Past Discovery Learning Seminars

2012 Seminars

11/10/2012

Gay Stewart, University of Arkansas at Fayetteville

Title: If physics can do it, anyone can: Increasing student success

Abstract: A more scientifically literate society benefits all STEM disciplines, as well as society as a whole. It is best realized by better serving all undergraduate STEM students. In better-serving all students, a STEM department also benefits. The University of Arkansas, Fayetteville physics department has seen a drastic change in number of majors, the number of students active in research and the number of graduates pursuing graduate work, while also increasing the number of majors who decide to teach. Prior to our involvement with the Physics Teacher Education Coalition, graduation rates had increased by more than a factor of 4 in 4 years. After the increased efforts when we became a part of PhysTEC (www.PTEC.org) our graduation numbers doubled again. Specific attention to class policy to impact student learning in our introductory courses and strong preparation of the graduate teaching assistants, and quality advising were our primary areas of emphasis. What worked to build these numbers and strengthen these resources at Arkansas will be discussed.

10/10/2012

Eugenia Etkina, Rutgers University

Title: Helping our students learn physics and think like scientists

Abstract: Most of our students will not become professional physicists. What and how should they learn in their physics courses so that they can not only explain some physical phenomena and solve simple problems but also develop processes and habits of mind (we call them scientific abilities) that help them learn to analyze real world problems using strategies of the scientific community. One of the possible solutions is to engage students in experimental design. In this talk I will describe how we can bring design into an introductory physics lab, what scientific abilities students can develop, how long it takes, and whether the students transfer those abilities to content areas outside of physics. I will also describe some unexpected results that we found when we were studying the effects of engaging students in experimental design.

Past Discovery Learning Seminars

09/27/2012

Alison Cook-Sather, Bryn Mawr College

Title: Students Partnering with Faculty in Explorations of Teaching and Learning

Abstract: In this presentation on Students as Learners and Teachers (SaLT), the signature program of The Andrew W. Mellon Teaching and Learning Institute at Bryn Mawr College, I will describe how SaLT supports pairs of undergraduate students and faculty members in partnerships through which they explore teaching and learning. I will discuss: the genesis of the SaLT program; the scholarship upon which it is premised; the opportunities within it; participants to date; premises and challenges of the program; faculty outcomes, and student outcomes. There will be ample time for questions and discussion.

4/27/2012

Michael Marder, Physics Professor and Associate Dean, University of Texas at Austin

Title: “Hey CNS Faculty! Do you want your salary set by Course Instructor Survey scores: alternatives from the MET?”

Abstract: Prof. Marder recently gave a talk on the subject of the changing views and expectations regarding the teaching role of faculty for a small group of Natural Sciences faculty. Michael’s talk sparked much conversation and many emails to me to try to make this presentation available to a larger audience. Michael Marder has graciously agreed to give his presentation, once again, for the entire Discovery Lunch group.

3/22/2012

Ruth Buskirk, Jen Moon and K. Sata Sathasivan, University of Texas at Austin
Title: Biology Course Transformation Project at UT Austin

Abstract: Approximately 4500 students register for introductory biology courses at UT, the majority during their first year in college. The Biology Course Transformation Project (CTP) sponsored by the Provost's Office aims to change the traditional lecture-style format of the introductory biology courses with a more student-centered pedagogy and active learning focus. Carefully designed learning outcomes provide the framework for each lesson. Online learning modules with mini-lectures and practice assignments help students learn the content outside class, and the students work on problem solving and group learning activities in class, with less lecture. Student engagement and overall performance in class have improved, and students feel more responsible for their own learning. Participants will have an opportunity to work through one of our student activities as we address questions related to the transformed course design, process, and implementation.

Past Discovery Learning Seminars

2/15/2012

Chris F. Bauer, Chemistry Education and Analytical Chemistry, in the Department of Chemistry at the University of New Hampshire. Chris

Title: Creating and Sustaining Inquiry in Science and Mathematics Instruction

Abstract: If inquiry instruction is such a good thing, why isn't everyone doing it? We've been talking about inquiry for a long time. Yet, our talking about it has not resulted in a wholesale integration into practice. I would like to explore this issue with you using several lines of argument. First, if you want to get ahead, get a theory. If we want to drive change, what reasons make us believe that we might be successful? Secondly, it takes a village to raise a practice. I will share my experiences with the Process-Oriented Guided-Inquiry Learning (POGIL) project, which started as an innovation in college chemistry and is now a non-profit organization supporting a network of practitioners in secondary and tertiary chemistry and biology. Thirdly, teach young dogs the new tricks. I just completed an NSF project that introduced inquiry-based instruction to chemistry graduate students and postdocs at several research-intensive institutions. How well positioned are they to become the next generation of inquiry-informed science instructors? Lastly, let's not kid ourselves - we don't engage in inquiry simply because it may benefit students. Our choice says something about the type of social and intellectual relationship we as instructors want to have with our students.

Past Discovery Learning Seminars

2011 Seminars

11/9/2011

Prof. Daniel Kaplan, Department of Mathematics and Computer Science at Macalester College:

Title: Teaching Calculus for Our Own Era

Abstract: The world that our students inhabit is considerably different than that of the 17th and 18th century in which modern calculus emerged. Then, calculus supported the mathematization of physics. Today's world is much more broadly mathematical: much more data, much more computing, increasingly complicated and multivariate, reliant on statistics as a framework for interpretation; a world of mathematical models rather physical law. Yet the way we teach calculus is very much rooted in the 18th century. As such it often fails to give students the skills that they need in today's world. I'll describe an approach to teaching calculus that's intended to match the demands of our era: multivariate, modeling-oriented, computational, and supporting a transition to sophisticated statistical analysis of data. At Macalester College, we've been developing and implementing this approach in introductory calculus for more than a decade. It's led to greater enrollment in calculus while arguably giving students more advanced skills.

While Professor Kaplan is an expert in the application of nonlinear dynamics to biomedical problems, he has also spent much time and effort in restructuring the way Calculus is taught at Macalester College.

10/20/2011

Our speaker will be **Prof. E. Lee May** of Salisbury University's Mathematics and Computer Science Department, who has taught hundreds of students using an adapted version of the Moore Method. He's also helping others do the same as a co-author of the Mathematical Association of America's *The Moore Method: A Pathway to Learner-Centered Instruction*. Lee May will discuss:

Title: Adventures with the Moore Method as a Student and Teacher

Abstract: In this talk, I shall describe how I first experienced the Moore Method as a student and why I decided to use it as a teacher. I shall mention some of the pleasures that I have experienced with the method, and describe some of the pits into which I have fallen. Finally, I shall present some of the lessons that I have learned about implementing the method. In keeping with the spirit of Dr. Moore and the method, I encourage the audience to ask questions, make comments, and otherwise participate in the presentation.

