

**Trinity University and the Associated Colleges of the South**  
**Fourth Report to**  
**The W.M. Keck Foundation of Los Angeles**  
**The Reform of Introductory Science Courses for Non-Science Majors Program**  
**January, 2007**

Report to the W.M. Keck Foundation of Los Angeles  
Reform of Introductory Science Courses for Non-Science Majors Program  
January, 2007

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Report to the W.M. Keck Foundation of Los Angeles  
Reform of Introductory Science Courses for Non-Science Majors Program  
January, 2007

Trinity University and the Associated Colleges of the South present the fourth report on the program activities made possible by a grant awarded on June 12, 2003, by the W. M. Keck Foundation of Los Angeles. This report covers the twelve-month period ending December 2006.

We thank the Foundation for their support and for granting the requested one year grant extension to June 2007. All funds will expended by June 2007.

**1. Progress Since Last Interim Report Dated 12/31/05**

a. **Program Committee membership**

Program Committee membership remained stable in the 2005-2006 academic year. The committee membership roster for 2006 is attached in Appendix A.

b. **The Teacher Education Summit**

The Program Committee began to look at next steps in Science Reform after the current grant is concluded in June 2007. Ed Roy, Trinity University, who has been instrumental in this project from the very beginning and currently has a consulting role, helped develop a presentation for the ACS Teacher Education Summit in March of 2006 at Rhodes College. This special session was on Attracting, Educating and Retaining Science Teachers. Given the shortage of students seeking to become science teachers, do we have any answers? And how do we work with and help local schools retain science teachers? How can our science departments and our education departments come together to develop connections for schools and school districts? These were questions that were brainstormed. It was agreed to begin collaboration between our science and education departments to further science education at the undergraduate level and in the K12 curriculum. We brought the groups together for a special meeting at the Science Course Reform Workshop in October at Birmingham-Southern College. The Teacher Education Summit agenda and an informal survey on Science Reform and Teacher Education are in Appendix C.

c. **Science Reform and Teacher Education Workshop**

The fourth Science Reform Workshop took place at Birmingham-Southern College, October 26-28, 2006. It was the largest workshop to date with 48 people in attendance and every ACS school represented. It had a dual, two-day focus on reform of introductory science courses for non-majors and reform of K-16 science education. This was the final workshop where “Reforming Introductory Science Courses for Non-Science Majors,” mini-grant recipients could share information about their projects. The grant

recipients from 2005-2006 presented their projects in a poster session and talked with their colleagues about objectives, methodology, results and assessment. Those who were interested in putting in a proposal for the final December 1, 2006 deadline were also in attendance. Sessions were devoted to The Need for Reform, Defining Science Literacy, the Importance of Pedagogy, Assessment and Dissemination. Guest facilitators included Dr. Scott Snyder from the Center for Educational Accountability at the University of Alabama, Dr. Spencer Benson from the Center for Teaching Excellence at The University of Maryland and Dr. Jeanette Norden, Vanderbilt University Medical School, the program's outside evaluator.

Also in the October workshop, the group began looking at another area where science reform is crucial. They discussed the crisis and need for reform in K-16 science education. They were seeking the direction that ACS science and education departments working together could take to be more effective in producing science teachers and support K-12 science in their local schools. Thirty-two people attended this part of the workshop. Each institution sent a scientist and an educator to the meeting. Discussions were designed to explore the issues and the direction ACS will take. Topics ranged from The Need for Reform of K-12 Science Education, Models of K-16 connections at ACS institutions, Assessment of K-16 Programs, National Models of K-16 Connections and funding opportunities, and The Need for Leadership. Many ideas were presented on what could be done and a committee was established from ACS science and education departments to decide in a smaller setting on the focus of the new initiative. They will be meeting in the spring of 2007 to discuss next steps.

Appendix D contains the complete Science Reform workshop agenda and the summary of the workshop evaluations. Appendix E contains the Teacher Education workshop agenda and summary of evaluations.

d. **Fourth Annual Meeting of the Program Committee**

The fourth meeting of the Program Committee for the Reform of Introductory Sciences courses was held on October 29, 2006, at Birmingham-Southern College, Birmingham, Alabama. It followed the two workshop meetings on October 27th and 28th. Leo Pezzementi, Birmingham-Southern College, chaired the meeting.

The committee discussed the 2005-06 mini-grant awards with an update from Dr. Tim Ward, Millsaps College and chair of the mini-grant review committee. The committee agreed to have one more round of grants, with a December 1, 2006 proposal due date. The current budget was discussed. It was agreed to move funds from the program committee meeting line to the course grants line to increase the amount of funding for this final round. The program committee will meet by conference call instead of in person as needed to complete their responsibilities. Dr. Jeanette Norden, the outside reviewer for this project, discussed how she will be assessing the overall Science Reform Grant activities and reminded the committee about the importance that evaluation and dissemination play in the grant process. Program committee roles and the timeline for evaluation were reviewed. It was agreed again that one of the things to be acknowledged up front is that the very nature of the grant funding cycle means the long-term investment results cannot be determined by the 2007 final grant report.

The importance of getting the Drury University group to release the Science and Math Values Inventory forms for ACS institutions and the scoring mechanism was

emphasized. To date, they have been slow in getting information to us. The agenda also included a review of the workshops held over the past two days. Next steps for future science reform grant projects including Reform of Teacher Education for K-16, were considered. Other ideas for future science grants included developing laboratory modules, science literacy of science majors, and collaborative research between faculty and students.

Program Committee members and course mini-grant recipients continue to be encouraged to share what they are doing as part of this grant. During the discussion of the course evaluation and dissemination, each committee member was asked to return to campus and encourage the grant recipients to send course syllabi and laboratory modules for posting on the ACS website <http://www.colleges.org/sciencereform/index.html>, and to ask colleagues to submit proposals for the final grant round in December. The ACS Council of Deans also was asked to encourage their natural science faculty who teach introductory courses for non-majors to submit proposals.

