College of Science's Request for Funding for the 2007-08 Quality Enhancement Plan

I. College of Science Quality Enhancement Plan Council Membership

Jane F. Schielack, Chair, Associate Dean for Assessment and PreK-12 Education, College of Science
Mail: MS 3257, Fax: 979-845-6077, Voice: 979-458-0549, Email: janie@science.tamu.edu
Thomas McKnight, Professor, Biology, Mail: 3258 TAMU, Fax: (979) 845-2891
Voice: (979) 845-3896, Email: mcknight@mail.bio.tamu.edu
C. O. Patterson, Professor, Biology, Mail: 3258 TAMU, Fax: (979) 845-2891
Voice: (979) 845-2187, Fax: (979) 845-2891, Email: cop@mail.bio.tamu.edu
John Fackler, Distinguished Professor, Chemistry, Mail: 3012 TAMU, Fax: (979) 845-4179
Voice: (979) 845-0648, Email: fackler@mail.chem.tamu.edu
Daniel Singleton, Professor, Chemistry, Mail: 3012 TAMU, Fax: (979) 845-4719
Voice: (979) 845-9166, Email: singleton@mail.chem.tamu.edu
Donald Allen, Professor, Mathematics, Mail: 3368 TAMU, Fax: (979) 845-6028
Voice: (979) 845-7950, Email: dallen@math.tamu.edu
Dante DeBlassie, Associate Professor, Mathematics, Mail: 3368 TAMU, Fax: (979) 845-6028
Voice: (979) 845-3728, Email: deblass@math.tamu.edu
William Bassichis, Professor, Physics, Mail: 4242 TAMU, Fax: (979) 845-2590
Voice: (979) 845-3137, Email: bassichis@physics.tamu.edu
Lewis Ford, Professor, Physics, Mail: 4242 TAMU, Fax: (979) 845-2590
Voice: (979) 845-3337, Email: ford@physics.tamu.edu
Michael Longnecker, Professor, Statistics, Mail: 3143 TAMU, Fax: (979) 845-3144
Voice: (979) 845-3162, Email: longneck@stat.tamu.edu
Thomas Wehrly, Professor, Statistics, Mail: 3143 TAMU, Fax: (979) 845-1359
Voice: (979) 845-3151, Email: twehrly@stat.tamu.edu

ABSTRACT: During 2007-08, the College of Science Quality Enhancement Plan Council (COSC-QEPC) will coordinate efforts to highlight and share among college faculty clarifying examples of inquiry/research-based experiences that are currently being implemented in the College of Science. Based on the results of the university council's recently conducted survey, in addition to other departmental information, the COSC-QEPC will identify a minimum of two examples of inquiry/research based experiences from each department (one for majors and one for non-majors). These specific examples will provide the contexts for engaging faculty in various activities for building familiarity with and exploring approaches to achieving the following college-level inquiry/research-related student learning outcomes: formulating good questions; examining, identifying, and gathering information; analyzing, interpreting and presenting results; formulating conclusions and/or selecting the best solution with appropriate justification; and evaluating the worth and importance of the conclusions drawn. The COSC-QEPC supported faculty engagement activities during the year will focus on (1) identifying commonalities in the cross-departmental examples that could be used as guidelines for designing inquiry/research-based experiences to support the

student learning outcomes for inquiry/research-based experiences, (2) identifying and sharing strategies for efficient implementation of these experiences, and (3) designing and implementing effective tools and techniques for assessing student achievement of the learning outcomes. These activities will include sponsored presentations by current implementers of inquiry/research-based experiences in the College of Science, targeted workshops guided by relevant published materials, and interactive development of a college-level web-portal resource for further development of inquiry/research-based experiences.