9/21/2011

Prof. Alberto A. Martinez, Department of History, UT Austin will discuss:

Title: Teaching Sciences and Math, using Myths and Disagreements

Abstract: I will discuss how to use historical myths and disagreements among past scientists and mathematicians for generating critical thinking and group discussions in classrooms. I will

discuss historical examples from various fields, including: Galileo and the Leaning Tower of Pisa, the myth of Darwin's finches, and seemingly impossible operations in Euler's Algebra of 1770.

Dr. Martinez is an Associate Professor in the Department of History at UT Austin. Since 2005, he has often taught the UTeach course: Perspectives on Science and Mathematics. He is the author of three books: Science Secrets: The Truth About Darwin's Finches, Einstein's Wife, and Other Myths (Pittsburgh 2011), Kinematics: The Lost Origins of Einstein's Relativity (Johns Hopkins 2009), and Negative Math: How Mathematical Rules Can be Positively Bent (Princeton 2005).

4/7/2011

Our speakers for this event will be Professors Ruth Chabay and Bruce Sherwood of the Department of Physics, North Carolina State University. The main area of interest of Chabay and Sherwood is Physics Education Research and Development (PERD), with the goal of improving physics courses and curricula, in terms of both content and pedagogy. The most visible example of this work is the two-volume calculus-based introductory physics textbook "Matter & Interactions" which Chabay and Sherwood have written.

Presentation Title: What Should Be the Goals of Introductory Science Labs?

Abstract: Experiments are a key part of science. Most introductory science courses have associated labs, but often these lab experiments are not closely linked to what students are learning in other parts of the course. In designing a contemporary calculus-based introductory physics curriculum[1], we found ourselves having to rethink the goals and pedagogical methodology of introductory physics labs. In this presentation, to stimulate a discussion of the goals and nature of lab experiments, we will engage participants in doing some very simple experiments that can have deep conceptual implications.

[1] See matterandinteractions.org.

3/11/2011

Our distinguished speakers for this event will be Professors Deborah Loewenberg Ball and Hyman Bass.

Deborah Loewenberg Ball currently serves as dean of the University of Michigan School of Education, where she is also the William H. Payne Collegiate Professor and an Arthur F. Thurnau Professor. Her work draws on her many years of experience as an elementary classroom teacher. Ball's research focuses on mathematics instruction, and on interventions designed to improve its quality and effectiveness. She is an expert on teacher education, with a particular interest in how professional training and experience combine to equip beginning teachers with the skills and knowledge needed for effective practice. Ball has served on several national and international commissions and panels focused on policy initiatives and the improvement of education, including the National Mathematics Advisory Panel (appointed by President George W. Bush) and the National Board for Education Sciences (appointed by President Barack Obama).

Hyman Bass is the Roger Lyndon Collegiate Professor of mathematics and mathematics education at the University of Michigan. His mathematical research publications cover broad areas of algebra, with connections to geometry, topology and number theory. Bass is a member

of the National Academy of Sciences and the American Academy of Arts and Sciences. Bass chaired the Mathematical Sciences Education Board at the NRC, and the Committee on Education of the American Mathematical Society, and he is President of the International Commission on Mathematics Instruction.

Presentation Title: Knowing Mathematics Well Enough to Teach It

Abstract: Although there is widespread agreement that teaching requires substantial mathematical knowledge, too often this translates into courses that offer teachers mathematics from a higher level, often on the abstract argument that it is "good for" them. This presentation offers a different perspective, namely, that what is "good for" teachers is what provides them with the mathematical resources to teach mathematics responsibly. We will examine the mathematical demands of teaching, and demonstrate the nature of the mathematical knowledge, thinking, and reasoning central to teaching. We will consider the implications of this analysis for teachers' mathematical training.

2/9/2011

Our speaker for this event will be Edward Burger, Professor of Mathematics, Robert Foster Cherry Professor for Great Teaching, Baylor University; and Lissack Professor for Social Responsibility and Personal Ethics at Williams College. He is the author of over 30 research articles, 12 books, and 15 video series. In 2010 he was named the winner of the 2010 Robert Foster Cherry Award for Great Teaching---the largest and most prestigious prize in higher education teaching and scholarship across all disciplines in the English speaking world.

Presentation Title: Discovery Learning

Abstract: Here we will describe and discuss an interdisciplinary educational experiment launched at Williams college that takes advantage of the two greatest underutilized resources we have at the academy: our students and the alumni body. The course, entitled "Exploring Creativity", is the ultimate in true discovery learning and attempts to offer a transformative experience for its students.

2010 Seminars

3/31/2010

The presenter for this seminar was former astronaut George Nelson, and Deb Donovan from Western Washington University

Title: A regional model, driven by science faculty in NW Washington, for improving STEM teacher preparation.

Abstract: With funding from the NSF, a partnership of institutions was formed with the intent of simultaneously improving K-12 science education and science teacher preparation. The partners include a regional university, four two-year colleges, 26 school districts, and a few other organizations. Many tools and resources were developed, including new biology and geology courses for future elementary teachers and inservice teachers, classroom observation guides, and supports for classroom teacher collaboration. So far, our work has resulted in measurable improvements in both K-12 science instruction and the content and pedagogical training of future teachers. This is reflected in increased student passing rates on the state science tests.

Dr. Nelson discussed the formation of the partnership, its tools and resources, shared some data, and highlighted the importance of collaboration between K-12, two-year colleges, and universities.

3/5/2010

The presenter for this seminar was Dr. David Bressoud, Professor in Mathematics and President of the Mathematical Association of America, Macalester College .

Title: Issues of the Transition to College Mathematics

Absract: Over the past quarter century, 2- and 4-year college enrollment in first semester calculus has remained constant while high school enrollment in calculus has grown tenfold, from 60,000 to 600,000, and continues to grow at 6% per year. We have reached the cross-over point where each year more students study first semester calculus in US high schools than in all 2- and 4-year colleges and universities in the United States. There is considerable overlap between these populations. Most high school students do not earn college credit for the calculus they study. This talk presented some of the data that we have about this phenomenon and its effects and raised issues of how universities should respond.

2/5/2010

The presenter for this seminar was Distinguished Teaching Professor in Mathematics Michael Starbird from the University of Texas at Austin.

Title: Inquiry-Based Learning: Courses and Beyond

Abstract: Guided discovery methods of instruction in mathematics are centered on students resolving mathematical issues on their own and presenting their results to their peers. Expected outcomes for students include their developing mathematical skills and the ability to tell whether an argument is correct or flawed. But beyond those mathematical skills, this experience frequently involves interesting consequences on student attitudes concerning self-reliance, independent thinking, persistence, and willingness to make mistakes. Guided discovery can be an important component of the education of all students.

2009 Seminars

11/19/2009

The presenters for this seminar were Dr. Sacha Kopp (Physics) and Dr. Cynthia LaBrake (Chemistry) from the University of Texas at Austin.

