer Engineering

Fall 2003 Student Increase Goal: 60 (13%) $171,516

1. *Recruitment, Outreach* (Curriculum Improvement)
2. *Retention* (Undergraduate Research Program - Summer)

Progress:

- ✓ Improved Freshmen course for Fall 2002; to be offered to area High Schools in Spring 2003
- ✓ Eight summer research projects with $1,500 competitive scholarships and final reports
- ✓ Success: One student is using summer research project as base for graduate work; gives professional paper presentation

Undergraduate Retention and Recruiting of ECE Students at the University of Houston

University of Houston (Main Campus) Electrical and Computer Eng. Department

Fall 2003 Student Increase Goal: 211 (27%) $326,511

1. *Retention, Mentoring* (Preparatory Camps for Incoming Students)
2. *Retention* (Improved Curriculum, Student Involvement)
3. *Under-represented Students, Outreach* (Summer Camps for High School Girls, Student Involvement)

Progress:

- ✓ Girls' summer camp curriculum and advertisement tested with high school focus group
- ✓ Fifty-two students participated in summer 'Redshirt Camp'; student aide hired
- ✓ Three NSF grant proposals submitted to leverage TWD grant funds
- ✓ Success: Enthusiastic feedback from teachers eager to participate and high school students motivated by group learning experience and prospect of continuing fall workshops

Recruitment and Retention to Increase the Number of Undergraduate Students in the Electrical Engineering Program

The University of Texas at Arlington Department of Electrical Engineering

Fall 2003 Student Increase Goal: 51 (14%) $165,657

1. *Recruitment* (Workshops, Summer Camps, Tutoring, Scholarships, Advertising)
2. *Retention* (Improved Curriculum, Student involvement, Industry Participation)
3. *Placement* (Foster Alumni, Industry Connections; Career Fair)

Progress:

- ✓ Coordination with several area high schools' engineering programs for future recruitment
- ✓ Eight scholarships for 'Progressing' students on competitive basis; student mentors hired
- ✓ Success: Involvement of IEEE Student Branch in setting up new Counseling Center is fueled by enthusiasm and creativity

Table 6 (continued)

Increasing and Improving Texas Capability in Electrical Engineering

The University of Texas at Austin Department of Electrical and Computer Eng.

Fall 2003 Student Increase Goal: 152 (7%) $459,152

1. *Retention*
2. *Retention*
3. *Under-represented students*

Progress:

- ✓ Success of student enrollment exceeds expectations
- ✓ Retention through ongoing curriculum improvements includes industry lecturers
- ✓ Additional teaching assistants hired through TWD grant funds

UTD School of Engineering and Computer Science -- TETC Undergraduate Expansion Program

The University of Texas at Dallas School of Engineering and Computer Science

Fall 2003 Student Increase Goal: 170 (7%) $375,424

1. *Recruitment* (Additional Staff: Recruiter; Scholarships)
2. *Retention* (Additional Staff: Advisors, Coordinators)
3. *Retention* (Additional Staff: Senior Lecturers for Summer Courses)

Progress:

- ✓ TWD grant's up-front funds aids rapid expansion and causes redirection of strategies
- ✓ "Industrial Practice Program" (436 Internships) expanded with new industry participants
- ✓ Success: Summer enrollment more than doubled, while student/teacher ratio was kept stable

Electrical Engineering Recruitment and Retention Enhancement

The University of Texas - Pan American Electrical Engineering Department

Fall 2003 Student Increase Goal: 51 (17%) $144,865

1. *Retention, Outreach, Mentoring* (Student Jobs)
2. *Recruitment*
3. *Recruitment*

Progress:

- ✓ Eight transfer scholarships tap into several area Community College student pools
- ✓ Sixteen student job opportunities have increased student/faculty working relation
- ✓ Student number increase will be around 12%
- ✓ Success: Through TWD grant support department was able to recruit top students of area high schools and colleges, which typically would go to flagship universities

Table 6 (continued)

Computer Science Awards

Study, Research, and Achievement in Lamar University Computer Science

Lamar University Computer Science Department

Fall 2003 Student Increase Goal: 17 (9%) $53,364

1. *Recruitment* (Curriculum Improvement)
2. *Under-represented Students* (Multi-faceted Mentoring Program)

