

**Final Report for Period:** 04/2000 - 03/2004

**Submitted on:** 04/01/2004

**Principal Investigator:** Marder, Michael P.

**Award ID:** 9953187

**Organization:** U of Texas Austin

**Title:**

UTeach-A Secondary Pre-service Program in Science and Mathematics

### Project Participants

#### Senior Personnel

**Name:** Marder, Michael

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** Confrey, Jere

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** Laude, David

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

David Laude was the faculty member who taught a new course, Research Methods, that we developed this past semester. No NSF funding was needed to support him.

**Name:** Petrosino, Tony

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Tony Petrosino has been teaching and developing a required UTeach course on Project-Based Instruction.

**Name:** Stroup, Walter

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Walter Stroup taught Knowing and Learning, one of the UTeach courses under development in this proposal

**Name:** Brand, Jerry

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Jerry Brand began doing advance work this past summer for a conference we will hold to coordinate with community colleges.

**Name:** Palmer, Julie

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Julie Palmer has been working to develop a new inquiry course on Biotechnology. It consists of a sequence of linked laboratory activities in which students identify unknown genes and identify proteins.

**Name:** Marshall, Jill

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Jill Marshall has been involved with UTeach both by teaching Classroom Interactions, but also by editing and annotating the nine CDs on teaching techniques we have recently produced.

**Name:** Williams, Nefertiti

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Nef Williams was a field trainer working with the team producing CDs.

**Name:** Richardson, Dick

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Dick Richardson has been developing an interdisciplinary course, Natural Resource Management, in field biology involving a nature preserve at Hornsby Bend. The course involves sustainability of natural environments in urban settings, and is also carried out so as to benefit at-risk elementary school students.

**Name:** Buskirk, Ruth

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Assisted in biology curriculum development of UTeach

**Name:** Hankinson, Robert

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Taught and helped develop course on history and philosophy of science and mathematics

**Name:** Sarkar, Sahotra

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Taught and helped develop course on history and philosophy of science and mathematics

**Name:** Hunt, Bruce

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Taught and helped develop course on history and philosophy of science and mathematics

**Name:** Starbird, Michael

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Developed in inquiry course in number theory

**Name:** Robinson, Sheri

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Developed course in educational psychology required for middle-grades certification

**Name:** Neff, Kristin

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Developed course in educational psychology required for middle-grades certification

**Name:** Stacy, Cathy

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Assisted in UTeach evaluation and course development

**Name:** Laturner, Jason

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Evaluates portfolios and will begin working as a program evaluator

**Name:** Hills, Thomas

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Provided biology expertise for Research Methods course

**Name:** Kronz, Fred

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Revised and taught Perspectives in Mathematics and Science

**Post-doc**

**Graduate Student**

**Name:** Lane, Matthew

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Matt Lane was laboratory assistant for Research Methods

**Name:** Lee, Eunmi

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Eunmi Lee was a teaching assistant for professional development courses in the College of Education.

**Name:** Nyberg, Ian

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

TA for UTeach classes

**Name:** Ries, Jane

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

TA for UTeach classes

**Name:** Smith, Paul

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

TA for UTeach classes

**Name:** Lane, Matt

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

TA for UTeach classes

**Name:** Armorgan, Carla

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helped coordinate field experience and recruitment class

**Name:** Vandecarr, Dorothy

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helped coordinate field experience and recruitment class

**Name:** Makar, Katie

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Katie is a graduate student with Jere Confrey who has been performing research on preservice teachers' understanding of statistics

### Undergraduate Student

**Name:** Gumbert, Jack

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** Wright, Colin

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helped to prepare material for UTeach web pages connected with the UTeach portfolio

**Name:** Harwell, Sabrina

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** Gipson, Pam

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Assisted with editing of UTeach video

**Name:** Strong, Emily

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Course support services

**Name:** Ham, Tyler

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

General purpose technology genius

**Name:** Zernial, Chris

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** Weber, Katie

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Undergraduate learning assisstant.

**Name:** Park, Indok

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Course support services

**Name:** Sisco, Stephanie

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Assisted with program evaluation and research

**Name:** Gonzales, Luz

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Course support services

**Name:** Milton, Tyleno

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Course support services

**Name:** Berglund, Allyson

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Course support services

#### **Technician, Programmer**

**Name:** Fetsch, Steve

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Steve Fetsch provided technical assistance for the filming of the UTeach teaching technique CDs

#### **Other Participant**

**Name:** Dodson, Melissa

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Melissa Dodson has worked for UTeach full time in two capacities. She is the program evaluator, and has prepared a variety of surveys and other evaluation materials. She is also student advisor.

**Name:** Kaye, Forgione

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Kaye Forgione has been working for UTeach by assembling materials for dissemination and improvement, and representing us at conferences. She has prepared the materials on curriculum alignment that occupied many UTeach personnel throughout this past fall.

**Name:** Long, Mary

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

In addition to teaching UTeach courses, Mary Long participated this semester in developing our model for student teaching.

**Name:** Walker, Mary

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Mary Walker assisted with the development of Research Methods, and also assisted in developing our model of student teaching.

**Name:** Carmack, Gail

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Gail Carmack was an instructor for Project-Based Instruction, one of the courses being developed under this grant.

**Name:** Evertson, Gayle

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

In addition to teaching duties in UTeach, Gayle worked on developing a new degree plan for the Middle Grades.

**Name:** Powell, Pamela

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Developed Student Teaching structure.

**Name:** Fowler, Marilyn

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Taught in program and helped develop Step I

**Name:** Ostlund, Karen

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helped with development of student teaching, and began developing plan for induction support.

**Name:** Laturner, Jason

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Supervised portfolio process, worked as evaluator, and gathered data on program.