Title: Hands-On Science: An Inquiry-Based Integrated Science Content Course for Pre-service Elementary Teachers

Abstract: How we learn versus how we think we learn: Much has been discussed about the need for better science curriculum and training for teachers of elementary school classrooms. Future elementary school teachers at UT Austin gain their degree from the College of Education, with significant credits earned in math and science. Dr. Kopp and Dr. LaBrake discussed a new inquiry-based curriculum in integrated natural sciences (physics, chemistry, geology, biology,

and astronomy) introduced for these teachers. Some items may be of interest to instructors in other college-level science courses: The experience of die-hard lecturer-based instructors transitioning over to an inquiry class, of student mastery of a broad curriculum, and in tailoring a curriculum to a target audience may be of interest to instructors of other college-level courses.

10/16/2009

The presenter for this seminar was Professor James Zull. James Zull is a professor of Biology and also Director Emeritus of the University Center for Innovation in Teaching and Education (UCITE); both of these at Case Western Reserve University in Ohio.

Title: Can Learning About the Brain Change How We Educate?

Abstract: Teachers have assumed that knowledge of how the brain develops and learns will open many new insights into pedagogy, and educational design. However, this belief has been challenged by Bruer, who claimed that connections between neuroscience and education are "a bridge too far." He urges educators not to expect too much from neuroscience itself, but rather examine the new links between cognitive psychology and neuroscience. Bruer's work was published in the late '90s, but is still strongly influencing ongoing discussion in this area. Dr. Zull examined his main ideas and presented examples of conceptual "bridges" that he has found useful in his own research and teaching.

9/24/2009

The presenter for this seminar was Eric Stade, Chair, Department of Mathematics, University of Colorado at Boulder

Title: Preparing Future K12 Math and Science Teachers : the Colorado Learning Assistant Model

Abstract: There is substantial evidence that future K12 teachers in the U.S. are inadequately prepared in science and mathematics. At the University of Colorado, we've developed an effective and adaptable program that increases the numbers of math and science majors going into teaching, models best practices for future teachers, and improves the educational experiences of students in these majors. Since its inception in 2003, the Colorado Learning Assistant model has increased the pool of well-qualified K12 teachers significantly, has engaged faculty fundamentally in the preparation of future teachers, and has led to demonstrable improvement in learning gains among students in the affected courses. On top of all this, working with Learning Assistants is GREAT FUN, and invigorates the life of the mind. All of this will be amply corroborated by way of tables, graphs, testimonials, pop culture, Pop Cubes, and Pop Tarts.

4/15/2009

Uri Treisman is professor of mathematics and of public affairs at The University of Texas at Austin. He is the founder and executive director of the University's Charles A. Dana Center, an organized research unit of the College of Natural Sciences. The subject of his talk will be:

Title: On Innovation in Urban Mathematics Education

Abstract: Higher expectations, as reflected in state and federal accountability systems, have led to dramatic improvements in mathematics student performance in most, but not all, urban

districts. Fifteen years ago, only one-half of urban high school graduates completed Algebra 1; today, most urban districts require four years of mathematics including at least Algebra II. Urban districts have responded to these new pressures by creating new approaches to such difficult problems as serving children with special learning needs in high school mathematics courses, academic language development in populations with high linguistic diversity, and in strategies for motivating students to persist in courses that present high levels of challenge. Professor Treisman will describe the work of the Urban Mathematics Leadership Network in surfacing these innovations and in re-engineering them for use at scale. He will share examples of new instructional strategies and will discuss new structures for supporting research and practitioners seeking to solve urgent problems of educational practice.

3/25/2009

Dr. Robert Bjork, Distinguished Professor, Cognitive Psychology, UCLA Dr. Elizabeth Bjork, Professor, Cognitive Psychology, UCLA

The Bjorks lead the Bjork Lab at UCLA. Research in the Bjork Lab focuses on principles of human learning and memory and on applying these to enhance instructional practices.

Title: How we learn versus how we think we learn: Implications for the design and evaluation of instruction

Abstract: Paradoxically, certain manipulations that promote forgetting and impair performance during instruction actually enhance long-term recall and transfer, whereas conditions that retard forgetting and enhance performance during instruction frequently fail to support long-term understanding and retention. From a theoretical standpoint, such findings have implications for the functional architecture of humans as learners. From a practical standpoint, they point to reasons why instructors are susceptible to choosing less-effective conditions of instruction over more effective conditions; why students are prone to illusions of comprehension; and why real-world instruction is seldom as effective as it might be.

2/26/2009

Biologists, Dr. Nigel Atkinson and Dr. Ruth Buskirk of UT Austin will speak on the topic "Scientific Teaching."

Nigel Atkinson and Ruth Buskirk, UT Austin School of Biological Sciences, report on their participation in the National Academies Summer Institute for Undergraduate Education in Biology, ideas for implementation of Scientific Teaching, and the institute's major themes of active learning, assessment and diversity.

2008 Seminars

11/12/2008

Dr. Ron Douglas, Distinguished Professor of Mathematics at Texas A&M University, works closely with the Education Advancement Foundation (EAF).

The EAF is a philanthropic organization that supports the development and implementation of inquiry-based learning at all educational levels in the United States, particularly in the fields of mathematics and science, and the dissemination of the inquiry- based learning methodology inspired by Dr. R. L. Moore (1882- 1974), famed professor of mathematics at The University of

Texas at Austin.

Inquiry-Based Learning in Mathematics

Abstract: Using an inquiry-based learning (IBL) approach to teaching mathematics can be quite effective. I will explain the role IBL has played in my mathematics career. I will follow that with a description of efforts over the past five years by the Educational Advancement Foundation to foster and develop its use at campuses around the country with an emphasis on five research universities including the University of Texas at Austin. I will begin with a focus on what inquiry-based learning means in mathematics.

The facilitator and moderator of the discussion was Professor Michael Marder.

10/17/2008

The presenter for this seminar is Ray Bareiss. Professor Bariess holds a Ph.D. in computer sciences and a B.S. in communications from the University of Texas at Austin. He has worked on academic e-learning courses for Columbia University in the fields of ESL, information technology, economics, physics, and psychology, and on courses for Northwestern University. Ray is the author of a number of books and articles relating to the cognitive aspects of teaching and learning. Ray is currently Professor of the Practice of Software Engineering and Software Management, Director of Educational Programs Carnegie Mellon Silicon Valley. He will discuss the following topic:

A Story-Centered, Learn-by-Doing Approach to Undergraduate Education

Carnegie Mellon's Silicon Valley campus has made a commitment to a unique approach to teaching and learning, the Story-Centered Curriculum, for its programs in software engineering and software management. In a Story-Centered curriculum, students work in teams in a fictional but realistic context, performing complex, authentic tasks, learning the required knowledge and skills just in time as they work, and being evaluated on what they produce. My talk will explain our motivation for adopting this pedagogy, provide details of the educational experience, discuss the roles faculty play and the teaching approaches we have employed, and provide additional examples of employing Story-Centered curricula, ranging from college level down to middle school.