A complete Program Committee Meeting agenda and meeting summary are found in Appendix B.

- e. Final reports from the five **second Course Mini-Grant recipients** announced in May 2005 are included online at [http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html) and the recipients list is in Appendix F.
- f. The deadline for the **third round of Course Mini-Grants** was October 14, 2005. Five proposals were received from faculty for introductory courses in Biology, Geoscience, Chemistry, and for an interdisciplinary core course. One was awarded. Four PIs were asked to revise their proposals, addressing concerns around pedagogy, budget, assessment, and evaluation, and resubmit them by the end of January 2006. All were awarded mini-grants. Southwestern University used the science component of the Science and Math Values Inventory developed by Drury University in their new course. The list of those funded is in Appendix G and their proposals and final reports can be found online at [http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html)
- g. The **fourth round of Course Mini-Grants** was awarded in March of 2006. Nine proposals were awarded in Earth Science, Biotechnology, Geoscience, Biology, Chemistry, and Environmental Science. The recipients list is included in Appendix H and the proposals and interim reports can be found online at [http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html)
- h. The **fifth and final round of Course Mini-Grants** proposals were submitted on December 1, 2006. Six proposals were submitted and awards notification and funds will be sent in January 2007. These six projects will have their final reports submitted in June of 2008. The projects are in the fields of Biology, Chemistry, Neuroscience, Geology and Forensic Chemistry. The recipients list is in Appendix I and proposals can be found online at [http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html)

## **2. Problems Encountered Or Unanticipated Developments in Project/Program Since Last Interim Report**

- a. A renewed effort to encourage proposal submissions was undertaken.

Members of the ACS Council of Deans were asked to encourage their faculty to submit proposals. Program Committee members were asked to talk one-on-one with their colleagues to encourage submissions. Multiple announcements via the science faculty e-mail list, the ACS e-Palladian, and the Palladian were made, all designed to publicize the program and encourage an increase in proposals.

Approximately seven participants from the fall 2005 workshop at Furman University were expected to submit proposals in March 2006. We actually had ten submissions and nine were awarded mini-grants. After awarding these mini-grants, the program committee felt it important to have one final round of grants in December 2006 to allow more faculty to fully utilize the opportunity. By timing this after the October workshop, we felt we would be able to encourage some in attendance at the workshop to submit after having an opportunity to ask questions and see the presentations. Indeed, every ACS institution was in attendance and several faculty expressed their intention to submit.

b. We feel it is important to reiterate that final reports from mini-grant recipients often mean a final reporting of their activities for the grant period, not a comprehensive report on the overall project, especially if new or revised courses/modules are taught after the mini-grant period ends. New or redesigned courses/modules may not be implemented and or evaluated until one or two years after the mini-grants end due to curricular cycles, and the process for publishing in peer reviewed journals often takes 18-24 months.

The Program Committee is considering asking for updates from some of the first grant recipients to help address this reality. The assessment team of Ed Roy, (Trinity University) Leo Pezzementi (Birmingham-Southern College) and Jeanette Norden (Vanderbilt University and Vanderbilt Medical School) are continuing to work on this issue.

c. In the original ACS proposal submitted to the W.M. Keck Foundation of Los Angeles, ACS indicated that its member institutions would participate in the testing of the Science and Math Values Inventories that were being developed by colleagues at Drury University. There continues to be some frustration on the part of the ACS faculty who have used the pre-post Science Values Inventory in their introductory courses for non-majors with the time lag between submitting the completed inventories to Drury for scoring and receiving the tabulated results from Drury.

ACS remains committed to using the Science and Math Values Inventories and working with colleagues from Drury on this project to disseminate up-to-date information in a timely manner. The Program committee is encouraging ACS faculty to use these pre-post course instruments to help them evaluate and improve their introductory science courses for non-majors.

- d. Jeanette Norden, Ed Roy and Leo Pezzementi met in January 2006 to develop an assessment piece to share with the Program Committee. They suggested the following and the program committee was notified via email and in person at the program meeting in October of 2006. The program committee will work

with the mini-grant recipients at their institution to be sure the required information is received.

The Members of the Program Committee will be responsible for collecting the following information from their institutions:

- Raw course evaluation data, including institutional quantitative and qualitative course evaluations, and instructor-designed evaluations, which could include supplemental questions, pre and post tests, focus groups, etc., depending on the course.
- Numbers of students taking the course should also be reported.
- The methods used for on-campus, regional (meetings), and national (meetings, journal publications, books) dissemination will also be addressed.
- Whether additional funding has been requested, or is planned, and if not why not.
- Level of support and encouragement from the Dean/Provost, according to grant recipient and institutional representative.
- Additionally, the Members of the Program Committee will provide a context for and narrative summary of the data, describing the impact the course had and what difference it made at the institution.

The Subcommittees of the Program will be responsible for writing reports assessing if we did what we said we would do, and if not why not. These reports will come from the Mini-grant (Leo Pezzementi and Tim Ward), Course Design and Assessment Workshops (Preston Miles and John Snyder), and Mentoring Workshop Subcommittees (Linda McNally). These reports should refer to the goals in the grant proposal for each of the components.

SAM-VI data will be requested from the Drury group for inclusion in the evaluation. Leo Pezzementi will contact Don Deeds at Drury.