**Name:** Daniels, Mark

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Taught and improved Step II and Functions and Modeling

## Research Experience for Undergraduates

### Organizational Partners

### Other Collaborators or Contacts

We are working closely with the Austin Independent School district, but they are not direct collaborators on this grant. In the past year (2003-2004) we have also begun working with Austin Community College so that participants in their program GET SMART will have the easiest possible time transferring from Austin Community College and complete teacher certification through UTeach, if they are admitted to UT Austin

### Activities and Findings

#### **Research and Education Activities:**

Describe the major research and education activities of the project.

Our proposal was built around four thematic areas, with a set of activities described for each one. We have progress to report on all of them:

ACTIVITIES for GOAL ONE--Continuous Field Experience.

1. Strengthen recruitment efforts at high schools by sending student ambassadors to recruitment fairs throughout the state.

We continue to ensure that recruitment staff visiting high schools around the state of Texas to promote UT Austin are aware of UTeach, and supplied with brochures and information. Susan Harkins, who has directs a program to support students admitted to UT Austin in the wake of legislation admitting all high school seniors in the the top 10% of their class, has featured UTeach on her recruiting trips. It does not appear to

be feasible to send students off on recruiting trips while classes are in session. However, in the next two weeks we will feature UTeach at a local career fair visited by thousands of students, and will advertise it at the Texas State Science and Engineering Fair.

2. Develop and implement a structured framework for identifying, recruiting, and providing on-going staff development for mentor teachers.

Grants other than the CETP have provided us with our most important improvements to the professional development of mentor teachers. A PT3 grant enabled us to provide professional development in technology to many Austin-area teachers in the summer of 2002. Supervising teachers for student teaching in spring of 2003 and 2004 were chosen almost entirely from the pool of teachers who received this training. A grant from Hewlett-Packard has allowed us to provide a mobile computer cart to each of the three middle schools where our students conduct lessons for our second field course, STEP II. The teachers in those schools integrate technology into their teaching through a program of lesson study that we supervise. We have continued to improve databases that organize the information on mentor teachers participating with our program at various levels. These are used for several purposes, both to record our experience with the teacher, but also to keep track of payments and services rendered. Mentor teachers working in the program are requested to participate in a Saturday orientation at the beginning of each semester. The UTeach Master Teachers meet regularly with mentor teachers and continue to acquire information on excellent area teachers who can serve as mentors for our students.

3. Develop electronic portfolio system to track the pre-teachers' progress toward meeting the State's Learner-Centered Proficiencies.

We have drafted a portfolio document outlining students' progress toward meeting the Learner-Centered Proficiencies. Students use this document to gauge their progress, and portfolio reviewers use it to evaluate the students. The student's portfolios employ a mixture of media, including electronic and paper documents, as well as video and other technologies. We allow the students to submit documents in all-electronic format if they so choose, and some are taking advantage of this option. We have placed on our website a sample electronic portfolio to illustrate how it can be accomplished.

4. Develop video resources for field-based courses on Classroom Interactions and : Project-Based Instruction in Science and Mathematics.

Creation of a video library was largely completed in 2001-2002. Nine annotated CDs were produced to illustrate various aspects of teaching science and mathematics in connection with courses including Classroom Interactions and Project-Based Instruction. Students themselves have been producing CD-based projects as their final assignment in Project-Based Instruction, and our collection of these grows each semester.

ACTIVITIES for GOAL TWO-- Exemplary Undergraduate Education

1. Develop exemplary content courses that illustrate the best of Standards-based approaches in content and pedagogy at the undergraduate level.

The domain course 'Functions and Modeling' continues to be taught and refined. A CETP-developed course, 'Research Methods,' was first taught in spring 2000, in a completely different way in fall 2000, and has continued to be refined. It was revised substantially yet again in spring 2003 and spring 2004. An inquiry course on number theory has been developed and taught in each of three semesters by two professors. A new course on Secondary School Reading in Content Subjects was developed and taught in Fall 2002 and 2003.

2. Use internet technology to refine and disseminate the instructional materials developed in these courses.

We finally have a tolerable web-site, [www.uteach.utexas.edu](http://www.uteach.utexas.edu). We still have not resolved questions about intellectual property that would lead to full sets of all course materials being made available over the net, but materials for many courses are already accessible. We have added some material, including current degree plan advising sheets, and a sample electronic portfolio.

3. Offer sections of these undergraduate courses during evening and summer periods so they are accessible to practicing teachers.

We are currently stretched to capacity offering our courses to undergraduate majors in UTeach. The College of Natural Sciences offered for the last three summers a Master Teacher Summer Institute, a five-week institute giving graduate credit, and aimed at improving the content knowledge of 75-120 inservice secondary teachers. We have continual and vigorous discussions about inservice training, and about a program aimed at allowing professionals from other fields to enter teaching, but until the undergraduate UTeach program can be delivered on a more routine and comfortable basis, some of these extensions will have to wait. For the last two years we have been able to offer a section of Knowing and Learning in the summer, have offered a field course on Natural Resources Management, and have offered our history and philosophy course, Perspectives. In Summer 2004 we will offer Step II for the first time in the summer. This offering will reduce the time needed by post-baccalaureate candidates to complete UTeach. Finally, we will begin offering a UTeach Master of Arts in Science and Mathematics Education with courses offered almost entirely in the summer.

#### 4.Reform selected sections of large service courses in cooperation with parallel efforts in College of Natural Sciences.

The College of Natural Sciences has established a list of constituencies for Small Classroom Experiences, which are relatively small sections of introductory service courses taught by the College's best instructors. Six new courses were added to the menu in 2001-2002, and a new pre-logic course for prospective CS majors was piloted in the fall of 2002, bringing the total to sixteen. Seats in these sections are reserved for UTeach students, and we promote them heavily as they model better instruction than the usual large lecture halls. See <http://www.utexas.edu/tip/whotip.html> for details.

#### ACTIVITIES for GOAL THREE--Equity and Excellence in Mathematics and Science Education.

1.Continue early recruitment methods that have proven successful in attracting a diverse group of students to teacher preparation in math and science. Increase early recruitment by sending student ambassadors to urban and rural areas to promote UTeach.