9/11/2008

A panel from the UTeach Institute in charge of the dissemination of the UTeach Program Natural Sciences discussed the following topic:

What starts here changes the world! The UTeach Institute was created in 2006 to support the replication of UT Austin's UTeach mathematics and science teacher preparation program at universities in the United States. Tracy LaQuey Parker, Melissa Dodson, Kim Hughes, and Michael Marder will discuss what the Institute has accomplished in the past 2 years, specific activities of the Institute including curriculum development and adoption, evaluation approach, data collection plans, future directions in research, and the implications of UTeach replication for mathematics and sciences faculty.

Tracy LaQuey Parker is Director of the UTeach Institute, Dr. Melissa Dodson is Manager of Program Replication, Kim Hughes is Manager of Knowledge Development. Dr. Michael Marder is co- director of the UTeach program.

The facilitator and moderator of the discussion was Professor Michael Marder.

3/25/2008

Dr. Kathy Schmidt, director from the Faculty Innovation Center, Cockrell School of Engineering, and Kris Wood, Cullen Trust Endowed Professor in Engineering No. 1 and University Distinguished Teaching Professor made a presentation on Journeys in Hands-on, Active Learning:

In recent years, several pedagogical themes and approaches have been touted in engineering education. These pedagogies seek to address a number of fundamental educational questions. How often have you heard that you need to get your students involved in active learning? Or that your students need to develop critical thinking skills? Have you ever been challenged with the thought that passively listening to lectures, completing well-constrained homework problems, and studying for scheduled exams does not necessarily promote a student's deepest thinking? In this Discovery Lunch Seminar, we considered hands-on, active learning as seen through the lens of a set of active learning products (ALPs). We have developed an extensive set of ALPs that reinforce difficult technical concepts and improve overall compression of course materials. We have also created a systematic, efficient methodology to assist faculty in devising ALPs for their classes, in addition to appropriate assessment methods, ties to learning styles and personality types, and methods for strategic project-team selection. With NFS funding and collaboration with the United States Air Force Academy, we have tested and validated a range of active learning products across K-16 education.

2/8/2008

Mitchell Nathan, Professor of Educational Psychology, Chair of the Learning Science program in the School of Education at the University of Wisconsin-Madison and Anthony Petrosino, Associate Professor, Department of Curriculum and Instruction, College of Education at University of Texas spoke on:

Expert blind spot: How content knowledge can eclipse pedagogical content knowledge.

A series of studies was discussed in which the relationship between teachers' (both inservice and pre-service) subject-matter expertise in mathematics and their judgments of students' algebra problem-solving difficulty were examined. The contrast between instructors' predictions and the students' actual difficulties is an instance of a more general phenomenon called "expert blind spot". As predicted by the expert blind spot hypothesis, teachers with more advanced mathematics education tend to view symbolic reasoning and mastery of equations as a necessary prerequisite for the development of algebraic reasoning. This view is in contrast with students' actual performance patterns that shows an advantage for algebra word problems. An examination across several subject areas, including mathematics, science, and language arts, suggests a common pattern: Teachers' content area expertise may have a disproportionate influence on teachers' beliefs about the conceptual develop experiences of novices. Consistent with this notion, instructors with the most experience are the most likely to make the incorrect prediction. This talk considers how instructors' developmental views may influence classroom practice and professional development, and calls into question policies that seek to streamline the licensure process of new teachers solely on the basis of their subject-matter expertise. It also calls into question some of the implicit assumptions that regard theory and mastery of formalisms as gatekeepers for access to disciplinary knowledge in mathematics, the natural sciences and engineering.

11/2/2007

Dr. Lynn Jones Eaton and a team from the Division of Instructional Innovation and Assessment (DIIA) discussed ways that DIIA supports innovative instruction at UT. Below is an abstract of the presentation topic.

The Division of Instructional Innovation & Assessment (DIIA) provides campus-wide support for teaching and learning, by offering services that focus on the use of emerging technologies, appropriate forms/tools of assessment, and best practices for engaging students in learning. This informative and interactive session will primarily feature the latest in virtual world teaching (with the use of Second Life) and ways to gather feedback from students BEFORE the semester ends. An overview of DIIA's services will also be presented.

10/19/2007

Dr. William Cliff (Department of Physiology and Biophysics) from the University of Buffalo built upon the idea of 'concept mapping' that was introduced by Dee Silverthorn at the last Discovery lunch. Below is an abstract of the presentation topic.

Understanding Made Visible Using Concept Maps for Student Learning and Assessment

Concept mapping enables students to graphically represent their understanding of significant interrelationships between concepts within a knowledge domain. This workshop presentation will provide one with practical ways for using concept mapping to 1) help students to achieve more integrative learning and 2) assess the depth and breadth of the meaningful understanding they achieve.

9/25/2007

Dr. Dee Silverthorn (Biological Sciences) from UT discussed the following topic and questions related to undergraduate instruction: Interactive teaching in many forms is being more widely used in college instruction. But what happens when one takes students who are successful in traditional didactic lectures and asks them to change their behavior in an interactive classroom? And what happens to traditional lecture professors who decide to change their instructional style? This talk presented data from two studies that investigated these two questions.

Dr. Michael Marder was the facilitator and moderator of the discussion. 3/29/2007

Dr. Elwood Parker of Guilford College presented a talk titled "Discoveries and Inquiries about D/IBL (Discovery/Inquiry Based Learning)." Reflecting on 40 years experience - or, more accurately, experimentation with - D/IBL, after a brief description of the context (undergraduate only, small liberal arts college) of that experience, Dr. Elwood Parker, explored what he and his colleagues discovered about D/IBL by discussing inquiries he uses in deciding how to apply D/IBL. Attention is paid to writing in D/IBL, to undergraduate research as part of D/IBL, to forays into inter- and cross-disciplinary D/IBL teaching, and to D/IBL influences on college-wide pedagogy and curriculum.

2/6/2007

Physicist Dr. Ramon Lopez, from the Florida Institute of Technology, presented "A personal

perspective on why cognitive science is important for the teaching of undergraduate physics." Physics is widely considered to be a difficult subject by students. Things that may seem very evident to physics professors are often very mysterious to students. This problem has led many physicists to do research in the area of the teaching and learning of physics, and physics education research (PER) is a generally accepted part of the physics community. Members of the PER community are essentially engaged in cognitive science research from a physics perspective. Dr. Lopez gave a brief overview of some results from cognitive science broadly, and PER specifically, that have influenced his practice in the classroom. He presented a sample result from his own research in visualization and made the case that all faculty should have some familiarity with the results from cognitive science that might directly impact undergraduate instruction.