The external reviewer expressed the following concerns and recommended that these concerns be addressed by the Program Committee and grant recipients in the following year:

- Has there been adequate dissemination – on campus to inform faculty about the initiative and encourage them to apply for mini-grants, at regional meetings to communicate the goals of the program in the South outside the ACS, and at national meetings and in refereed publications to reach the widest audience possible and to provide additional independent evaluation of the courses and the program.
- Has there been adequate evaluation of the courses, including SAM-VI and other pre and post test evaluations that get at the questions of the faulty paradigms that students bring to classes and how the class addresses science literacy, both process and content?

e. A new ACS staff person has been working with this grant program since January 30, 2006. Together with the Program Committee members, chair, and consultant we have continued to provide effective leadership for this grant.

### **3. Further Progress Anticipated Within The Next 6 Months**

- The fifth and final round of mini-grant recipients will be announced in the next issue of the electronic *Palladian* and in the electronic *ACS Announcements*.
- Dissemination will continue to occur via the *Palladian*, the *ACS Announcements*, the ACS website, and disciplinary state and regional meetings.
- Paula Lessem (W&LU), course mini-grant recipient will present her course ideas at the June 2007 Association of Biology Laboratory Education meeting at the University of Kentucky.
- Pamela Hanson (BSC), course mini-grant recipient will disseminate project ideas at the Experimental Biology Meeting, April 28-May 2, 2007.
- Pamela Hanson (BSC), will launch her website which integrates materials from books and websites on cancer biology into a “hypertextbook” in February 2007.
- Kerry Bruns & Willis Weingand (Southwestern), course mini-grant recipients will present a poster of their work at the Texas Academy of Sciences meeting, March 1-3, 2007 at Baylor University.

### **4. Other Support Solicited/Received Since Last Interim Report**

None solicited/received

### **5. In Hindsight, Would You Have Structured This Grant Differently, And If So, How?**

As stated previously, in hindsight, we certainly would have set two dates during each academic year for submission of course mini-grant proposals. This would have kept the process in front of our audience and hopefully encouraged more submissions. Our submissions increased once we added more dates.

### **6. Related Activities**

- Articles about the science reform initiative were published in the Winter and Fall 2006 editions of the *Palladian*. Copies of these editions are included in Appendix G.
- A presentation was made at the February 2006 PKAL meeting that was hosted by Trinity University by Leo Pezzementi (BSC), Program Committee Chair.

- Rosanna Capellato (Rhodes), course min-grant recipient presented her course as part of a session at The Ecological Society of America's annual meeting in August 2006.
- Cindy Hauser (Davidson), course mini-grant recipient shared her work at the 2006 NSF Summer Workshop at Governors State University.
- Weston Dripps (Furman), course mini-grant recipient presented his course idea at the Annual Geological Society of America Meeting in October 2006 in Philadelphia.
- Megan Gibbons (BSC), course mini-grant recipient shared ideas at the annual meeting of the Ecological Society of America in Memphis, August 2006.
- Suresh Muthukrishnan (Furman), course mini-grant recipient shared course ideas and technological requirements at the National Institute for Technology in Liberal Arts Education at Pomona College in June 2006.

#### **7. Relevant Honors and Awards Since Last Report**

At this time we are not aware of any honors and/or awards that have been received in 2006 by anyone involved in the program.

Financial Reports  
Trinity University

Financial Reports  
Associated Colleges of the South

Appendix A

2006-07 Program Committee Membership

ACS Reform of Introductory Science Courses for Non-Science Majors  
Program Committee  
2006-2007

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Appendix B

Program Committee Meeting  
October 29, 2006

Agenda  
Meeting Summary

**Science Reform Program Committee Annual Meeting**  
**Sunday, October 29, 2006**  
**Birmingham-Southern College**  
**Executive Dining Room**

Chair, Leo Pezzementi

7:30 A.M.	Meet in hotel lobby	Facilitator
8:00	Breakfast	
8:30 A.M.	Welcome, Introductions, Housekeeping	Leo Pezzementi
8:45	Science Education Workshop Discussion	Leo Pezzementi Jeanette Norden
9:00	Science Reform Workshop Discussion	Leo Pezzementi Jeanette Norden
9:15	Mini-grant Committee Report and Discussion	Tim Ward
9:30	Assessment Update and Needs for Final Program Meeting and Report: Part I	Jeanette Norden
10:00	Break	
10:15	Assessment Update and Needs for Final Program Meeting and Report: Part II	Jeanette Norden
10:45	Location, Time, and Date of Final Program Meeting	
11:00	Third Year Report Needs and Review of Budget	Marcia White
11:15	Future Activities and Funding	Leo Pezzementi
12:00	Adjourn and Box Lunch	

This meeting is supported by a grant from the W.M. Keck Foundation of Los Angeles

ACS Science Reform Program Committee  
Meeting Summary  
October 29, 2006-Birmingham-Southern College

**Present:** Leo Pezzementi (BSC, chair), Preston Miles (Centre), John Snyder (Furman), Larry Blumer (Morehouse), Brent Hoffmeister (Rhodes), Kerry Bruns Southwestern), Glenn Kroeger (Trinity), Thomas Moore (Rollins), Lawrence Blumer (Morehouse), Tim Ward (Millsaps), Beth Leuck (Centenary), Linda McNally (Davidson), David Sukow (W&L), Jeanette Norden (outside reviewer, Vanderbilt), Marcia White (ACS)

**A. TO DO LIST for Program Committee members:**

For all members:

- Encourage their natural science colleagues who teach intro courses for non-majors to submit a proposal either by December 1, 2006.
- Encourage use of the SaM-VI, especially in science courses for non-majors.
- Leo Pezzementi will contact Don Deeds at Drury about the SaM-VI scoring and see what the delay is.
- Let Marcia White know when presentations are made or when manuscripts are published related to the ACS Science Reform program. And, remind the course mini-grant recipients on your campuses to also share this information as part of the dissemination documentation.
- Provide a summary report of the courses, on their respective campuses, that use the SaM-VI and any changes made as a result of its use. This information will be included in the evaluation of the overall grant.
- Have course mini-grant recipients send course syllabus and laboratory modules to Marcia White on CD to post on the website.