A letter to all incoming freshmen in Natural Sciences continues to be our most effective recruiting tool. In fall 2002 we offered three sections of our introductory course STEP I for the first time, filled them to capacity, and still had a waiting list. We have found it more appropriate to work with the professional College recruitment staff than with students to promote UTeach at far-flung locations. As our graduates adopt teaching positions around the state, we expect eventually to be able build a recruitment network that does not involve flying students around while school is in session.

2.Relieve financial pressures by assisting in application for state funds supporting preteachers, and providing paid internships in the science and math community.

We encourage students to apply for pay-back fellowships made available by the State, and have created an internship program. Each semester between 50 and 60 students work 10-20 hours per week for nonprofit educational organizations in the Austin area. This program has been very popular with area foundations, which have provided all the funding. Since 2001-2002, through cooperation with the Austin Independent School District, we have been able to offer students a cash fellowship of up to \$1000-1500/semester to all prospective teachers in our program in their final two years. We obtained Noyce Scholarships from the National Science Foundation in Fall 2003 that provide further support to our students.

3.Relieve academic pressures by providing special sections of service courses, tutoring services, and peer mentoring.

This goal is being met through the Small Classroom Experiences provided by the College of Natural Sciences, through cohort support within UTeach, through interventions by UTeach instructors, and by the active involvement of our two advisers.

4.Address issues of equity within preservice courses, providing students with techniques and strategies for working with diverse student populations.

These issues are addressed in the courses Knowing and Learning and Classroom Interactions that are under continuing development for UTeach.

5.Establish field-placement sites with mentor teachers who have been successful in promoting student success in a full range of urban settings.

UTeach has had close connections to many high-needs schools. For several years, we worked closely with Travis high school, an urban high school that was linked to the University of Texas through co-PI Confrey's Systemic Research Center. Many student placements occurred in this school, particularly those associated with the course Classroom Interactions. In 2003/2004, Travis temporarily stopped accepting outside visitors, and we found alternative solutions in other high-needs schools. Almost all the placements for our introductory courses, Step I and Step II, are in high-minority schools on the East side of Austin. We have developed a formal professional development arrangement with all our middle schools through a grant from Hewlett-Packard.

#### ACTIVITIES for GOAL FOUR-- Technology Integration:

1.Integrate technology into all innovative content courses and provide pedagogical support to participating faculty through ongoing faculty seminars and workshops.

All the the new courses developed for UTeach weave educational technology use into the instruction. For example, Functions and Modeling makes use of motion detectors and Geometer's Sketchpad. Final projects for Project-Based Instruction involve creating a CD-ROM with

interactive instructional material. Research Methods requires use of appropriate technology for experiments, ranging from a variety of computer-based probes, to use of Excel as a programming platform. All of the courses have a web page with extensive resources that plays an important role in the instruction. In spring of 2002, UTeach won an ISTE for its approach to technology integration.

2. Model the use of technology in all subject-matter focused education courses both as demonstration device and learning tool.

As mentioned above, educational technology is employed in this fashion in all the new courses we have created or are creating.

3. Update the technological skills of inservice and mentor teachers through enrollment in the program's new innovative courses.

One week of the Master Teacher Summer Institute has been devoted each summer to educational technology. Thanks to two grants from Hewlett-Packard, we offer technology training in all the middle schools where we offer STEP II placements. A PT3 grant has allowed us to offer technology training to almost all the teachers we employ as student teaching mentors. Most of the UTeach students model use of technology during their field placements and student teaching.

4. Create a set of focused videos that illustrate key concepts in the courses on Knowing and Learning and Classroom Interactions to support professional development.

We have produced nine CD video segments on different aspects of teaching science and mathematics.

5. As part of portfolio review, evaluate all students against technology benchmarks.

Our technology benchmark standards are now in relatively final form, and a regular part of the portfolio evaluation process. See <http://www.uteach.utexas.edu/technology/> for a description of technology integration in UTeach.

In accord with our supplemental agreement, we held a workshop May 22-24, 2001 to coordinate curriculum with community colleges. It was held on the UT Austin campus, and there were around 35 participants, including biology faculty from junior colleges and community colleges around Texas and from colleges and universities in the Austin area. The workshop was organized by Ruth Buskirk, School of Biological Sciences, UT Austin. The first day dealt with curriculum issues, and featured Gordon Uno as a speaker. The second day focused upon laboratory design, with breakout sessions on Molecular Biology, Integrated Anatomy and Physiology, and Field Biology. The third day focused upon teaching and learning, including sessions on assessment, information technology, distance learning, and conference evaluation.

In partial consequence of this workshop, we have established an agreement with Austin Community College that will allow students to transfer smoothly to UTeach after completing two years there. Austin Community College has created field courses that can substitute for our STEP I and STEP II.

### **Findings:**

UTeach continues to experience successes and difficulties. Our successes are found in a continual increase of student numbers, graduation and retention rates, and student satisfaction with the program. Our greatest difficulties continue to lie with the number of participating professors from the College of Education, and our findings on the actual proficiencies of our students in science and mathematics. Three new Education faculty were hired for Fall 2002, and the difficulties in staffing courses finally subsided in Fall 2003, which was fortunate because we experienced a new surge in student enrollment.

We are making progress toward all the goals we established for ourselves at the beginning of the grant. In spring 2004 we have over 400 students, and are supervising 52 student teachers. In 2004-2005, we expect a total of around 75 graduates. We have developed many new courses, participated in reformed sections of large service courses, compiled a video library of teaching techniques, obtained major new sources of scholarship and financial support for our students, won an ISTE for technology integration, and obtained grants to provide new sources of professional development for cooperating teachers.