2006 Seminars

11/9/2006

Dr. Eric Hooper, an astronomer at the University of Wisconsin (and former NSF Astronomy & Astrophysics Postdoctoral Fellow at UT who also taught courses in the UTeach program), returned to Austin to discuss the application of teaching practices learned from previous Discovery Learning Seminars (DLS) to a large non-majors survey course in astronomy. He designed the course with these practices in mind and set out to mindfully use the subject matter to address some broad goals for the students, including making them more astute consumers of science, providing them with a better understanding of how science and scientists operate, enhancing their scientific communication skills. He discussed practical issues, including the large impact classroom layout and university policies have on implementing DLS practices, use of discussion sections, allocation of personnel resources (instructor, teaching assistant, grader), and executing field experiences with large numbers of students.

10/27/2006

Dr. Noah Finkelstein, from the University of Colorado, presented a talk titled “A Scientific Approach to Science Education.”

The presentation reviewed a variety of effective classroom practices and surrounding educational structures. The talk also examined why these practices do (and do not) work. Dr. Finkelstein presented a survey of physics education research (including some of the exciting theoretical and experimental developments within this field) that is being conducted at the University of Colorado. Throughout, Dr. Finkelstein considered research and practices that are likely to be of value in all of the sciences.

9/26/2006

Our first Discovery Learning luncheon seminar for this academic year brought together a panel of CNS faculty who have taught the _398T SUPERVISED TEACHING course to graduate students. Topics discussed included:

--- Inquiry or discovery-based teaching methods that are discussed with students as part of the 398T course curriculum.

--- The pressure that is placed upon faculty, in the role of a 398T instructor, to emphasize inquiry or discovery-based teaching methods to graduate students.

The panel included Dr. Ruth Buskirk, Dr. Robert Duke, Dr. Mona Mehdy, Dr. Roger Priebe, Dr. Ruth Shear, and Dr. Don Winget. Each member of the panel was asked to address the two topics mentioned above and then to respond to questions from other Natural Sciences faculty and a representative group of graduate students selected from the various departments in the College of Natural Sciences. The facilitator and moderator of the discussion was Dr. Michael Marder.

4/20/2006

How to teach politicized science topics, such as evolution, was the theme of this meeting. Do you teach the facts with little consideration for the politics of the outside world, or do you take into account the biases of your students and teach in a way that attempts to force your students to confront their misconceptions? Proponents of each side of this issue stated their case – Andy Ellington and Sahotra Sakar promoting "just the facts" and Michael Marder and Peter Rispin describing how one could use Discovery Learning teaching strategies to confront the students' biases.

3/22/2006

Dean Rankin led this seminar; a continuation of our discussion of the Report of the Task Force on Curricular Reform. At this session we worked in small groups to examine the report and highlighted those changes that we felt will improve undergraduate education at UT Austin and in the College of Natural Sciences.

2/23/2006

The presenter was Dr. James Bower, currently a Professor of Computational Neuroscience at the University of Texas Health Science Center at San Antonio, and previously director of the Caltech Pre-college Science Initiative, a hands-on inquiry-based curriculum reform effort in California. Dr. Bower ill introduced us to Whyville.net, a science, math, and technology educational gaming-based web site designed from principles learned at CAPSI. Whyville has been particularly successful in engaging young women ages 9 - 14. This presentation came highly recommended by several members of the UT Computer Sciences department and especially by the chair, Dr. J Strother Moore.

2/2/2006

This seminar provided an opportunity to examine the "Report of the Task Force on Curricular Reform" and, with Dean Mary Ann Rankin, to consider the reaction of the College of Natural Sciences. Many people think we need constructive alternatives to the suggestions of the Task Force, that now is a particularly opportune moment for ambitious new plans, and that we should consider new classes that introduce students to research through inquiry.

2005 Seminars

11/18/2005

Our presenter was Dr. James Bryant from the Integrative Biology department at The University of Texas. Dr. Bryant's presentation was entitled "Simple Steps Which Can Help Boost Student Performance". Dr. Bryant addressed the question, "What factors are significantly related to student performance?" He noted that sections of his biostatistics class performed better than others. Dr. Bryant determined the factors that accounted for these differences in student performance. He found that there are methods of encouraging performance by limiting some of

these factors. In addition, he has shown that these methods do not weaken assessment, are not difficult to implement by the instructor, are positively received by students and, most importantly, appear to work for a large proportion of students. His findings also highlight the importance of not just educating students in the subject material, but also educating students on how to be professional scholars.

10/7/2005

Dr. Diane Ebert May from Michigan State University discussed her research on scientific teaching -- "Scientific Teaching: What is the Evidence that Students Learn?" (also published in Science, April 23 2004) In this article and during her talk, Ebert May and her co-authors state that "...reform in science education should be founded on "scientific teaching", in which teaching is approached with the same rigor as science at its best. Scientific teaching involves active learning strategies to engage students in the process of science and teaching methods that have been systematically tested and shown to reach diverse students."

9/22/2005

Dr. Michael Marder, and other instructors of an undergraduate Research Methods course developed for UTeach in the College of Natural Sciences at The University of Texas, discussed the challenges involved in developing a structured course whose aim is to introduce students to unstructured research.

4/21/2005

The speaker for this seminar was Dr. J Strother Moore, chair of the Computer Sciences Department at UT Austin. Dr. Moore talked about his use of the Moore Method (no relation) to teach Computer Science. He has used these teaching strategies in his graduate classes since 1981.

3/10/2005

Dr. Michael Starbird from the Mathematics Department here at UT Austin spoke on "Developing Independent Thinkers". As was noted at last month's session with Dean Rankin, one goal of education is to make our students able to think for themselves. We hope to move them from being consumers of knowledge to producers of knowledge and insight. We can accomplish this transformation systematically by using methods of instruction designed for that purpose. Dr. Starbird discussed some successful models.

1/28/2005

Dr. Mary Ann Rankin, Dean of The College of Natural Sciences at The University of Texas, led a discussion concerning change in undergraduate natural sciences instruction. The following questions were considered:

* What do you believe are the main opportunities to improve undergraduate instruction in the College?

* What new teaching strategies do you believe should be implemented in existing College courses?

* What new resources, support, and incentives would be needed to implement these new

teaching strategies in existing courses?

Copies of three articles that stimulated our thoughts on change in natural sciences undergraduate instruction were distributed and discussed.

New York Times, January 16, 2005 "101 Redefined"

If some educators have their way, however, the lecture course will soon occupy the same dustbin of history as the chariot race. "I don't think the solely lecture-based course will survive," says Carol A. Twigg, director of the Center for Academic Transformation at the Rensselaer Polytechnic Institute in upstate New York. "And," she adds, "it shouldn't."

Science, Vol 304, 23 April 2004 "Scientific Teaching"

Scientific teaching involves active learning strategies to engage students in the process of science and teaching methods that have been systematically tested and shown to reach diverse students.

