Goal 1: To encourage and enable the integration of science education and research at all educational levels and to explore innovative mechanisms for doing so.

- CISER has been funded primarily by the Texas Tech University / Howard Hughes Medical Institute Undergraduate Science Education Program, which is supported currently for 4 years (2006-2010) with $1,500,000 from HHMI and $1,400,000 in matching funds from TTU. HHMI has provided a total of $7.8 million to support the TTU/HHMI Undergraduate Research Program since 1992. The TTU/HHMI grant supports the following components: a). Undergraduate Student Research 52.5%, b). Current and Future Faculty Development 9%, c). Precollege Outreach 23%, d). Program Administration 10%, and e). Program Assessment 5.5%. This budget allocation is a reflection of CISER's commitment to Goal 1.

- The grant funds were designated and reported to the Office of Research Services at the beginning of the grant period as follows: • $97,500- 26% Michael San Francisco, Program Director, Biological Sciences • $93,750- 25% Lewellyn Densmore, Associate Program Director of Undergraduate Research, Biological Sciences • $86,250- 23% Susan Talkmitt, Associate Program Director of Precollege Outreach, College of Education • $48,750- 13% Gerald Skoo, Director of CISER, College of Education • $48,750- 13% Roman Taraban, Assessment Coordinator, Psychology

- CISER, TTU’s Engineering Outreach Center and the Outdoor School at Junction have collaborated to form one of the 7 Texas T-STEM Centers. This Center during the last two years has provided workshops for teachers in several Texas T-STEM Academies and other schools, activities for K-12 students, STEM-focused lesson plans and curricula, and online resources. Workshops and presentations have focused on the Engineering Design model conceptualized for use in STEM curricula.

- An Exemplar Grant from the Texas High School Project for the 12-month period ending July 2008 supported professional development activities, mentoring, conference travel and other services for 12 teachers in Lamesa ISD. These and other partnership activities, such as demonstration teaching, involved and benefited students and community members. The project, which was evaluated positively by the participants and school administrators, was conceptualized and directed by Susan Talkmitt.

- CISER continued its collaboration with the Region 17 Education Service Center (ESC) to provide professional development activities, matching funds, and supplies for the Texas Regional Collaborative (TRC) funded program for area science teachers. The participating teachers experienced an average of 105 hours of science-content professional development. CISER hosted 2008 teacher workshops using GLOBE (Global Learning Objectives to Benefit the Environment) protocols and curricula. A GLOBE workshop for trainers was held on the Junction campus and attracted teachers from Texas, Illinois, and California.

- CISER teamed with the TTU T-STEM Center and the Biological Sciences Curriculum Study (BSCS), which is a national leader in the development of science curriculum materials and professional development, to develop instructional materials that focus on engineering design, project-based learning, and important science and engineering concepts.

- Dr. Lou Densmore, Program Director for the TTU/HHMI Undergraduate Research Program provided the leadership to organize and plan a retreat to be held in June 2009 at the TTU Junction Campus for program directors for the three other HHMI-supported programs in Texas and others from neighboring states.

- The annual Harragan Lecture, which is supported in part by HHMI, had an audience of 500 for a 2008 lecture by Dr. Jerry Jaax, VP for Research at Kansas State University and author of the popular book The Hot Zone. Thomas Cech, who is a Nobel Laureate and former President of HHMI, was confirmed as speaker for the 2009 lecture.

- The HHMI-funded Graduate Teaching Scholars (GTS) and Postdoctoral Teaching Scholars (PTS) Programs are designed to prepare future university teachers and leaders. One GTS scholar is selected yearly. GTSs are introduced to teaching through laboratory Teaching Assistantships (TAs). One PTS is appointed for up to two years, supported by the TTU/HHMI Program and DBS, and pursues not only postdoctoral research, but also teaches one class per semester. Scholars are involved in curriculum development, learn about classroom and course management and teaching through informal meetings with their research/teaching mentor, and receive mid-semester and end of term faculty and student assessments. The Scholars participate in mentoring activities and workshops/seminars sponsored by the TTU Teaching, Learning and Technology Center or DBS.

- The Technology Scholars program was initiated in 2008. The 2 scholars in this program worked on a variety of tasks and initiatives including HHMI’s Share Point system.

- TTU personnel involved in CISER participated in numerous task forces, committees, and professional activities in the area, state, and nation conferences and organizations that focused on the improvement of K-12 science education. Quantitative data representing the participation of individual faculty members is reflected in the reports of their academic units.

- CISER personnel collaborated with faculty members in the College of Education, College of Arts and Science, and the College of Engineering to conceptualize and support proposals for external funding.