An extensive discussion of the current status of UTeach is contained in an evaluation report attached as an appendix. Major sections of this evaluation of our program are

Section 1: UTeach Enrollment History

Section 2: Profiles of Current (Fall 2003) UTeach Students

Section 3: Program Retention

Section 4: ExCET Teacher Certification Exam

## Section 5: Profiles of the UTeach Graduates (S 2000-S 2003)

The overall picture painted by this evaluation report is extremely positive. Highlights from the report are:

### Section 1: Recruitment and Enrollment

New recruitment efforts for the 2002-2003 year include targeting more students and increasing the offerings of the first introductory field courses, STEP 1 and STEP 2.

Starting in fall 2002, we experience a 50% increase in enrollment that has persisted ever since. In 2002 and 2003 three sections of STEP 1 filled to capacity before fall registration was complete and a waiting list of potential students (n=50) for spring 2003 was created. In Fall 2004, we offered 4 sections of Step I for the first time.

### Section 2: Profiles of Current (Fall 2002) UTeach Students

There are currently over 400 students enrolled in the spring 2004 UTeach program.

26% of the UTeach students are members of underrepresented groups.

Roughly 43% of the UTeach students are majoring in mathematics and another 40% of the students are majoring in the sciences (biology, chemistry, physics, and geology). Computer Science majors make up roughly 7% of the population. 10% are undecided or some other major. The average GPA for UTeach students has held steady for the past several years at 3.05, compared to a College of Natural Sciences average of 2.95.

### Section 3: Program Attrition and Retention

74% of the students who take STEP 1 go on to take STEP 2.

Of the students who take STEP 2, between 46% and 61% continue in the program.

91% of the students who take STEP 2 and three EDC courses go onto complete student teaching.

Over the last seven years, UTeach has recruited over 800 students into the program. A total of 299 students left the UTeach program at some point in their academics.

Of the UTeach leavers, 23% were under-represented minorities.

The average GPA of the UTeach leavers is 2.84.

42% of the UTeach leavers remained in the College of Natural Sciences, presumably making the decision not to teach.

Approximately 36% of the leavers transferred to another school or college in the university.

21% of the leavers withdrew or were dismissed from the university.

### Section 4: ExCET Teacher Certification Exam Scores

97% of the UTeach program candidates have passed the ExCET teacher certification exam in their content.

97% of the UTeach program candidates have passed the ExCETteacher certification exam in pedagogy.

### Section 5: Profiles of the UTeach Graduates

A total of 121 students graduated from the UTeach program by spring 2003.

84% (n=102) are currently teaching.

26% of the UTeach graduates are of minority descent, and their average GPA is 3.26.

The report does not give a sense of the difficulties that UTeach has faced, and some of these deserve comment.

Despite the arrival of three new faculty in the College of Education in the fall of 2002, staffing the sections of the three core UTeach professional development courses has been challenging. In spring 2003, half of the sections were taught by instructors mainly employed by the College of Natural Sciences. In fall 2004 the problems finally subsided, and most sections were taught by Education faculty. As a result, we are finally able to address some new challenges, such as the creation of a substantial induction support network, and a new Master's degree.

We believe that induction support is particularly crucial. State and national statistics show that 50% of new teachers leave within the first five years. Examination of the data on our graduates, although our program is still very young, shows no indication that they will break this pattern. If anything they will leave at higher rates than others because of the excellent opportunities for graduates with a degree in mathematics or science. There is no surprise in what we are seeing, and no great disappointment. However, it makes us keenly aware of a structural problem in teacher preparation. Funding, such as this CETP grant, is almost always limited to addressing part of the overall problem, and is very limited in duration. Funding rewards novelty, rather than supporting success. What we must put in place is a sustained program of support for teachers that begins the moment they consider entering the profession, and continues for at least five years after they first enter the classroom. UTeach has a successful model to support prospective teachers in their undergraduate years, and we are on track to sustain ourselves after the

termination of CETP funds.

As of Fall 2004, we expect to have created this comprehensive support for our graduates. The first two years will be covered by an induction support center that will offer in-class assistance on demand to all new mathematics and science teachers in districts surrounding Austin. Once teachers start becoming comfortable with their profession, we will encourage them to enroll in the new Master's option we are creating, which will be open to teachers from across Texas, and will feature courses offered over three summers.

Various State agencies continue to change the rules by which teachers are certified, meaning that time and energy must continually be put into developing new degree plans and shepherding them through long lists of committees with conflicting priorities, and demands for different types of written documentation. Most recently, Texas has created a new Temporary Teaching Certificate, which gives full certification to college graduates to teach in areas related to their degree. The impact of this new certificate remains to be seen.

Concerns I have raised in the past about the degree to which UTeach graduates, as well as mathematics and science majors in general, gain skills that faculty would consider most important, continue to be addressed in an incremental fashion. A college-wide initiative to require courses with a substantial research component of all undergraduates will play a role in addressing this problem, but offering enough courses that fulfill this requirement is difficult. A Discovery Learning project provides a monthly forum for faculty to hear about innovative teaching techniques. Approximately 50 attend per month, and around 200 attend at some time each year. All new faculty in the College of Natural Sciences attend a workshop on inquiry methods in teaching, and receive a financial incentive to implement what they learn in their classes. These initiatives are based upon common sense, rather than secure knowledge that they will change the university culture and affect student learning.

### **Training and Development:**

The creation of UTeach involves the training and development of four separate groups of people

1. Faculty in the College of Education have developed a completely new professional development sequence for UTeach students. Generic Education courses were eliminated, and replaced with new courses specifically devoted to the problems of teaching, learning, and knowing science and mathematics. A recent alteration of certification requirements by the State of Texas required us to create a new Middle Grades certification program, and this new program involves two more courses, one on Secondary School Reading in Content Subjects, and the other on Adolescent Development. These courses were taught for the first time in Fall 2002.