Nature, Vol 425, 18 September 2003 "Spare me the lecture"

Rather than lecturing to 200-plus students at a time, McCray divides them into 'cooperative learning teams' of about a dozen people, throws problems at them over the Internet, and then uses the lecture hall to discuss their various solutions. He did not innovate for the sake of it - he was deeply worried about the poor teaching performance of America's leading research universities.

2004 Seminars

12/2/2004

The seminar featured one of the founders of the Discovery Learning group, Dr. Austin Gleeson. Dr. Gleeson addressed the following questions:

Why Discovery? Discovery is a technique to develop student engagement in the material. Why not try to develop engagement directly? I regularly teach a required Plan II course in Modern Physics in a rather large enrollment section. Why do I teach what I teach and what are the techniques that I use to bring the students to the subject, not one that they would ordinarily deal with?

10/28/2004

Improving Learning in Chemistry and Other Science and Math Courses David Hanson, Department of Chemistry Stony Brook University, Stony Brook, NY Research on learning suggests that most students learn best when they are actively engaged, working together, and given the opportunity to construct their own understanding and have it validated. In contrast, science and math classrooms in colleges and universities often appear to be based on the ideas that teaching is telling, knowledge is facts, and learning is recall. This presentation will identify and address the challenges in moving to a more research-based classroom, and provide a research-based design for classroom activities that participants can use in their own classrooms. These ideas have been shown to increase student attendance and engagement in class, lecture, and recitation sessions; enhance performance on examinations; and reduce attrition in courses and course sequences.

10/7/2004

Our speaker was Dr. Rodger Bybee. Dr. Bybee is internationally known for his expertise in inquiry-based teaching strategies in the natural sciences. He promotes the concept that understanding science or mathematics is more than just knowing the facts of each discipline. Rodger Bybee helped us consider instructional strategies that will cause our students to be able to use and apply content knowledge to novel situations.

Rodger Bybee is executive director of the BSCS Center for Curriculum Development in Colorado Springs, Colorado. Before joining BSCS, he was executive director of the National Research Council's Center for Science, Mathematics, and Engineering Education (CSMEE) in Washington, D.C. At BSCS, he has been principal investigator for four National Science Foundation programs, including a college program titled Biological Perspectives.

9/17/2004

Have you ever found it challenging to teach an interactive, inquiry- based "writing component" course in your area? In this seminar, we worked with an expert in writing in all content areas, Professor Joan Mullin.

According to Dr. Mullin, writing can be used not just to produce products (i.e. papers), but as a way to teach concepts and processes. Using writing as a teaching tool allows students to practice manipulating the language (verbal/written, mathematical, or visual) of a discipline so that they can integrate it into their own knowledge system in meaningful ways, rather than memorizing others' words. Dr. Joan Mullin directs a new Writing Across the Curriculum (WAC) initiative in the College of Liberal Arts at UT-Austin. Professor Mullin is one of the country's leading voices in WAC. She has directed the University of Toledo's WAC program since 1988 and its Writing Center since 1987, and, in recent years, has earned an international reputation for her work in these areas. Currently she is collaborating on a book exploring the international implications of what were, until the late 1990s, largely American initiatives in writing instruction.

5/13/2004

Our presenters were Dr. Ken Diller, chair of the Department of Biomedical Engineering and the PI of VaNTH at UT, Dr. Anthony Petrosino (College of Education) and Dr. Marcus Pandy (Biomedical Engineering). They presented work from their ongoing collaboration in biomechanics, the VaNTH project.

VaNTH is a working model for how multidisciplinary, multi- institutional groups can define an approach to developing and testing inquiry-based curricula for rapidly evolving knowledge bases. The National Science Foundation funded the Vanderbilt-Northwestern-Texas-Harvard/MIT Engineering Research Center (VaNTH) in 1999. The overall strategy is to bring learning scientists, assessment experts, learning technologists and bioengineering domain experts together into an integrated effort to develop an educational system centered on challenge-based instruction with major support from technology.

This presentation consisted of data collected on the effectiveness of the VaNTH approach both at UT and across all four universities as well as a practical demonstration of the curricula materials developed. Challenges and rewards of cross-disciplinary research and curriculum development were also be presented and discussed.

3/10/2004

On February 6, the Discovery Learning group had a presentation from Robert Beichner, NCSU, that was very stimulating, but many people noticed that we would need new physical teaching space to emulate him. On March 10, Discovery Learning decided to learn about some innovative strategies for teaching large classes in large lecture halls. Someone who has been trying to take as many similar ideas as possible and use them in traditional large lecture halls is Dick McCray, who spoke on March 10. He is a professor of Astronomy from the University of Colorado at Boulder, and chairs the US National Research Council's Committee on Undergraduate Science Education. An article about his teaching methods appeared in the 18 September issue of Nature, 2003.

2/6/2004

Dr. Robert Beichner, Professor of Physics, North Carolina State University, described student-centered activities for large enrollment undergraduate classes. Here is an abstract of his talk:

The Student-Centered Activities for Large Enrollment Undergraduate Programs

(SCALE-UP) Project Robert J. Beichner, Professor of Physics, North Carolina State University

How do you keep a classroom of 100 undergraduates actively learning? Can students practice communication and teamwork skills in a large class? How do you boost the performance of underrepresented groups? The Student-Centered Activities for Large Enrollment Undergraduate Programs (SCALE-UP) Project has addressed these concerns. Materials developed by the project are now in use by more than 1/3 of all science, math, and engineering majors nationwide. Physics and chemistry classes are currently in operation, with biology, engineering, and oceanography adaptations in progress.

Educational research indicates that students should collaborate on interesting tasks and be deeply involved with the material they are studying. We promote active learning in a redesigned classroom for 100 students or more. (Of course, smaller classes can also benefit.) Class time is spent primarily on tangibles, ponderables, hands-on activities, simulations, and interesting questions. There are also hypothesis-driven labs. Nine students sit in three teams at round tables. Instructors circulate and engage in Socratic dialogues. The setting looks like a banquet hall, with lively interactions nearly all the time.

Hundreds of hours of classroom video and audio recordings, transcripts of numerous interviews and focus groups, data from conceptual learning assessments (using widely-recognized instruments in a pretest/posttest protocol), and collected portfolios of student work are part of our rigorous assessment effort. We have data comparing 16,000+ students. Our findings can be summarized as the following:

Ability to solve problems is improved Conceptual understanding is increased Attitudes are improved Failure rates are drastically reduced, especially for women and minorities Performance in later courses is enhanced

In this talk Dr. Beichner discussed the classroom environment, described some of the activities, and reviewed the findings of studies of learning in various SCALE-UP settings.

2003 Seminars

12/2/2003

Dr. Roger Bengtson, UT Austin Physics Department, and two of his graduate students, Becky Thompson and Josh Hone, presented their experiences on adding two discovery-style laboratories to the series of labs required for introductory noncalculus-based Physics. They even allowed us to try out a bit of one of the labs first hand. These discovery- style labs were implemented this semester. An evaluation of the students' response to these labs has already been administered and the results of this evaluation were shared at the luncheon.