- Continued to be a driving force in the creation of a seamless community of science educators from K-12 to the university by building long-term collaborative relationships with the TTU College of Education, the Institute for the Development and
Goal 2: To expand educational opportunities for undergraduate science students by promoting and supporting undergraduate research.

- Extensive research experiences in research labs and science education-related activities were supported for 60 undergraduate research, technology and science education scholars, which was over the budgeted numbers of 35-40 as a result of the use of matching funds from mentors and creative budgeting of other funds.
- Since the first TTU/HHMI grant in 1992, there have been 91 scientific papers published with Scholar authors (29 with Scholars as senior authors) and 262 abstracts for conference papers. This year, 5 undergraduates were authors of 5 abstracts for conference presentations, and 4 former scholars and one current scholar were authors of scientific publications.
- Funds provided support for 19 scholars to participate in 13 different regional, state, national, and international research and education meetings, helping them make decisions about pursuing careers in research and education. Three undergraduate research scholars received research awards for presentations at national meetings.
- Scholars are expected to provide service to other campus and community organizations. The TTU/HHMI Scholar Service Organization (SSO), which was organized in 1997 to serve as the organizing entity for Scholars’ social and service activities, provides opportunities for involvement with K-12 schools, tutoring peer students in introductory TTU biology courses, and arrange other service activities. The major service activity of the organization is Student Research Days. SSO meetings provide an opportunity for scholars to discuss their research and service projects, educational experiences, and other issues related to undergraduate research and science education. There are 15-25 meetings and special events each year (scholars are required to participate in at least 6-9).
- The Student Research Days Symposium was started by the SSO officers in 1997 to provide opportunities for undergraduate students to present and showcase their research. The 11th annual symposium held in April 2008 involved undergraduate research students from HHMI, the Honors College, and McNair Scholars program. Twenty-nine of the 76 poster presentations featured the research of TTU/HHMI Scholars. Two former Ph.D. scholars were invited to present informal oral presentations to the undergraduates on their research and respective fields. The Symposium was followed by a Friday evening reception and banquet, which was attended by 125 individuals. Two undergraduate students were recognized as Richard L. Blanton Endowed Scholarships for Undergraduate Research recipients. New research scholars were “coated” during the banquet.
- For twelve consecutive years, at least one TTU student has received the nationally prestigious Goldwater Scholarship in Science, Mathematics, and Engineering. Twenty-three of the 29 recipients of this scholarship during the period 1994-2007 have been HHMI Undergraduate Research Scholars. Prior to 1994, only one TTU student had received this scholarship. Research and Science Education scholars received other scholarships and travel awards during the 2007-2008 academic year.
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- Sixty research faculty members from TTU and TTUHSC departments served as mentors for the Scholars during the 2007-2008 academic year.
- An ongoing effort has been made to track the 402 current and former undergraduate scholars who have been supported since the first grant in 1992. Available data indicated that 75 Scholar alumni now have research and teaching positions. Sixty-six Scholar Alumni were in medical careers. In 2008, 97 Scholar Alumni were graduate students with 33 in medical school, 28 in Ph. D. programs, and 3 in M.D./Ph.D programs.
- Twenty-five new Scholars start in June 2009.
- The TTU Society for the Advancement of Chicanos and Native Americans in Science (SACNAS) Student Chapter (organized and sponsored by the TTU/HHMI Program in 2004) had a membership of 16, which included undergraduate and graduate students, faculty members and university administrators. The group is supported by CISER with staff and financial support. They met 30 times during the year for general and officer meetings, and for SACNAS events. Service projects include helping with the annual Native American Fall Event, tutoring for Upward Bound and chemistry classes, Comanche Nation Book Drive, and sending members to the national SACNAS meeting in Kansas City.
- The Clark Scholars program, which has a 12-year history, provides opportunities for 12 gifted high school students selected from a nationwide pool of applicants to work with TTU professors on research projects during an 8-week summer period. In 2008, 12 of 103 applicants were accepted for this program. The number of applicants increased to 134 for 2009 and 2 of the 12 Scholars accepted are from Turkey. During the past decade, 26 Clark Scholars have enrolled at TTU and, as undergraduates, continued their work in research laboratories through the TTU/HHMI Program and, as a result, have had many opportunities to present and publish research data prior to their graduation.
- The Joint Admission Medical Program (JAMP) at Texas Tech provides services to support and encourage highly qualified, economically disadvantaged students pursuing a medical education. The TTU/HHMI Undergraduate Scholars and JAMP students have common access to a reading and study room, snacks and resting area, networked computers, books and magazines, and career and graduate and professional school information, as well as a support staff. In return, the JAMP program provides the HHMI program with funds to further increase recruitment efforts.