**B. Discussion of Science Reform and Teacher Education Workshop held October 27 & 28 at Birmingham-Southern College**

- All were glad to see the meetings so well attended and how dedicated junior faculty was.
- There is the need to strengthen assessment and dissemination in the science reform projects.
- Encourage junior faculty to submit a proposal for last round
- Poster session was a good idea and provided time for discussion of individual projects on a one on one basis
- **NEXT STEPS FOR FUTURE FUNDING**-Good idea to bring Science and Education faculty together to brainstorm on next steps after this grant is over.

- Connecting Undergrads through our science & education depts. with local schools is a multi-faceted idea.
- What strategy makes sense to our faculty and administration on this collaborative idea?
- What will it do for the institutions?
- Some felt our focus should be to increase the number of undergrads going into science education by bringing the two depts. Together.
- Some of the committee felt we need to concentrate on strengthening our undergrad programs in Science Education and not work with local schools
- Sell the idea to the administrations by the difference it will make for undergrads to go into sciences if they can feel like they are making a difference working in the local schools. Students can see a real world application.
- Many felt we should focus on middle and elementary schools as they do not have science strengths as a focus.
- No child left behind shows need is high in for science in elementary and middle schools.
- Some felt high school should be the focus as the students are nearing college and it can positively affect admissions at our schools if students are better prepared.
- Other ideas for future funding were:
- Collaborative Research with Faculty and Students -It should be interdisciplinary in nature
- Developing Laboratory Modules
- Science literacy of non-science majors compared to science literacy of science majors-Preston Miles

### **C. Course Mini-Grants**

- Tim Ward, grant review committee chair, gave a report on the grants given since the last program committee meeting. He reminded the committee that in the Fall of 2005 five faculty submitted proposals and were asked to revise and resubmit. They were actually awarded in January of 2006. He also reviewed the grants awarded in the Spring of 2006.
- In Fall of 2005, \$84,435 was requested in mini-grants and \$70,525 was funded. 100% of proposals submitted were funded after they were revised.
- In the Spring of 2006, 7 Colleges in the consortium applied and 6 colleges were funded giving us 85.7% of schools that submitted were funded.
- A total of 9 proposals were funded, 4 coming from the University of Richmond. \$83,899 was requested in this round and \$76,999 was awarded.

- Total requested for fall 2005 & spring 2006 was \$168,334 and total funded in those cycles was \$147,524.
- It was decided we did not need another program meeting. We can do what is needed via email and conference calls. The funds for the next program committee meeting were moved to the grants area for distribution.
- With the transfer there is \$41, 406 available to award in December 2006.

#### **D. Assessment**

- Jeanette Norden reviewed what was needed from each institution, program committee member and grant recipient.
- She gave out the document created when she, Leo and Ed Roy met in January 2006 to discuss what Jeannette needed to write her report. It had been sent to committee members previously.
- The following needs to be collected by committee members at their institution and sent to Marcia White at ACS by April 14. Marcia will send it to Jeanette Norden.

The Members of the Program Committee will be responsible for collecting the following information from their institutions:

- Raw course evaluation data, including institutional quantitative and qualitative course evaluations, and instructor-designed evaluations, which could include supplemental questions, pre and post tests, focus groups, etc., depending on the course.
- Numbers of students taking the course should also be reported.
- The methods used for on-campus, regional (meetings), and national (meetings, journal publications, books) dissemination will also be addressed.
- Whether additional funding has been requested, or is planned, and if not why not.
- Level of support and encouragement from the Dean/Provost, according to grant recipient and institutional representative.
- Additionally, the Members of the Program Committee will provide a context for and narrative summary of the data, describing the impact the course had and what difference it made at the institution.

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SAM-VI data will be requested from the Drury group for inclusion in the evaluation. Leo Pezzementi will contact Don Deeds at Drury.

The external reviewer expressed the following concerns and recommended that these concerns be addressed by the Program Committee and grant recipients in the following year:

- Has there been adequate dissemination – on campus to inform faculty about the initiative and encourage them to apply for mini-grants, at regional meetings to communicate the goals of the program in the South outside the ACS, and at national meetings and in refereed publications to reach the widest audience possible and to provide additional independent evaluation of the courses and the program.
- Has there been adequate evaluation of the courses, including SAM-VI and other pre and post test evaluations that get at the questions of the faulty paradigms that students bring to classes and how the class addresses science literacy, both process and content?

**E. Next Program Committee Meeting**

It was decided we did not need another program committee meeting. We can connect via conference calls and emails to complete what is necessary. Therefore, as mentioned earlier- almost all remaining program committee funds were moved to the grants line for distribution.

## Appendix C

### Teacher Education Summit Agenda and Pre-Meeting Survey of Science Reform in Teacher Education

Rhodes College  
March 30, 2006

Associated Colleges of the South  
**Teacher Education Summit (5<sup>th</sup> Annual)**  
**Rhodes College March 30-31, 2006**

**Thursday Evening -March 30**

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- 6:00 Assemble in lobby of Hampton Inn – Beale Street  
6:30 Dinner at Downtown Restaurant (need 3 or 4 drivers needed)