Progress:

- ✓ Course "Thinking, Speaking, and Writing in Computer Science" readied for Spring 2003
- ✓ Graduate and undergraduate student trained to mentor year-long woman research group of five
- ✓ Recruited female industry mentors and upper level peer mentors for Lamar University Women Mentoring Women (LUW++) program
- ✓ Success: The funding for five women has been leveraged to involve five additional students in research in this area

Enhance Computing Workforce & Provide Higher Education in Computer Science to Working Professionals

Southwest Texas State University Department of Computer Science

Fall 2003 Student Increase Goal: 108 (18%) $329,240

1. *Recruitment, Under-represented Students - Working Professionals* (Off-campus Multi-Institutional Teaching Center)

Progress:

- ✓ Infrastructure, laboratories set up for a Fall 2002 start of the new baccalaureate program
- ✓ Extensive publicity at schools, industry, media, libraries, with letter campaign, posters
- ✓ Success: The need for growth in faculty, classrooms, laboratories, and staff, because of the growing student enrollment, could not have been met without grants obtained from TETC

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Tarleton State University Department of Math, Physics, and Engineering

Fall 2003 Student Increase Goal: 34 (283%) $12,432

1. *Retention* (Increased Laboratory facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Meetings with Teachers)

Progress:

- ✓ Infinity-based laboratory set up for Fall 2003 course offering; new faculty trained
- ✓ Extensive recruitment for new CS program in regional area high schools
- ✓ Current funding available for Strategy 1 (retention) only

Table 6 (continued)

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

Texas Woman's University Department of Mathematics and Computer Science

Fall 2003 Student Increase Goal: 19 (19%) $31,060

1. *Recruitment, Under-represented Students* (Curriculum Improvements)
2. *Retention, Under-represented Students* (Curriculum Improvements)
3. *Retention* (Curriculum Improvements)
4. *Outreach, Under-represented Students* (Summer Course)
5. *Outreach* (Summer Courses for High School Students)
6. *Outreach* (High School Teacher Training)
7. *Mentoring* (Student Involvement in High School Tutoring)

Progress:

- ✓ Infinity-based laboratory set up and TWD grant funds leveraged with University dollars
- ✓ Laboratory and curriculum tested during upper-level summer course, student aide trained
- ✓ Exceeded goal of the graduation rate for the 2002 academic year

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

The University of Texas at Arlington CSE Department

Fall 2003 Student Increase Goal: 58 (11%) $61,118

1. *Retention* (Increased Laboratory facilities, Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Recruitment* (Specialty Courses for Prospective Transfer Students)

Progress:

- ✓ Infinity-based laboratory set up for a Fall 2002 pilot program
- ✓ Curriculum integration is planned for Spring 2004
- ✓ Current funding available for Strategy 1 (retention) only

Launching the Texas Engineering Education Pipeline: Deploying The Infinity Project Statewide (part of joint proposal)

The University of Texas at Tyler Department of Computer Science

Fall 2003 Student Increase Goal: 42 (26%) $23,984

1. *Retention* (Curriculum Improvements)
2. *Outreach* (Summer Courses for High School Students)
3. *Outreach* (High School Teacher Training)
4. *Outreach* (Student Involvement: Student/Teacher Meetings)
5. *Outreach* (Mentoring Program Involving Freshmen and High School Students)
6. *Recruitment* (Curriculum Improvements)

Progress:

- ✓ Infinity-based laboratory set up, including new infrastructure
- ✓ Workshop under way with area high schools' teachers and principals
- ✓ Newly prepared and Infinity-based course readied for Spring 2003

Table 6 (continued)

Increasing Computer Science Retention by Developing and Deploying Self-Paced Learning Modules

Texas A&M University Department of Computer Science

Fall 2003 Student Increase Goal: 70 (5%) $228,329

1. *Mentoring* (Student Involvement in Tutoring)
2. *Mentoring, Retention* (Student Involvement in Research of Engineering Education)
3. *Other* (Research of Engineering Education)
4. *Outreach* (Distribution of Learning Materials)

Progress:

- ✓ Five students worked on self-paced learning modules during the summer
- ✓ Module development, extensive student training will continue till next summer
- ✓ 'Peer teachers' have been recruited to help with Fall 2002 course offering

Efficient, Cost-Effective, Seamless, Advising Process to Increase CS Graduates

Texas Tech University College of Engineering

Fall 2003 Student Increase Goal: 30 (8%) $105,239

1. *Outreach* (Workshops for High School Students, Communication Between Teachers, Counselors, Students, and Faculty)
2. *Mentoring, Under-represented Students* (Life-skills Training, Web-based Advising Tools)

Note: CS enrollment has sharply dropped at Texas Tech since August 2001, linked to the failure of Internet commercial companies

Progress:

- ✓ 'Electronic College Optimal Advisor & Career Helper' (E-Coach) tested over summer
- ✓ New career assessment web-tool developed; aid to comprehensive college planning
- ✓ First generation college students are aided in decision making for college success
- ✓ Success: Over 1200 people have used E-Coach to date; perspective students and parents have provided positive feedback

Texas Scholars in Computer Science

University of Houston - Clear Lake School of Natural and Applied Sciences

Fall 2003 Student Increase Goal: 26 (12%) $274,906

1. *Recruitment* (Endowed Scholarships)
2. *Outreach, Mentoring* (Infrastructure for Endowed Scholarships)

Progress:

- ✓ Steering committee and scholarship committee for program is being formed
- ✓ Awards for endowed scholarships and student mentors will be made in the Fall of 2002 for the next Spring semester.
- ✓ Initiated talks with industry to increase co-op and internship opportunities

Table 6 (continued)

Recruitment and Retention of Computer Science Students

University of Houston - Victoria School of Arts & Sciences

Fall 2003 Student Increase Goal: 42 (27%) $34,135

1. *Retention, Mentoring* (Student Involvement in Tutoring)
2. *Outreach, Recruitment* (High School Programming Contest)
3. *Recruitment, Outreach* (Summer Programming Class plus Scholarship)
4. *Outreach* (Creating Awareness Among Prospective Students)
5. *Recruitment* (Faculty Recruitment: Visits, Open Houses, and Publicity)

Progress:

- ✓ Four scholarships for mentors/tutors and for recruitment efforts during the summer
- ✓ Ten students attended Cinco Ranch summer programming class
- ✓ Recruitment during six CS Open Houses plus extensive advertisement campaign
- ✓ Success: Open Houses at Community Colleges were well attended and garnered interest from prospective students and teachers alike. Discussions where enthusiastic and substantive

Retention Strategies for Computer Sciences

University of North Texas Department of Computer Science

Fall 2003 Student Increase Goal: 165 (18%) $69,994

1. *Retention* (Faculty Involvement in Freshman Course, Lower Student to Faculty Ratio)
2. *Recruitment* (Improved Curriculum)
3. *Mentoring* (Help Laboratory Staffed by Upper-level Students)
4. *Retention* (Student Involvement in Research Projects)

Progress:

- ✓ New curriculum developed for two new Fall 2002 computer science courses
- ✓ New Help Lab developed for implementation in Fall 2002
- ✓ One-on-one faculty advising process implemented

Target Diversity: Increasing Graduation Rates by Recruiting and Retaining Underrepresented Populations

The University of Texas at Austin Department of Computer Sciences

Fall 2003 Student Increase Goal: 100 (4%) $198,131

1. *Recruitment* (Honors Program)
2. *Under-represented Students, Outreach, and Retention*
3. *Under-represented Students, Retention* (Freshman Curriculum Improvement)

Progress:

- ✓ Forty-four students were recruited into inaugural class of Honors Program
- ✓ A new class was developed for Fall 2003 to retain students with lower than
- ✓ average background in mathematics

Table 6 (continued)

Building Strategic Pathways to the Baccalaureate Degree in Computer Science

The University of Texas at San Antonio Department of Computer Science

Fall 2003 Student Increase Goal: 43 (8%) $263,122

1. *Outreach* (High School Curriculum Improvement; Teacher Training)
2. *Recruitment*
3. *Mentoring, Retention* (Student Tutoring in Laboratories)
4. *Mentoring* (Curriculum and Laboratory Improvement)
5. *Scholarships, Mentoring, Under-represented Students* (One on One Faculty Mentors)