2. Faculty and staff in the College of Natural Sciences have been developing the course on Research Methods, are developing a course on Biotechnology, and have assisted with domain courses on Functions and Modeling, Number Theory, and Geometry and Visualization. They are also teaching Small Classroom Experience sections of introductory service courses to UTeach and other students.

3. UTeach students are working toward teaching certificates in secondary and middle grades mathematics and science. In addition, they have the opportunity to work as interns in a wide variety of nonprofit educational ventures throughout Austin.

4. Teachers in the Austin Independent School District have to opportunity to work with UTeach students when our students are interns, during early field-experience courses, and when they are student teachers. When UTeach students bring innovative projects into the classrooms, all parties benefit from the exchange of ideas. We can point to an increasing number of programs throughout Austin beginning to view UTeach interns as in important resource.

### **Outreach Activities:**

While UTeach does involve outreach --- particularly the internship program, which places between 50 and 60 students in educational programs each semester --- we feel that the preparation of skilled teachers of science and mathematics is our most important activity.

The notion of outreach make most sense in the context of a basic research grant that has education as an auxiliary focus, rather than this one in which education and improvement of the educational system is the primary focus.

### **Journal Publications**

Dodson, M. M., Carmack, G. D., & La Turner, R. J., " Who is responsible for teacher education?: Changing the role of colleges of Natural Sciences in preparing secondary mathematics and science teachers", *Teacher's College Record*, p. , vol. , ( ). Submitted

Confrey, J., Makar, K., & Kazak, S., " Undertaking Data Analysis of Student Outcomes as Professional Development for Teachers.", *International Reviews on Mathematical Education (ZDM)*, p. 32, vol. 36, (2004). Published

Makar, K., & Confrey, J., "Secondary Preservice Teachers' Informal Reasoning about Variation.", *Statistics Education Research Journal*, p. , vol. , ( ). Submitted

### Books or Other One-time Publications

#### Web/Internet Site

**URL(s):**

<http://www.uteach.utexas.edu>

**Description:**

Our web site has been updated, and is much improved over last year. It still has a long way to go!

#### Other Specific Products

**Product Type:**

**Audio or video products**

**Product Description:**

Nine CDs have been produced with annotated clips illustrating a variety of teaching techniques.

**Sharing Information:**

CDs are cheap to reproduce, and we will press them as needed.

#### Contributions

**Contributions within Discipline:**

The principal discipline of our project is the preparation of secondary science and mathematics teachers. With over 400 students enrolled, UTeach is one the largest programs of this type at any research institution in the United States; to our knowledge, only Indiana and Michigan State have comparably large programs. We hope we can show other research institutions how colleges of Science and Education can work profitably together for a dramatic increase in the quantity and quality of the certified secondary teachers they prepare.

**Contributions to Other Disciplines:**

Our project has no importance for the other disciplines of science and engineering, except that if there are no qualified teachers of science and mathematics, there will be few US citizens able to enter these fields in the future.

**Contributions to Human Resource Development:**

UTeach is exclusively concerned with the development of human resources, the preparation and support of future secondary science and mathematics teachers, and the professional development of the teachers in the schools with whom they work.

We have over 400 students currently enrolled, and have graduated 136 secondary teachers so far, with 52 more set to graduate this spring.

**Contributions to Resources for Research and Education:**

The materials for the UTeach courses constitute an information resource upon which it will eventually be possible to build similar programs at other institutions.

We have developed detailed sets of materials for the following courses:

STEP I (1 hour field course)

STEP II (1 hour field course)

Knowing and Learning in Science and Mathematics (3 hours)

Classroom Interactions (3 hours)

Project-Based Instruction (3 hours)

Research Methods (3 hours)

Perspectives in Science and Mathematics (3 hours)

Functions and Modeling (3 hours)

Geometry and Visualization (3 hours)

A 3-hour biotechnology course is under development

We have not yet decided how to make the materials for these courses available. There is concern, for example, that commercial publishers could take over our materials and then try to prevent us from using them without payment. This scenario would sound fantastic if one of the faculty associated with our program had not already experienced it. We intend to make course materials available in a form that can be disseminated, but whether we settle upon books, CDs, the web, or other media is still a matter of discussion within the faculty. The materials for some of these courses are far from polished, so it would be inappropriate to distribute the materials right now in any event.

### **Contributions Beyond Science and Engineering:**

I believe that the deficiencies of the US educational system pose the largest standing threat to the welfare of the country after the terrorist threat that recently absorbed almost all attention. Many national politicians appear to agree. The recent economic expansion had been fueled by the development of the technology sector, which demands workers highly skilled in computer science, engineering, mathematics and science. Despite the generous salaries given these positions, there are not enough trained US citizens to fill them, and around 85,000 skilled foreign workers obtain visas each year to take them. Many business leaders regard the hiring of foreign workers as a quick fix that relies on the relative strength of our economy compared to that of other countries, particularly India and China.

While the dependence of the US economy upon knowledge workers increases, the educational infrastructure to prepare them is decaying. Every level of the educational system demands rapid improvement, but the greatest difficulties lie in the upper elementary and secondary grades. A large group of excellent teachers hired in the 50s and 60s is beginning to retire, and shortages of qualified science and mathematics teachers are widespread and growing. UTeach provides a model for how research universities can attempt to fight these dismaying trends. I hope that the lessons we learn will be of value beyond the boundaries of our campus, and that our efforts are not too little and too late.

### **Categories for which nothing is reported:**

Organizational Partners

Any Book

# **UTEACH END OF YEAR REPORT**

## **Fall 2003**

Prepared by R. Jason LaTurner, Ph.D.  
UTEach Program Evaluator

# UTEACH STUDENT CHARACTERISTICS REPORT

DATA AS OF EOS FALL 2003

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## UTeach Enrollment History

The UTeach Program has been highly successful in the recruitment of outstanding science, mathematics, and computer science undergraduates and post-baccalaureates. In the Fall of 1997, 27 CNS freshmen entered the UTeach program. Since then the program has grown to include over 410 students with a variety of majors and standings who are all in the pipeline for math, science, and computer science certification. These students are entering the program at various levels in their coursework. Some enter as freshmen while others enter later in their undergraduate career.