**Friday-March 31**

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- 7:30 Leave Hampton Inn for Campus (car pool – maps will be available)  
**MEETING SITE – PAUL BARRET JR. LIBRARY, ROOM 301**
- 8:00 Continental Breakfast in Meeting Room
- 8:30 **Welcome and Introductions**  
‣ Mark Smith- Rhodes College-Meeting Host  
‣ Marcia White – ACS Representative-Grant News and Announcements
- 9:00 **Session One: Sharing Assessment Issues (especially dispositions)**  
‣ Continued discussion from previous meetings relating to assessment, issues with disposition (remediation or denial of admission), etc...
- 10:00 **Break and Tour of Library**
- 10:50 **Session Two: Attracting, Educating, & Retaining Science Teachers**  
‣ Given the continued shortage of students seeking to become science teachers, do we have any answers? Do we have suggestions as to how to help schools retain science teachers and how to work with our local schools? Let's brainstorm. Guest: Ed Roy-Trinity College-Keck Science Initiative  
‣
- Noon **Session Three:** Lunch in Catherine Burrow Refectory (The Rat)  
‣ Guest: Ben Guest – Mississippi Teacher Corps
- 1:30 **Session Four: Sharing Activity**  
‣ Best Practices, New Initiatives, Updates  
‣ Problems/Issues  
‣ Teacher Ed Grant Possibilities
- 2:30 **Wrap-Up Activities**  
‣ Next Meeting: Place, Date, Agenda...  
‣ Evaluation and Other items
- 3:00 **Adjourn**  
**NOTE: Please bring copies of materials for sharing!!!**

*This workshop is supported by the New Dimensions Program of the Mellon Foundation*

### Science Reform and Teacher Education Survey

The ACS/Keck project, entitled “Reforming Introductory Science Courses for Non-Science Majors”, was funded by the W. M. Keck Foundation of Los Angeles for three years. The purpose of the grant is to design, develop and/or revise introductory science courses especially those that enroll mostly non-science majors. Key components of the reform are to introduce students to the nature of science, the methods and skills of science, and the content and concepts of science. Most of the courses that have been developed so far have also demonstrated a relationship between science and society. Three design and assessment workshops were held that permitted faculty who are in the process of developing courses to present their progress to faculty from other ACS institutions.

In addition to curriculum reform, the project has a component of mentoring for faculty especially those in their 4th-5th years of teaching. An important outcome of the course design and development will be the ability to transport models of these courses to other ACS institutions as well as to others who may wish to use them. Also, a partnership with Drury College in Missouri has allowed us to include an assessment of student values about science in the new courses.

The next phase is to involve pre-service teachers and local schools or districts. In order to do this, we want to have a conversation with the ACS Teacher Education group so you can inform us on how to be more effective in Science Education. This will serve as research for an upcoming grant proposal. Please read and think about the questions below. We will discuss them at the Summit on March 31, 2006. Thank you.

#### Questions for the survey

1. Does the science education component of the teacher education program on your campus need to be improved? What ACS school are you with?
2. Is there an effective working relationship between the Department of Education and the science departments at your institution?
3. Is there someone on your campus who specializes in science education?
4. How much science credit do the pre-service teacher-graduates need for:
  - a) High School Teaching (9-12)?
  - b) Middle School Teaching (6-8)?
  - c) Elementary School Teaching (K-5)?
5. Does your institution have a relationship/partnership with a local school or school district? If not, would you be open to one?
6. If you have an existing relationship, does it involve training teachers, classroom teaching or mentoring students? Which one or ones?
7. Does your institution offer in-service courses/credits for teachers?
8. Does your institution have a grant that supports science education in your local school district or in a local school?
9. Are you interested in pursuing a consortial grant to fund the partnership of ACS institutions with local schools?

March 2006-ACS Teacher Education Summit

Appendix D

Reform of Introductory Science Courses Workshop  
Birmingham-Southern College  
October 28, 2006

Agenda  
Workshop Evaluation Summary

**Science Reform and Teacher Education Workshop**

Birmingham-Southern College

26-28 October 2006

This fourth and final workshop will provide an opportunity for recent grant recipients to share their new science courses for non-majors. The workshop will also aid the efforts of additional faculty to design, implement, and assess their courses, through the discussion of the importance of reform, pedagogy, assessment, dissemination, and the meaning of science literacy.

The next phase of the project that is being considered is to involve pre-service teachers and local schools or districts. In order to do this, we want to have a conversation between science and education faculty to determine how to be more effective in science education. This discussion will serve as a basis for an upcoming grant proposal.

Saturday, 28 October 2006

**The Reform of Introductory Science Courses for Non-science Majors in the ACS**

8:00 A.M.	Meet in hotel lobby for transportation to BSC
8:30 – 9:00	Continental Breakfast – Great Hall, Norton Center
9:00 – 9:15	Introductions, Welcome, and Overview – Leo Pezzementi, Great Hall, Norton Center
9:15 – 9:45	The Need for Reform of Science Courses for Non-science Majors – Glenn Kroeger (Trinity University)-Great Hall
9:45 – 10:45	The Importance of Pedagogy - Spencer Benson-Great Hall
10:45 – 11:00	Break
11:00 – 12:00	What is Science Literacy? – Facilitators, Spencer Benson, Jeanette Norden (Vanderbilt U.), Preston Miles-Great Hall
12:00 – 12:20	Mellon Faculty Development Grant Proposal – Marcia White-Great Hall
12:30 – 1:30 P.M.	Lunch, Executive Dining Room
1:30 – 2:15	The Importance of Assessment - Scott Snyder, Great Hall
2:15 – 2:45	The Importance of Dissemination - Jeanette Norden, Great Hall
3:00 – 5:00	Poster Session of courses funded in 2005-Third Floor Atrium Tours of E.B. Stephens Science Center; refreshments
5:00 – 5:30	Closing Session and Evaluation – Leo Pezzementi, Stephens Science Center, Room 138
5:30 – 6:00	Recent Trends in the Design of Science Facilities – Gary McNay (Perkins and Will) Stephens Science Center-Room 138
6:15 – 7:00	Reception-Executive Dining Room
7:00 – 9:00	Dinner - Executive Dining Room, <i>Sponsored by Perkins and Will</i>

*This workshop is supported by the W.M. Keck Foundation of Los Angeles*

**ACS Reform of Introductory Science Courses for Non-Science Majors Workshop**  
Birmingham-Southern College-October 28, 2006

**Evaluation Summary**

Please complete the following sentence stems. Use the back of this sheet if additional space is needed. Thank you for your thoughtful responses.