Progress:

- ✓ Organized Fall 2002 high school recruitment with faculty site visits, advertisement, etc.
- ✓ Peer tutors have been hired, trained for the Fall of 2002; teaching lab is awaiting funds
- ✓ Two Summer 2003 courses for teachers are being developed; crucial, since AP exam will convert from C++ to Java following that time

Conclusions

The Technology Workforce Development Grants Program is in its infancy. Considerable progress has been made by the departments despite obstacles due to the current economic climate. The departments were successful in revising their budgets to a reduced funding expectation and in prioritizing their efforts. The start of the funding period was delayed from the beginning to the end of the spring 2002 semester. Most departments used the summer months to set up their projects and most departments are ready to implement their new measures fully with the fall 2002 semester. Some departments were able, in addition, to have a considerable part of their efforts up and running during the summer. Reports from those institutions indicate preliminary success involving new and future students into the demanding fields of electrical engineering and computer sciences.

TEXAS HIGHER EDUCATION COORDINATING BOARD
Technology Workforce Development Grants Program
Advisory Committee

Mr. Torrence H. Robinson, Chair
Public Affairs
Director
Texas Instruments, Inc.
12500 TI Blvd., MS 8656
Dallas, TX 75243
214/480-6823 FAX: 214/480-6820
t-robinson4@ti.com

Ms. Sue Snyder
Government Affairs Director
AMD
5204 East Ben White Blvd., MS 562
Austin, TX 78741
512/602-4159 FAX: 512/602-4999
sue.snyder@amd.com

Mr. Wayne Johnson
Executive Director, University Relations
Worldwide
Hewlett Packard
1501 Page Mill Road
Mail Stop 3L-7
Palo Alto, CA 94304
650/857-6515 (Asst. – Sharon Atkins)
FAX: 650/857-8100
Wayne_Johnson@hp.com

Dr. Sam Hughes
Director, Continuous Improvement
Motorola
3501 Ed Bluestein Blvd.
Mail Drop K10
Austin, TX 78721
512/933-2044 FAX: 512/933-7934
Sam.Hughes@motorola.com

Dr. Alfred J. Griffin, Jr.
Distinguished Member Technical Staff
Silicon Technology Development
Texas Instruments, Inc.
13570 North Central Expressway
Dallas, TX 75243
972/927-3941 FAX: 972/598-7396
grif@ti.com

Dr. C. S. Burrus
Dean of Engineering
Rice University
6100 Main Street
MS-364
Houston, TX 77005
713/348-4009 FAX: 713/348-5300
csb@rice.edu

Dr. Sung-won Park
Chairman, Electrical Engineering and
Computer Science
Texas A&M University - Kingsville
7800 University Blvd.
MSC 192
Kingsville, TX 78363-8202
361/593-2638 FAX: 361/593-2110
park@tamuk.edu

Dr. Daniel E. Cooke
Head, Department of Computer Science
Texas Tech University
West Broadway, MS 3104
Lubbock, TX 79409
806/742-3527 FAX: 806/742-3519
Daniel.cooke@coe.ttu.edu

Dr. Bill D. Carroll
Dean, College of Engineering
The University of Texas at Arlington
P.O. Box 19019
Arlington, TX 76019
Express mail address:
701 South Nedderman
Arlington, TX 76019
817/272-5725 FAX: 817/272-5110
carroll@uta.edu

Dr. Ben Streetman
Dean, College of Engineering
The University of Texas at Austin
301 Dean Keaton
MC 2100 ECJ 10.310
Austin, TX 78712
512/471-1166 FAX: 512/475-7072
bstreet@mail.utexas.ed

Coordinating Board Support Staff:

Dr. Reinold R. Cornelius
Program Director in Research
THECB
P.O. Box 12788
Austin, TX 78711
512/427-6156 FAX: 427-6147
Reinold.Cornelius@thecb.state.tx.us

Dr. Linda N. Domelsmith
Director of Research
THECB
P. O. Box 12788
Austin, TX 78711
512/427-6150 FAX: 512/427-6147
Linda.Domelsmith@thecb.state.tx.us