II. Working toward the Desired Undergraduate Student Learning Outcomes for Inquiry/Research-based Education

The COSC-QEPC has chosen to focus on the student learning outcomes for inquiry/research-based education identified in the Inventory of Inquiry-rich Courses developed by the university-level QEPC:

- formulate good questions and/or identify problems within the discipline;
- examine, identify, and gather information regarding the questions and/or problems;
- analyze, interpret and present results;
- formulate conclusions and/or select the best solution with appropriate justification; and
- evaluate the worth and importance of those conclusions—including their placement in a social, environmental and historical context, as appropriate.

Although these learning outcomes, individually and as a sequence, are very closely related to the inquiry and research activities of the faculty in the College of Science, it is not a trivial task for faculty to design instruction that engages undergraduates in these types of activities nor to design assessment that measures the extent to which undergraduates have learned these skills. College of Science faculty are "experts" within their own scientific fields, but most of them would consider themselves "novices" with respect to designing and assessing learning in inquiry/research-based educational experiences. According to research in cognitive science (Bruer, 1993) one of the most effective techniques for increasing expertise in novices is to engage them in the analysis of good examples. Therefore, the COSC-QEPC proposes to use the information collected with the Inventory of Inquiry-rich Courses, along with other input from the departments in the College of Science, to identify a minimum of two exemplar courses from each department (preferably one for majors and one for non-majors) around which to build a beginning set of guidelines for designing inquiry/research-based experiences for undergraduates. These guidelines will provide the organizing structure for a set of activities during the year whose purpose will be to familiarize faculty with various ways to design student experiences that develop the inquiry skills identified by the College and methods for assessing the desired student learning outcomes. These activities will include (1) sponsored presentations by current implementers of inquiry/research-based experiences in the College of Science, (2) targeted workshops guided by material from the Center for Teaching Excellence and the Office of Institutional Assessment (e.g. the recent presentation on Assessment Techniques for Inquiry), and (3) interactive development of a college-level web-portal resource for further development of inquiry/research-based experiences. The evaluation of the

2007-08 COSC QEP activities will be based on evidence of progress toward the following deliverables:

- A baseline plan for providing additional faculty in the College of Science, including new hires, with orientation in Inquiry/Research-based Education in the College of Science in future years.
- A beginning structure for a College of Science web-based portal that can be used as an interactive resource to support faculty in the design and assessment of inquiry/research-based education.
- The development of the 2008-09 COSC-QEP proposal for increasing the quantity and quality of inquiry/research-based experiences in College of Science courses.

III. Process for Review and Revision

This 2007-08 COSC-QEP proposal was created by the COSC-QEPC (as identified on Page 1) and approved by Dr. H. Joseph Newton, Dean, College of Science. The implementation of the activities proposed, and the necessary budget allotments, will be managed by the COSC-QEPC through face-to-face and virtual meetings during the year. Each department in the college has two representatives on the council, and they will be responsible for communicating with department heads before and after each meeting. The chair will be responsible for compiling official minutes for the council, for the Dean, and for the College of Science Executive Committee, which includes the department heads.

IV. Budget

To support the flexibility needed to plan the year of activities, the COSC-QEPC would like to leave the budget designations as open as possible. Specific budget allocations will be made by the council as specific activities are formalized during the year. In general, the budget will be divided approximately in thirds across the three major categories of activities: (1) sponsored presentations by current implementers of inquiry/research-based experiences in the College of Science, (2) targeted workshops guided by material from the Center for Teaching Excellence and the Office of Institutional Assessment (e.g. the recent presentation on Assessment Techniques for Inquiry), and (3) interactive development of a college-level web-portal resource for further development of inquiry/research-based experiences.

IV. Report of Progress

A report of progress will be submitted to the Office of Institutional Assessment in the summer of 2008. This report will include a restatement of the student learning outcomes, with any revisions that have occurred during the previous year of development; a summary of the types of assessment methods that have been used for each learning outcome; a summary of the impacts of the QEP activities on these student learning outcomes across the college; and a discussion of how these results will be used to inform the plans for continuing to improve inquiry/research-based experiences in the 2008-09 QEP proposal.

Reference

Bruer, J. T. (1993). Schools for thought. Cambridge, MA: MIT Press.