1. **For me, the most beneficial aspects of this day were**
  - Poster Session
  - Presentations on thinking about goals of General Ed Science Courses and Assessment-I found myself arguing with myself about whether I agreed or not
  - Discussion of literacy vs. appreciation was helpful to hear the range of ideas
  - Discussion on need for reform-Kroeger was excellent-many respondents expressed this as the best
  - Perkins and Will presentation
  - Importance of Pedagogy session
  - Glenn's presentation was great and thought provoking
  - Poster session was enlightening-makes me want to go back and review everything I teach
  - Reform talk focused me on areas to improve teaching-provocative ideas
  - Different methods to reach students
  - Enjoyed all sessions-found them informative and interesting
  - Chance to talk across disciplines about pedagogy & what works in the classroom
  - Received incentive to disseminate results
  - Everything
  - Opportunity to discuss important issues with colleagues/scientists
  - Identifying the point that science appreciation is our goal, even more than science literacy
  - Should we be addressing science appreciation?-yes
  - Discussing what works and what doesn't among colleagues
  - Clarification of Dissemination Expectations
  - Scott Snyder's talk
  - Asking serious questions on what do we mean by science reform
  
2. **For me, the least helpful aspect of this day was**
  - Poster discussion
  - Pedagogy discussion
  - Importance of dissemination
  - More time for small group discussions and less "Expert" speak
  - More concrete ideas-less theory
  - Science literacy vs. Appreciation
  - I can't think of anything that was not worthwhile
  - Small group discussion and less large group format

- I got more out of seeing others posters than feedback about mine-minor point
- None
- Assessment techniques-good but nothing new
- Snyder talk not focused enough-could have been expanded
- Snyder talk-but that is because of differences in thinking between education & science
- Assessment/rubrics did not provide as much useful info as I had hoped. To some degree it created confusion with regard to the use of rubrics.

**3. For my courses, the two most important ideas/or pieces of information I am taking from this workshop are**

- Attention to rubrics as a way to clarify expectations
- Modeling pedagogy so I can get students to think and behave as desired
- Assessment ideas, Dissemination ideas
- Cindy Hauser Poster on Lab Experts for Environmental Chemistry
- To re-evaluate my view/instructions of non-majors courses
- Different pedagogy picked up from poster session
- One minute evaluation, encouraging classroom discussion, students paraphrasing
- Extra credit ideas for courses
- Ideas about science literacy, science appreciation and course assessment
- Moving away from content driven courses-pedagogical suggestions
- Use of rubrics for grading
- Designing classes outcomes---syllabus not vice versa
- Trick of 2<sup>nd</sup> student answer to a question: asking for a paraphrase of the first answer
- The fact that evaluation questions as well as testing should be closely related to the specific course objectives. More often I get lost in the process and forget that part
- New ways to think about the purpose of non-major courses
- The idea that the next step is to think about integration of all sciences into the Liberal Arts curriculum
- Class provides a set of opportunities for you (student) to construct knowledge
- Extra credit book assignment (Benson) is a great idea
- Need to engage students more in class
- Need to ask myself what I want students to be able to do vs. content knowledge
- Benefit of studio format courses, reinforcement of the value of the reforms we have already begun
- Splitting assessment into basic mastery and advanced skills
- Student collaboration enhances learning
- Plan to humanize science for students by providing more historical context & how we know what we know-development of knowledge
- Design assessments to meet course goals
- Discussion with non-science colleagues about non-science courses –novel and marvelous!

**4. [For hopeful grant recipients] I plan to submit a proposal for the**

**\_\_\_\_\_December 1, 2006 Submission Deadline**

- 5 yes and 2 maybe, several plan to tell colleagues

**5. Other comments**

- Food at lunch could have been healthier, otherwise well organized and efficient
- Wish there had been time to explore BSC and Birmingham because of its rich history
- Good discussions over lunch too
- Nice workshop-well organized
- This has been very helpful for me. I learned a lot on science ed. and the importance of pedagogy, assessment and evaluation-Thank you for doing this.
- The 5 minute university clip was great!
- Great workshop as always
- Getting together with colleagues from other schools is always refreshing, useful and thought provoking
- Room much too large, layout too awkward for good conversation
- Wireless mouse tripped up most presenters
- Well organized, beautiful location, good participation
- I liked something better about last yrs workshop. Oral presentations by award winners could have been broken up into sections (given numbers) and breakout groups to talk with folks who have been funded and who want to be funded to generate ideas & provide feedback. Just the gathering together of faculty with common interest in better teaching leads to a helpful event. Programming fostered this but perhaps afternoon of short oral presentations & breakout session would have been more helpful.

Please rate the following on a scale of 1-5. 1= Not Helpful; 5= Very Helpful

**Overall, this workshop was: Somewhat helpful=2, Very helpful =3 At 4.5 rating= 18**

<b>Not Helpful</b>		<b>Somewhat Helpful</b>		<b>Very Helpful</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

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This consortial program is supported by the W.M. Keck Foundation of Los Angeles.

Appendix E

Reform of K-16 Science Education Workshop  
Birmingham-Southern College  
October 27, 2006

Agenda  
Workshop Evaluation Summary

**Science Reform and Teacher Education Workshop**

Birmingham-Southern College  
26-28 October 2006

This fourth and final workshop will provide an opportunity for recent grant recipients to share their new science courses for non-majors. The workshop will also aid the efforts of additional faculty to design, implement, and assess their courses, through the discussion of the importance of reform, pedagogy, assessment, dissemination, and the meaning of science literacy.