Goal 3: To enhance recruitment of pre-college science teachers.

- Five TTU/HHMI Undergraduate Science Education Scholars were involved in both scientific research and a variety of science education activities. The Scholars taught science lessons in K-6 schools and in Super Saturday sessions, which is a weekend science class for K-6 school students. SEds assisted with the Crusader Raiders program, which is a partnership with the Institute for the Development and Enrichment of Advanced Learners (IDEAL) and involves Iles Elementary School students, who are brought to campus to get exposure to the university. The SEds accompanied these students to lunch and demonstrated mini science lessons. Scholars also providing mentoring and instruction CISER-IDEAL partnership programs, which include Science, It’s a Girl Thing and Shake Hands with Your Future, both summer science camps. Over 100 students were enrolled in several sessions of these two programs in the summer.
Goal 4: The retention of precollege science teachers and the enhancement of their subject matter knowledge and pedagogical skills.

- Concentrated efforts were made through our Science Teachers Academy at CISER (STAC) to increase opportunities for teachers to enhance their content and pedagogy through partnerships CISER has formed with the TTU T-STEM Center, The Texas High School Project, the Texas Regional Collaborative, and the Texas Education Agency Region XVII Education Service Center. Additional information about these partnerships is provided in the narrative for Goal 1.
- The TTU/HHMI Traveling Laboratory Program offers 19 TTU/HHMI Traveling Labs and associated workshops for area teachers. A third van was added for use in delivering the labs. During the period September 2007-August 2008, the delivery of these labs, which provided science curricula and materials used by 9106 students, required 20,732 miles of travel. The traveling labs provide support for area science teachers and enhance the quality and variety of science instruction experienced by students.
- Support through special events and tuition grants has been provided by CISER for 8 consecutive years for teachers enrolled in the M.S. Degree in Multidisciplinary Science program. The 3rd cohort of 9 teachers (8 female and 1 male) enrolled in this program completed their degree requirements in August 2008. Support was provided for a 4th cohort that began this degree program in the summer of 2008.
- CISER collaborated with the T-STEM Center to conduct 12 workshops in June and July for 66 teachers. Scholarships were provided for teachers as well as special equipment, which included iPods and GPS units. Additional workshops for teachers were held between January and August in collaboration with either ESC 17 or the TTU T-STEM Center. These workshops varied in focus but included an emphasis on the Full Option Science System (FOSS), GEMS, and GLOBE (Global Learning Observations to Benefit the Environment), which is an international program that provides protocols and curriculum that focuses on topics in soils, weather, land cover and hydrology and encourages students to gather data using precision in methodology. A training session for new GLOBE trainers held in March involved teachers from Texas and other states.
- CISER collaborated with the ESC Region 17 and the Texas Regional Collaborative to provide 9 workshops, which focused on geology and had 191 teachers participate in the spring and summer of 2008.
- Thirty teachers from the Houston area participated in a professional development session that focused on evolution.
- CISER continued support for the TTU/HHMI Teacher Research Partners, who participate in TTU or TTUHSC research labs in the summer as part of an ongoing effort to integrate research and education at all levels (K through graduate school). This program is limited to 1 or 2 teachers per summer.
- The summer TTU/HHMI Teacher Partner program supported 8 teachers, who taught science camps such as Science: It’s a GIRL Thing and Project Future. These teachers also mentored Science Education Scholars who also provided instruction for camp students. The teachers received stipends totaling $11,150.
- In response to their growing expertise as leaders and science teachers, CISER provided travel funds for teachers to participate and present at the 2008 Conference for the Advancement of Science Teaching (CAST) in Fort Worth. Financial support was provided for 13 area teachers to attend the national conference of the National Science Teachers Association in Boston. 5 Science Education Scholars, 1 TTU faculty member, and 1 CISER staff person accompanied these teachers.
- CISER co-hosted the 1st annual STEM Best Practices Conference in partnership with the TTU T-STEM Center, the Transformation 2013 T-STEM Center in Austin, and El Centro de Futuro in Edinburg. Approximately 300 educators attend this conference.
- CISER's Small Grants program provides support for teachers to introduce new laboratory experiences in their classrooms. Three teachers received a total of $1500 to purchase GLOBE kits. Another teacher received a grant for $450. This grants program also provided travel funds for 37 teachers to attend conferences and workshops. The participation of these teachers has increased their involvement and expertise as science teacher leaders in the area and state.
- Provided individual consultation for preservice and inservice science teachers and loaned instructional materials to individual teachers through the Skoog Collection, a resource library for science educators.
- CISER has nominated and supported Partner Teachers for leadership positions in the Science Teachers Association of Texas (STAT). Currently, Sarah Anderson and Ross Ann Hill occupy the offices of Vice President and Secretary, respectively. Ms. Anderson has been a Partner teacher and is now the Coordinator for the Science Teacher Academy at CISER (STAC). Ms. Hill has an extensive record of service and involvement with CISER.
Section 2. Universal Quantitative Data

There are no Universal Quantitative Data for this area/unit.
There is No Area Specific Data in Calendar Year Section.
There is No Area Specific Data in Fall Section.
There is No Area Specific Data in Fiscal Year Section.
Section 3b. Qualitative Information.