This seminar was applicable to all disciplines in that common problems are encountered as you attempt to add inquiry-based learning to your courses. We discussed the joys and difficulties of discovery learning.

10/2/2003

Our speaker was Dr. W. Ted Mahavier, Associate Professor of Mathematics at Lamar University. Ted is an experienced inquiry-based mathematics instructor, and an academic grandson of R.L. Moore, who taught at UT Austin using discovery techniques from 1920 to 1969, and for whom the RLM building is named. Ted discussed inquiry-based teaching strategies, focusing on mathematics, but with ideas that are applicable to all natural science teaching.

5/8/2003

UTeach staff and faculty presented an interactive session concerning the use of inquiry-based teaching strategies in the UTeach Program. UTeach (CNS) prepares secondary mathematics, science and computer science teachers. UTeach is a collaborative program between the Colleges of Education and Natural Sciences.

Questions that were explored:

What is UTeach?

Were seeds for the future success of our College of Natural Sciences professors sown in high school?

What does it take to teach in an inquiry-based fashion to five classes of students per day?

no teaching assistant

five sections of two different courses 55 minutes of preparation time during the school day

How does instruction in College of Natural Science courses affect the way future high school teachers will teach?

3/21/2003

We continued the discussion of a possible Research Component course requirement for College of Natural Sciences majors. We began this discussion at a Discovery Learning luncheon seminar about a year ago. A committee of CNS staff and faculty has continued this discussion and asked for advice on some of the details of this plan. We started with a short presentation on how the Writing Component course requirement operates and then proceeded to discuss possible Research Component course requirements.

2/12/2003

A panel of University of Texas students reflected on their experiences with inquiry-based/discovery learning The University of Texas. The College of Natural Sciences continues to investigate the possible addition of required Research Component courses (a la Writing Component courses). It was valuable to hear the opinions of students who have taken courses that included inquiry elements or have participated in undergraduate research.

2000 Seminars

9/2000

Dr. Michael Marder, Discovery Learning Director, lead a discussion entitled, "Introducing New Faculty to Discovery Learning". The 44 faculty and staff members who attended the discussion looked at the ways in which the teaching traditions of this university can be passed on to new faculty. The new faculty mentoring program was introduced, including the agenda for the October 6 and 7 CNS Teaching Strategies Conference to which all new faculty and their mentors were invited. 5/00: Natural Science courses for Liberal Arts majors

Two undergraduates, members of the Liberal Arts Council, shared their perspectives on how well Natural Sciences courses meet the needs of the Liberal Arts students. Do the present natural science courses for Liberal Arts majors meet the needs of these students? (There are 12,000 Liberal Arts majors.)

* What should educated citizens know about the natural sciences?

* If these courses do not meet the students' needs, what would work better?

* Would it be possible or desirable to offer courses involving Discovery Learning on a sufficient scale that they can become a regular part of the Area C requirement?

The assembled professors recommended a number of changes in CNS courses, but felt that it was very difficult to obtain the resources necessary to make the desirable innovations. The recommended resources/innovations included adding discussion sections to large undergraduate courses, having laboratory sections for all science courses, adding additional teaching assistants for large service courses, and changing the furniture in the classrooms that have fixed desks to moveable furniture that promotes more interactive teaching strategies.

3/2000

Dr. Ed Burger, Williams College, reflected on his experiences with the Moore Method. Dr. Bing taught Dr. Burger Topology in the fall of 1985. (class of 50 students) According to Dr. Burger, Bing emphasized students discovering ideas and material for themselves. Bing taught material in the following sequence:

1. - handed out terms 2. - defined the terms for a day or two 3. - handed out theorems 4. - students were told to prove the theorems themselves

The course caused Dr. Burger to learn to think on his feet and to solve problems on his own. Dr. Burger told the story of his first few days in the class. Dr. Burger solved the first theorem he was given with a geometric construction, not topology. He went to see Dr. Bing during office hours to explain that he didn't feel prepared for the class. Bing said, "If you've got a proof, that's fine." Ed then went to class where he was the first one called on. Ed leaned forward and whispered to Bing, "Remember, I am the one who doesn't know any topology." Bing answered, "I know, that's

why I picked you."

2/2000

Dr. William Schmidt, the U.S. Director of the Third International Mathematics and Science Study (TIMSS), spoke at this Discovery Learning seminar. Dr. Schmidt is at Michigan State University. The TIMSS was a battery of standardized tests given around the world. Dr. Schmidt feels that the poor showing of the United States on these tests demonstrates that there is something very wrong with the science and mathematics curriculum in the U.S. The web site that includes many of the overheads used in this session can be found at http://ustimss.msu.edu/

1/2000

The January seminar focused on the content and teaching strategies used in calculus courses here at UT. In addition to mathematics faculty, the luncheon featured faculty from the departments that require calculus-professors from Physics, Chemistry and Engineering. These people shared their experiences with student understanding of and ability to use calculus topics that impact their courses. The non-mathematics faculty present generally pressed for more concept development in Calculus - rather than a straight computation focus. This was the first time in the memory of the faculty present that people teaching Calculus have come together to discuss the course. The 32 people who are teaching Calculus this academic year were invited to the discussion. 13 of those 32 were able to attend (41%).

1999 Seminars

11/1999

The Discovery Learning seminar/luncheon featured Dr. Russ Wright from the Montgomery County Public Schools in Rockville, Maryland. Dr. Wright is the author of Event-Based Science which is a new way to teach science at the middle school level. Newsworthy events establish the relevance of science topics; authentic tasks create the need-to-know more about those topics; and lively interviews, photographs, Web pages, and inquiry-based science activities create a desire to know more about those topics. The Event-Based Science Project is supported by grants from NSF and NASA. This seminar was helpful both to professors who prepare secondary teachers and to those seeking new teaching strategies for use in their undergraduate classes.

10/1999

Discovery Learning hosts two types of seminars. Some months DL will facilitate individual department teaching strategy sessions, while other months DL will host larger sessions open to all as we have in the past. The following seminar was the first of the departmental teaching strategy sessions.

Discovery Learning facilitated a meeting of The University of Texas College of Engineering Math-Science Committee chaired by Dr. Rebecca Richards-Kortum. Dr. Michael Marder, Physics professor, presented the inquiry-style teaching strategy changes that are being piloted in Physics 303K/L this semester. Eleven professors attended the meeting and unanimously decided to incorporate the changes into the spring semester as well.

9/1999

Sheldon Ekland-Olson Discovery Learning, the Center for Teaching Effectiveness and the

Academy of Distinguished Teachers sponsored a luncheon discussion on the Boyer Commission Report, "Reinventing Undergraduate Education, A Blueprint for America's Research Universities", with 70 people in attendance. The speakers were President Shirley Strum Kenny, President of the State University of New York at Stony Brook and Chair of the Boyer Commission that developed the report and Provost Sheldon Ekland-Olson of The University of Texas at Austin.