In the Spring of 2000, the first two UTeach students graduated and completed the program both with Composite Science Certification. As of Fall 2003, a total of 136 UTeach students have completed student teaching and graduated with secondary math, science, and computer science certification, many of whom have accepted teaching positions in local area school districts. Table 1 below describes the enrollment and graduation history of the UTeach program since the program began in the fall of 1997.

**Table 1. UTeach Enrollment History (Fall 1997 – Fall 2003)**

	New Recruits	Enrollment*	Graduated**	Teaching
Fall 1997	27	27		
Spring 1998	20	47		
Fall 1998	36	68		
Spring 1999	39	90		
Fall 1999	65	133		
Spring 2000	53	154	2	1
Fall 2000	81	191	7	3

Spring 2001	59	188	26	23
Fall 2001	69	189	20	19
Spring 2002	63	191	26	23
Fall 2002	94	276	17	13
Spring 2003	99	368	23	20
Fall 2003	103	410	15	n/a
<b>Total</b>	<b>808</b>	<b>n/a</b>	<b>136</b>	<b>102 (84%)</b>

\*The term *enrollment* refers to the 12<sup>th</sup> class day enrollment figures for the courses each semester. Students who leave the program are identified in the database by their last semester enrolled in UTeach. However, these students are not removed from the enrollment figures until they have not enrolled for their second consecutive long-semester.

\*\*The term *graduated* refers to all students who have completed the UTeach sequence including student teaching. Some students complete University graduation after they complete the program but before they enter the classroom. The TEXES exam, and actual certification from the state may take up to a year after graduating the program.

**Table 2: Seat Availability in STEP 1 & 2 for Fall 2002, Spring 2003 and Fall 2003**

Fall 2002	Unique #	Enrollment/Limit	Available Seats
STEP 1	59215	30/30	None
STEP 1	59220	30/30	None
STEP 1	59225	30/30	None
STEP 2	52230	22/30	8
STEP 2	59235	22/30	8
<b>Spring 2003</b>			
STEP 1	58605	25/30	5
STEP 1	58610	29/30	1
STEP 1	58615	28/30	2
STEP 2	58620	31/30	None
STEP 2	58625	33/30	None
STEP 2	58630	32/30	None
<b>Fall 2003</b>			
STEP 1	59795	23/26	3
STEP 1	59800	28/26	(2)
STEP 1	59805	26/26	None
STEP 1	59792	18/25	7
STEP 2	59810	13/20	7
STEP 2	59815	17/20	3
STEP 2	59820	15/20	5
STEP 2	59808	19/20	1
STEP 2	59813	12/20	8
STEP 2	59818	6/20	14

**Profiles of Current (Fall 2003) UTeach Students**

**Table 3: Demographics and SAT II Math scores of Fall 2003 UTeach Students**

	<b>Number</b>	<b>Percentage</b>
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<b>Gender (n=406)</b>	Female	251	61.8%
	Male	155	38.2%
<b>Ethnicity (n=393)</b>	Caucasian	242	61.6%
	*Hispanic	82	20.9%
	Asian-American	37	9.4%
	*African-American	21	5.3%
	International	5	1.3%
	*American Indian	0	0%
	Other	6	1.5%
	<b>UTeach</b>	<b>CNS</b>	<b>UT Austin</b>
<b>% Female</b>	61.8%	48.8%	50.5%
<b>% Underrepresented*</b>	26.2%	15.4%	15.9%
<b>% Minority (non-int.)</b>	35.6%	37.2%	29.8%
	<b>Score</b>	<b>Number</b>	<b>Percentage</b>
<b>SAT II Math (n=311)</b>	701-800	46	14.8%
	601-700	141	45.3%
	501-600	100	32.2%
	200-500	24	7.7%
<b>SAT II Math Averages</b>	<b>UTeach</b>	<b>UT Austin</b>	<b>National Average</b>
	622	629*	519*

Some students are missing data, percentages are calculated on valid n.

\*Underrepresented refers to those students who are African American, American Indian, and Hispanic. Asian American's and International students are not considered to be underrepresented at UT Austin. Institutional data throughout this document is taken from the UT Office of Institutional Research handbook, often there is a lag of a semester between UTeach statistics and institutional statistics due to reporting schedules.

**Table 4: Current UTeach Student Classification, College, and Majors (n=410)**

		<b>Number</b>	<b>Percentage</b>
<b>Classification</b>	Freshman	28	6.8%
	Sophomore	83	20.2%
	Junior	95	23.2%
	Senior	165	40.2%
	Postbac	39	9.5%
<b>College</b>	Natural Science	360	87.8%
	Graduate	5	1.2%
	Liberal Arts	20	4.9%
	Engineering	7	1.7%
	Education	11	2.7%
	Communication	3	0.7%
	Business	3	0.7%
	Nursing	1	0.2%

<b>Major</b>	Mathematics	177	43.17%
	Biology	83	20.24%
	Chemistry	28	6.83%
	Computer Science	26	6.34%
	Physics	9	2.20%
	Geology	6	1.46%
	Astronomy	1	0.24%
	Other	80	19.51%

**Table 5: Current UTeach Students Overall GPA (N=410)**

		<b>Number</b>	<b>Percent</b>
<b>Overall GPA</b>	4.0	18	4.4%
	3.5-3.99	79	19.2%
	3.0-3.49	109	26.6%
	2.5-2.99	103	25.1%
	2.0-2.49	63	15.4%
	1.0-1.99	15	3.7%
	No GPA established	23	5.6%

<b>GPA (average) Comparisons</b>	<i>UTeach F03 3.05</i>	<i>CNS F02 2.95</i>	<i>UT Austin F02 3.04</i>
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**Program Retention**

**Table 6: Student retention into STEP 2**

	N STEP 1	N STEP 2	% STEP 2
Freshmen	197	141	71.57%
Sophomore	148	110	74.32%
Juniors	120	91	75.83%
Seniors	92	70	76.09%
<b>Avg. Retention</b>	<b>557</b>	<b>412</b>	<b>73.97%</b>

\*does not include students who took Step 1 in semester prior to this report.