There is no qualitative information for the current year.

Commentary:

STEM teachers in middle schools and high schools are being challenged increasingly to provide curriculum and instruction that prepare students to meet college readiness standards as well for 21st Century careers. This dual set of challenges requires that STEM curriculum and instructional strategies have to be rethought and restructured. CISER’s expanding number of partnerships and the ever-strengthening seamless community of science educators involved in the Center activities increase the Center’s potential to address these challenges. The traveling labs, which have been an essential part of the Outreach Program since the beginning of the program, continue to be used by a large number of teachers. When first designed, the traveling labs offered instructional material and equipment that were not available to most schools. However, a new generation of labs is needed so as to help students become more college ready in the sciences. CISER’s ongoing collaboration with the College of Engineering is resulting in increased and varied professional development opportunities for science teachers in engineering-related areas and, in particular, engineering design. The collaborative effort with the Biological Sciences Curriculum Study is resulting in the development of a handbook that provides instructional materials that focus on engineering design. Selected instructional materials are scheduled to be piloted nationally in 2009-2010. Other instructional materials prepared for a variety of program initiatives have been shared and used by teachers at the local, state and national levels. Teachers are seeking access to these resources regularly because of their effectiveness. A part-time computer science student was employed recently to assist in making materials available on the CISER website. Our plan is to have a more national presence in providing resources to teachers. There is growing evidence that professional development activities directed by CISER personnel and supported with funding from the Texas Regional Collaborative, the Texas High School Project, and HHMI have been effective in promoting changes in the STEM courses planned and taught by teachers who have lengthy records of involvements in these activities. Workshops sponsored by CISER have focused on student-centered instructional strategies that are based on current learning theories and stress inductive approaches. CISER’s campus partnerships have provided expanded opportunities for CISER personnel to be involved in planning and delivering STEM experiences to enrich the informal STEM experiences for school age students. Overall, CISER has gradually developed an infrastructure of STEM educators and partnerships that are increasing the Center’s potential to scale up the variety and effectiveness of services and programs available to the teachers and students served. The space and facilities in the College of Education and the Department of Biological Sciences contribute much to the effectiveness of the CISER’s HHMI Outreach Program. The many facets of the Outreach Program and the demands that emanate from the large number of schools and teachers served pose a major challenge. Despite the number of partnerships and faculty members involved in CISER programs and receive assistance in conceptualizing grant proposals and with various programs, CISER’s “tent” needs to be bigger and more inclusive. The Science Education Scholar program has not recruited the desired number of undergraduate students. Scholarships funded by the Mobil Exxon Foundation and two NSF funded campus programs is expected to attract additional recruits. The nature of the Scholars’ experiences is being rethought. Throughout the history of the program there has been an emphasis on providing opportunities for Scholars to have sustained and professional experiences with accompanying mentoring in both informal and formal settings. This emphasis will continue, but there will be an effort and expectation that the planning and instruction completed by the Scholars will become better aligned with professional practices that are considered to be “cutting edge” and reflect current learning theory and the National Science Education Standards. Plans are being made to invite a small number of Science Education Scholar alumni to return to campus for 2 or 3 weeks during the summer of 2009 to serve as Partner Teachers, mentor current scholars, and participate in specific activities designed to build on and learn from the knowledge they have accrued during their initial period of teaching. This initiative is designed to enhance the professional lives of these individuals and enhance the retention rate. The Undergraduate Research Program has been very successful in achieving the goal of attracting, holding, and preparing undergraduate students for science-related careers. The presentations of the Research Scholars during Research Days, the continued record of Scholar publications and paper presentations at national meetings, the science and medical-related career paths selected by the scholars, and the continued availability of a sizeable number research faculty members to serve as mentors are among the pieces of evidence of the program’s success. The number of Scholars in the program has increased steadily as a result of extra funding and strategies. The documents prepared by these two programs will be useful tools as CISER works to
meet the aforementioned challenges.

**Implementation Plan:**

*There is no implementation plan for the current year.*