The next phase of the project that is being considered is to involve pre-service teachers and local schools or districts. In order to do this, we want to have a conversation between science and education faculty to determine how to be more effective in science education. This discussion will serve as a basis for an upcoming grant proposal.

**Thursday, 26 October 2006**

- |             |  |
|-------------|--|
| 6:30 P.M.   | Meet in hotel lobby to go to dinner  |
| 7:00 – 8:00 | Dinner - Executive Dining Room, 3 <sup>rd</sup> floor Norton Campus Center |
| 8:00 – 8:30 | Welcome - Leo Pezzementi, Kathy Murray (Provost)                           |

**Friday, 27 October 2006****Reform of K-16 Science Education**

- |                   |  |
|-------------------|--|
| 8:00 A.M.         | Meet in hotel lobby for transportation to BSC  |
| 8:30 – 9:00       | Continental Breakfast – Great Hall, Norton Center  |
| 9:00 – 9:15       | Introductions, welcome, and overview - Leo Pezzementi, Great Hall, 3 <sup>rd</sup> floor Norton Campus Center                      |
| 9:15 – 9:45       | The Need for Reform of K-12 Education – Preston Miles (Centre College) Great Hall  |
| 9:45 – 10:00      | Break  |
| 10:00 – 11:30     | Models of K-16 connections at ACS institutions-Great Hall  |
| 11:30 – 11:50     | Mellon Faculty Development Grant Proposal – Marcia White-Great Hall  |
| 12:00 – 1:30 P.M. | Lunch, Executive Dining Room   |
| 1:30 – 2:00       | The Greater Birmingham Mathematics Partnership (GBMP) – Ann Dominick, (GBMP, Hoover City Schools), Great Hall                      |
| 2:00 – 2:45       | The Assessment of K-16 Programs – Scott Snyder (Center for Educational Accountability, UAB) Great Hall                             |
| 2:45 – 3:45       | National models of K-16 connections and funding opportunities – Spencer Benson (Center for Teaching Excellence, U. Md.)-Great Hall |
| 3:45 – 4:00       | Break  |

K-16 Science Education Agenda-continued

4:00 – 4:15	The Need for Leadership – Leo Pezzementi-Great Hall
4:15 – 5:15	Wear Do We Go from Here? – Facilitator, Spencer Benson-Great Hall
5:15 – 5:30	Evaluation-Great Hall
5:45 – 6:30	Reception-Executive Dining Room
6:30 – 8:30	Dinner-Executive Dining Room

**ACS Keck Reform of K-16 Science Education Workshop**

Birmingham-Southern College-Friday, October 27, 2006

**Evaluation Summary**

Please complete the following sentence stems. Use the back of this sheet if additional space is needed. Thank you for your thoughtful responses.

**1. For me, the most beneficial aspects of this day were**

- Spencer Benson-National Models of K-16 Ed.
- Where do we go from here?
- Evaluating K-16 Partnerships
- Models of K-16 Connections at ACS Institutions
- Mellon Faculty Dev Conversation
- Greater B'ham Math Partnership
- Increasing awareness of undergraduate student preparation
- Learning key concepts of the Higher Ed & k-12 relationship or lack of
- Interacting with Science Faculty
- Discussion of Grant sources
- Learning that state dept of Ed regulations & procedures present obstacles in other states as well as my own
- Learning about partnership programs
- Introductions to new colleagues
- Need for K-12 reform
- Hearing diverse opinions, especially on our next steps after this grant
- Discussions with colleagues from similar institutions on Science education issues at all levels
- Various initiatives around the ACS, hearing opinions and problems
- Conversation with Spencer Benson and thinking of issues
- Learning from other schools what worked best and what did not
- Strategies for writing successful grant applications
- Realization of disparate student backgrounds, understanding a lot of their foundation is weak
- Snyder's presentation and sharing of initiatives in a.m.
- Helpful to hear of the concerns of educators to help me in my work
- Getting to know folks, ACS, the group, their interests, skills and strengths

**2. For me, the least helpful aspect of this day was**

- Scott Snyder-too much jargon, not enough content
- Collaborating with individuals from fellow schools to address concerns at my home institution
- Breakfast
- Understanding the role of science faculty in teacher education
- Summaries of various science related projects
- All were helpful
- Talk on assessment
- More time on where do we go from here discussion

- Greater Birmingham Math Partnership (GBMP) did not relate to what I do
- The Need for Reform talk
- Excellent day of discussions
- Listening to two presentations (GBMP & Evaluation)-not necessary

**3. For my courses, the two most important ideas/or pieces of information I am taking from this workshop are**

- Evaluating k-16 partnerships-methods & goals-we are doing this for some programs
- Connections between k-12 and higher ed
- Continued evaluation of teaching methods/skills
- Renewed sense that I am on the right track-doing good-validates importance of improving education
- Ideas on how to start a dialogue with k-12 educators
- Discussing obstacles to science education careers that our students encounter
- The outreach programs to students are well received by students and by some school systems
- Commitments with K-12 schools and commitment with administrators
- Various formats for science ed projects
- K-16 partnerships are a two way relationship
- Importance of inquiry at early ages
- Challenge of figuring out what to do next
- Ways to collaborate with Education Dept
- Beginning conversations between different groups
- Emphasize teaching as a career option for students
- I have to do more evaluation to judge student learning styles and identify what works best.
- Restructure class time to get away from lecture focus
- Relate material in a manner to engage and excite students
- Science Ambassador Program
- In Class writing Assignments (e.g. Write about when you were a good observer)
- The possibility of integrating my department with the education department
- The need to talk with High School teachers before designing a new program
- There is no single answer
- Reasonable people can disagree
- Ideas on creating paid internships
- Educational Needs are complex need to talk with High School teachers before designing a new program