**Table 7. Retention after Step 2 by classification**

Freshmen	57.8%
Sophomores	75.9%
Juniors	78.2%
Seniors	82.7%
Post-Bacs	76.9%
<b>Average</b>	<b>72.0%</b>

Students who leave the program are identified in the database by their last semester enrolled in UTeach. However, these students are not removed from the enrollment figures until they have not enrolled for their second consecutive long-semester

**Table 8: Students who departed after completing STEP 2 (n=133) and the number of EDC courses completed by student classification (Retention prior to student teaching).**

<b>N and Percentage of those originally enrolled who departed after taking:</b>					
<b>Entered As:</b>	<b>Step 2</b>	<b>STEP 2 &amp; 1 EDC course</b>	<b>STEP 2 &amp; 2 EDC courses</b>	<b>STEP 2 &amp; 3 EDC courses</b>	<b>Total</b>
Freshmen	27	20	12	3	62
Sophomores	8	8	9	2	27
Juniors	3	3	10	3	19
Seniors	4	6	1	2	13
PostBac	5	3	4	0	12
<b>Total</b>	<b>47</b>	<b>40</b>	<b>36</b>	<b>10</b>	<b>133</b>
Percent of total	35.34 %	30.08%	27.07%	7.52%	

NOTE: This table focuses only on those who have departed after Step 2 – while 72% of people taking Step 2 have remained in the program – this table looks at the 28% who have left. So the percent of total below refers to the percentage of n=133 – or those departing after Step 2.

**Table 9: Program Attrition Rates by Semester**

	<b>New Recruits</b>	<b>N Departed</b>	<b>N Graduated</b>	<b>N Enrolled</b>	<b>Attrition Rate</b>
<b>Fall 1997</b>	27	0		27	
<b>Spring 1998</b>	20	0		47	
<b>Fall 1998</b>	36	15		68	31.91%
<b>Spring 1999</b>	39	17		90	25.00%
<b>Fall 1999</b>	65	22		133	24.44%
<b>Spring 2000</b>	53	30	2	154	22.56%
<b>Fall 2000</b>	81	36	7	192	23.38%
<b>Spring 2001</b>	59	36	26	189	18.75%
<b>Fall 2001</b>	69	48	20	190	25.40%
<b>Spring 2002</b>	63	37	26	190	19.47%
<b>Fall 2002</b>	97	39	17	231	20.52%
<b>Spring 2003</b>	99	19	23	<b>288</b>	
<b>Fall 2003</b>	103		15	<b>391*</b>	
<b>Total</b>	<b>808</b>	<b>n/a</b>	<b>136</b>		

\*Fall graduates are included in this total and 19 students enrolled in our courses were not specifically accounted for; our database shows 410 enrolled in a course no longer than 1 semester ago; Attrition rate is the number departing divided by the previous semester's enrollment – it is difficult to ascertain exactly when a student departed.

**Table 10: UTeach Leavers' Demographics (N=253)**

		<b>Number</b>	<b>Percentage</b>
<b>Gender</b>	<b>Female</b>	<b>199</b>	<b>67.2%</b>
	<b>Male</b>	<b>97</b>	<b>32.8%</b>
<b>Ethnicity</b>	<b>White</b>	<b>179</b>	<b>60.1%</b>

	<b>Hispanic*</b>	<b>58</b>	<b>19.8%</b>
	<b>Asian American</b>	<b>46</b>	<b>16.2%</b>
	<b>African American*</b>	<b>9</b>	<b>2.4%</b>
	<b>American Indian*</b>	<b>1</b>	<b>.4%</b>
	<b>International</b>	<b>1</b>	<b>.8%</b>
	<b>Unknown</b>	<b>2</b>	<b>1.1%</b>
	<b>Underrepresented*</b>	<b>68</b>	<b>23.0%</b>
	<b>Total Minority (non-int)</b>	<b>114</b>	<b>38.5%</b>
<b>Entered UTeach As:</b>	<b>Freshman</b>	<b>128</b>	<b>43.2%</b>
	<b>Sophomore</b>	<b>69</b>	<b>23.3%</b>
	<b>Junior</b>	<b>51</b>	<b>17.2%</b>
	<b>Senior</b>	<b>34</b>	<b>11.5%</b>
	<b>Postbac</b>	<b>14</b>	<b>4.7%</b>
<b>Overall GPA at point</b>	<b>3.0-4.0</b>	<b>137</b>	<b>46.3%</b>
<b>of departure (n=296)</b>	<b>2.0-2.99</b>	<b>118</b>	<b>39.9%</b>
	<b>0-1.99</b>	<b>41</b>	<b>13.9%</b>
<b>Total Average</b>	<b>2.84</b>		

### ExCET Teacher Certification Exam

**Table 12: UTeach Student Performance on the State Certification (ExCET) Exam**

ExCET Exams	N Examinees	Passed Initially	% Passed Initially	Passed w/Retest	% Passed w/Retest
Content Test	87	83	<b>95%</b>	1	97%
Pedagogy Test	90	84	<b>93%</b>	3	97%

**Table 13: Average Total Score Performance on Pedagogy and Content Exams by Content Specialization**

Content and Pedagogy Test Results	Content Total Score	Pedagogy Total Score
Mathematics (N=37)	86.22	80.59
Science (N=49)	82.55	82.44
Computer Science (N=4)		86.25
<b>All Specializations (N=90)</b>	<b>84.13</b>	<b>81.86</b>