4/1999

Dr. Vicki Almstrum of The University of Texas Computer Science department spoke about her Software Engineering course. It is an excellent example of active, inquiry and discovery learning. Dr. Almstrum was presented with a Natural Sciences Teaching Excellence Award this month for her terrific work with undergraduates. Dr. Almstrum has two sections of 30 students each that spend the semester simulating a real software design company. Each class breaks into five groups of six students, which are deemed development teams. The teaching assistants are vice-presidents and Dr. Almstrum is the CEO. The students bid for jobs (previously lined up by Dr. Almstrum in the nonprofit community) and then follow all the steps that would normally occur in software development. They interview the client to assess needs, they design the software, and they make a software presentation. The software becomes "freeware" available to all.

During this project Dr. Almstrum has 10 speakers from real world companies speak to the students as well as having two real world mentors for each team. The students keep a journal of the process and write a term paper. The URL for more information about her course is -- http://www.cs.utexas.edu/users/almstrum/classes/cs373/

3/1999

Dr. John Kappelman, UT Anthropology Department, demonstrated his NSF funded multimedia exam software which allows students to interact with the assessment instrument and saves class time by moving testing outside of class time. Most of the software shell that is ready at this point does not require student use of inquiry skills, but Dr. Kappelman did end his talk with a demonstration of a sequence of questions that required critical thinking and problem solving. He said that this type of question would be the focus of the next part of his NSF grant. Even as is, this exam is helpful to the discovery approach in that the content knowledge that is required in many disciplines can be effectively assessed outside of class time. This would allow more in-class time for active learning activities. Time is one of the main problems sited by professors when they are asked about difficulties in implementing discovery learning.

2/1999

The February luncheon seminar was a round table discussion. The following questions were discussed in small groups and then each group reported on the discussion.

1. What does "discovery learning" mean to you?

2. Have you ever used any techniques in class that you would consider discovery in nature? Describe them.

3. If you tried a discovery technique, what problems did you have and how did you overcome the problems or were they insurmountable?

4. What are the benefits and drawbacks of adding discovery to your teaching? Did discovery

techniques assist you in reaching the goals of your course?

5. Do the benefits outweigh the drawbacks?

6. What could be done to convince more professors to focus on improving teaching or is this unnecessary or unwise?

1/1999

Diane Ebert-May is the Director of Lyman Briggs School, a residential, liberal arts science program within the College of Natural Sciences at Michigan State University, and is a Professor of Botany and Plant Pathology. She provides national leadership for promoting professional development opportunities for faculty, postdoctoral teaching fellows, and graduate students who actively participate not only in their own discipline-based research, but also in creative scholarship and research about teaching and learning. The title and abstract of her talk were:

"Active Learning in Large Group Classes"

She demonstrated how active learning can be achieved in large group classes. Even in her 600 person lecture, students are called by name (name placards) and students interact with one another and are accountable on a daily basis. She has 95% attendance for the semester. Dr. Ebert-May's pre and post studies show that students become more confident in their own ability to solve subject matter related problems after taking her active learning style course. She and a colleague both taught two lectures on the same material in two different styles of teaching and then compared results on three types of tests. The active learning method resulted in the same amount of content learning with significantly more process learning occurring. Dr. Ebert-May's power point presentation may be reached at this link.

1998 Seminars

11/1998

Three professors from the College of Engineering, Dr. Phil Schmidt, Dr. Jerry Jones and Dr. Rich Crawford, presented an overview of discovery learning in engineering courses they teach and in their outreach to elementary teachers through DTeach.

10/1998

A panel of six University of Texas professors presented their Discovery: learning projects to the seminar/luncheon group. Each presentation was followed by questions and discussion. The six professors were:

Mike Hall - Department of History Larry Shepley - Department of Physics Mary Hoenecke and Suzanne Franka - Department of Nursing Stan Roux - Department of Botany Michael Starbird - Department of Mathematics

9/1998

Dr. Louis Bloomfield from the University of Virginia was the guest speaker at the monthly seminar/luncheon. 33 faculty members attended the seminar and a lively discussion followed the talk. His title and abstract were:

"How Things Work: a Novel Way to Teach Physics to Non-Scientists"

How Things Work is a course for non-science students that introduces them to physics in the context of everyday objects. It reverses the traditional format of physics courses by starting with whole objects and looking inside them to see what makes them work. Because it concentrates on concepts rather than math, and on familiar objects rather than abstract constructs, How Things Work serves both to reduce students' fears of science and to convey to them a substantial understanding of our modern technological world. In the 7 years that

How Things Work has been taught at the University of Virginia, it has attracted a wide audience and has precipitated a cultural change- students throughout the University have come to recognize that they can understand physics and that it does have something valuable to say to them.

8/1998

Dr. Patton, a physicist from Dalhousie University, spoke both at lunch and again later in the day on his newly developed Virtual Laser laboratory. This is a teaching tool that allows remote access to expensive equipment at another site. His talk title and abstract were:

"The Virtual Laser Laboratory"

The Virtual Laser allows students and other interested people to go to places where concerns of safety, lack of experimental skills, knowledge or distance would limit access. Over a web browser, you can enter the Virtual Laser lab to explore a 4 foot by 8 foot optical table covered with interesting experiments. By clicking on virtual buttons on the viewer's monitor, the viewer can pan, tilt or zoom a color camera to take a closer look at the laser and other optical components. You can conduct a chosen experiment using a 1 Watt argon-ion laser as the optical source. You can see the experiment in progress and download the measured data at the end of the session.

7/1998

Professor Marilla Svinicki, The University of Texas Director of the Center for Teaching Effectiveness and Professor of Educational Psychology here at UT, gave a talk entitled:

"Cognitive Basis for Effectiveness of Discovery Learning"

Problem-based or discovery learning is based on student exploration of an authentic problem using the processes and tools of the discipline. Discovery learning encourages higher level learning, such as: the view that education is a process, not a set of facts to memorize; a set of problem-solving strategies for confronting the unknown or unfamiliar; a belief in one's own ability to learn about the subject; and accepting responsibility for one' own learning. Dr. Svinicki's overheads are available for your use.

7/1998

Professor Fisher of the University of Illinois at Chicago Department of Mathematics, Statistics, and Computer Science gave the seminar. She has also been active in MER, an acronym for Mathematicians and Education Reform, which emphasizes mathematics education at research

universities. Her talk title and abstract were: "Recognizing Excellence in Mathematics Education Programs" Looking at mathematics education from the perspective of the

mathematics community, the speaker will consider distinctive attributes of excellent mathematics education programs. Several examples of mathematics education projects were described to illustrate the highlighted points and to suggest how excellent projects influence the mathematics enterprise. Discussion of the relevance of the mathematics community's experience to other fields was encouraged.