**4. Are you interested in being a part of the development of a K-12 Science Education proposal for the consortium? What grades would you be interested in working with along with your students?**

  10   yes      9   no    grades   ??   Undetermined                   

**5. Other comments**

- Workshop was extremely well organized. Presenters were interesting and enthusiastic in addition to knowledgeable
- More on programs/projects that improved student achievement-actual tests results

- Learning lots. I am so glad to be a part to this grand adventure. More focus on real outcomes, too much theory, lets get real/concrete
- Specifics on effective proposal submission that would lend to resources needed to implement ideas
- Time to tour BSC facilities
- The idea of collaboration with a school district really being collaborative, with information flowing both ways is new idea for me. Great discussion
- Thank You
- More time and facilitation for moving forward. The time was too short and the forum too public. The group has tremendous potential

Please rate the following on a scale of 1-5. 1= Not Helpful; 5= Very Helpful

**Overall, this workshop was**  
**Somewhat helpful=6, Between Somewhat helpful & Very Helpful, a 4 rating=7, very helpful=7**

<b>Not Helpful</b>		<b>Somewhat Helpful</b>		<b>Very Helpful</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>

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This consortial program is supported by the W.M. Keck Foundation of Los Angeles.

Appendix F  
Second Round of Course Mini-Grants  
Final Reports  
Spring 2005 Recipients

Second Round of Course Mini-Grants  
Final Reports  
Spring 2005 Recipients

See Final Reports for the projects below at:

[http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html).

\* Rosanna Cappellato, Rhodes College, "Evaluation of ecosystems services as the objectives of field and laboratory activities to be added to an introductory course in Environmental Sciences"

\* Pamela Hanson, Birmingham-Southern College, "Textbook Prototype for Non-Science Majors Cancer Biology Courses"

\* Denise Pope, Kevin Livingstone, Kelly Lyons, and James Shinkle, Trinity University "Integrative Biology at Trinity"

\* Kristy Stensaas, Sarah Lea McGuire, Robert Nevins, Stan Galicki, Millsaps College, "Implementation of Re-energized Superscience Courses"

\* David Turner, Furman University, "Key Figures in Modern Physics"

Appendix G  
Third Round of Course Mini-Grants  
Proposals and Interim Reports  
Fall 2005 Recipients

Third Round of Course Mini-Grants  
Proposals and Interim Reports  
Fall 2005 Recipients

See Proposals and Interim Reports online at:

[http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html).

- \* Larry Blumer, Morehouse, “Science and Society: A New Interdisciplinary Core Course”
- \* Bill Hamilton, Washington and Lee University, “The Impact of Highway Traffic on Atmospheric Chemistry and Biological Processes: A New Lab Science Course for Non-Science Majors”
- \* Megan Gibbons, Birmingham-Southern College, “Integrating the Learning Cycle into Explorations in Biology for Non-Majors”
- \* Kerry Bruns and Willis Weigand, Southwestern University, “Chemistry Connections Science Course For Non-Science Majors”
- \* Suresh Muthukrishnan, Furman University, “Earth from Space: Spatial Science and Technology Focused Introductory Geosciences Course Development and Implementation”

Appendix H  
Fourth Round of Course Mini-Grants  
Proposals and Interim Reports  
Spring 2006 Recipients

Fourth Round of Course Mini-Grants  
Proposals and Interim Reports  
Spring 2006 Recipients

See Proposals and Interim Reports online at:

[http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html).

- \* **Wes Dripps**, Furman University, “Earth Sciences and Silver Screen”
- \* **Joseph Ginhardt**, University of Richmond, “Development of a Non-Majors Biotechnology Course”
- \* **Lisa Greer**, Washington and Lee University, “Assessment of Concept Questioning and Electronic Student Response Technology in the Small School Introductory Geosciences Classroom”
- \* **Cindy Hauser**, Davidson College, “Development and Implementation of Laboratory Modules to Accompany Introduction to Environmental Chemistry”
- \* **Malcolm Hill**, University of Richmond, “Making the Land-Sea Connection in Inner-City Richmond Classrooms: Bringing Chesapeake to School and Bringing Students to the Bay
- \* **Paula Lessem**, University of Richmond, “Emerging Infectious Diseases: Biology, Historical Significance and Public Policy”
- \* **Gary Radice**, University of Richmond, “Teaching Biology According to How People Learn”
- \* **Kristy Stensaas**, Millsaps College, “Incorporating Technology and Assessment Into Super Science”
- \* **Warfield Teague**, Hendrix College, “The Green Laboratory for Chemistry of the Environment”

Appendix I  
Fifth Round of Course Mini-Grants  
Proposals  
Fall 2006 Recipients

Fifth Round of Course Mini-Grants  
Fall 2006 Recipients

See Proposals online at:

[http://www.colleges.org/sciencereform/grant\\_recipients.html](http://www.colleges.org/sciencereform/grant_recipients.html).

- \* Paula Lessem and Maren Reiner, University of Richmond, “Biology in Popular Culture”
- \* Linda McNally, Davidson College, “Re-Designing Human Biology For Non-Science Majors to Enhance Scientific and Quantitative Literacy”
- \* Nancy Mills, Trinity University, “Creation of an Introductory Forensic Science Course for Non-Majors”
- \* Luis Schettino, Trinity University, “Redesign of Neuroscience Courses As A Part of the Trinity Common Curriculum”
- \* Nicholas Schister and Mike Winiski, “ Re-imagination of Interdisciplinary Non-Majors Science: The Physical and Living Universe Revealed”
- \* Kristina Stensaas, Robert Nevins and Stan Galicki, Millsaps College, “Incorporating Technology and Assessment into Superscience”

Appendix J  
Associated Colleges of the South  
*Palladian*  
Winter and Fall 2006