### Profiles of the UTeach Graduates (S2000- S2003)

**Table 14: Time-To-Graduate for UTeach Graduates who entered UT as Freshmen (N=76)**

Time	Percentage of Class	Entered UTeach As:
< 4 years	12% (9)	Freshmen = 5 Sophomores = 1 Junior = 1 Senior = 2
4.0 years	25% (19)	Freshmen = 11 Sophomores = 7 Junior = 1
4.5 years	26% (20)	Freshmen = 4 Sophomores = 5 Junior = 3 Senior = 8
5.0 years	21% (16)	Freshmen = 1 Sophomores = 3 Junior = 8 Senior = 4
5.5 years	7% (5)	Junior = 2 Senior = 3
6.0 years	7% (5)	Juniors = 2 Senior = 3
6.5 years	3% (2)	Juniors = 2
<b>4.56 years</b>	<b>Total Average Time</b>	

**Table 15: UTeach Graduates' Certification Profiles (N=121, Fall 03 not included)**

Certification	Mathematics	50	41.3%
	Science	64	52.8%
	Computer Science	7	5.8%

**Table 16: UTeach Graduate Teaching Status**

	Graduates	Currently Teaching	Entered But Left Teaching	Never Entered Teaching
Spring 2000	2	1		1
Fall 2000	7	3	4	
Spring 2001	26	23	2	1
Fall 2001	20	19	0	1
Spring 2002	26	23	0	3
Fall 2002	17	13	0	4
<b>Spring 2003</b>	23	20	3	0
<b>Total</b>	<b>121</b>	<b>102 (84%)</b>	<b>9 (7%)</b>	<b>10 (8%)</b>

**Table 17: UTeach Graduates' Demographics (N=121)**

		<b>Number</b>	<b>Percentage</b>
Gender	Female	81	66.9%
	Male	40	33.1%
Ethnicity	Asian American	12	9.9%
	African American*	3	2.5%
	Hispanic*	26	21.5%
	White	78	64.5%
	American Indian	1	.8%
	International	1	.8%
	<b>*Total Underrepresented</b>	<b>19</b>	<b>15.7%</b>
	<b>*Total Minority (non-int)</b>	<b>31</b>	<b>25.6</b>
Entered UTeach As:	Freshman	23	19.0%
	Sophomore	17	14.0%
	Junior	28	23.1%
	Senior	33	27.3%
	Postbac	17	14.0%
Overall GPA	4.0	5	4.1%
	3.5-3.99	34	28.1%
	3.0-3.49	46	38.0%
	2.5-2.99	34	29.7%
<b>Total Average</b>	<b>3.26</b>	<b>121</b>	

**Table 18: UTeach Current Teachers' Profiles (N=98, known assignments)**

Teaching Level	High School	64	65.3%
	Middle School or Junior High	26	26.5%
	Other	8	8.2%
Austin Area	Austin ISD	32	32.7%
	Round Rock ISD	6	6.1%
	Dripping Springs ISD	3	3.1%
	Pflugerville ISD	2	2.0%
	Georgetown ISD	3	3.1%
	Leander ISD	3	3.1%
		<b>49</b>	<b>50.0%</b>
Houston Area		12	12.2%
Dallas Area		11	11.2%
San Antonio Area		5	5.1%
Other- Texas		15	15.3%
Other States		6	6.1%

<b>School</b>	<b>Region</b>	<b>Number</b>
A. J. Moore Academy	Waco	1
Anderson HS	Austin	4
Austin HS	Austin	2
Bailey MS	Austin	1
Bammel MS	Houston	1
Bellaire HS	Houston	1
Birdville HS	DFW	1
Bowie HS	Austin	1
Brazos MS	Waco	2
Cedar Park HS	Austin	1
Cedar Park MS	Cedar Park	1
Coppell HS	Coppell	1
Crockett HS	Austin	1
Crockett HS	DFW	1
Dessau MS	Austin	1
Dripping Springs HS	Austin	2
Dripping Springs MS	Austin	1
Edison HS	San Antonio	1
Eisenhower HS	Houston	1
Elgin MS	Waco	1
Family Math/Reading Center	DFW	1
Forbes MS	Austin	1
Fossil Ridge HS	Keller	2
Fox Tech HS	San Antonio	1
George Bush HS	Houston	1
Georgetown 9th grade campus	Austin	2
Girlstart	Austin	1
Graduate School	Other	2
Graduate School	UT Austin	5
Homes HS	San Antonio	1
Jasper HS	DFW	1
Johnston HS	Austin	1
Kealing JHS	Austin	8
LBJ HS	Austin	1
Lincoln JHS	San Angelo	1
Lubbock-Cooper HS	Lubbock	1
Lyndon B. Johnson School (Columbia)	Out-of-State Teaching	1

MacArthur Senior HS	Houston	1
McCallum HS	Austin	2
McNeil HS	Austin	1
Not Teaching	N/A	18
O'Henry MS	Austin	2
Outdoor Education Center	Carrollton	1
Palms MS (CA)	Out-of-State Teaching	1
Pearce MS	Austin	2
Pflugerville HS	Austin	1
Porter MS	Austin	1
Private	Austin	1
Regan HS	Austin	1
Richardson HS	Richardson	1
Rogers MS	San Antonio	1
Shepton HS	DFW	1
Stony Point 9th Grade Center	Round Rock	1
Stony Point HS	Round Rock	2
Sugar Land MS	Sugar Land	1
Sylvan Learning Center (NY)	Out-of-State Teaching	1
Teaching math in Africa	Out-of-State Teaching	1
Texas Military Institute	San Antonio	1
Travis HS	Austin	3
Travis MS	DFW	1
Unknown	Austin	2
Unknown	Houston	1
Unknown	Houston	1
Westfield HS	Houston	1
Westside HS	Houston	2
Westwood HS	Austin	1

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10 were still planning to teach, but are not included here