2010 Mid-Atlantic ASTE Regional Conference
September 24th – 25th, 2010
At East Tennessee State University
Johnson City, TN

Conference Program

The conference hotel in Johnson City, TN (The Carnegie)

Association for Science Teacher Educators (ASTE)
“Promoting leadership and support for those involved in the professional development of teachers of science”
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-Department of Mathematics and Statistics
-Department of Biological Sciences
General Shale Brick Natural History Museum and Visitor Center at the Gray Fossil Site
ARAMARK Dining Services
The Carnegie Hotel
Thursday, September 23rd, 2010

7:00 p.m. - 9:00 p.m.

Thursday Pre-Conference Workshop with Dr. Bill Boone

Meeting Room: Brown Hall, (room 214) Computer Lab

“Rasch Measurement in Science Education Workshop”
sponsored by the SYMBIOSIS Grant (HHMI funding)

Brown Hall is directly across the street from the Carnegie Hotel. We will provide maps of the campus when attendees register at the Carnegie. The ETSU Office of Information Technology to download the free Rasch “Ministeps” software on these computers.

Dr. Bill Boone of Miami University (Ohio) will present an introductory hands-on “Rasch Measurement in Science Education Workshop”. Rasch measurement is now being used as a key component of analyses of survey and test data in the fields of education and medicine. Participants will be taught how to conduct an analysis of survey (questionnaire) data using free Rasch “Ministeps” software. [Ministeps is identical to a full copy of the widely used Winsteps Rasch software, but analyses are limited to 25 items and 75 respondents with the free software. Winsteps, the full software package costs less than $200.] By the end of the workshop participants will have learned enough techniques so that they can conduct their own Rasch analysis with science education (and math education) survey and test data!
Friday, September 24th, 2010

7:00 a.m. - 7:30 a.m.  Registration Opens/Conference Check-in

7:30 a.m. - 8:30 a.m.  Breakfast/ D.P. Culp Center/ Tennessee Room

8:30 a.m. - 9:00 a.m.  Introductions

9:00 a.m. - 11:00 a.m.  Presentations

- **Integrating Scientific Research into Elementary Education Standards: A Closer Look at GK-12 in East Tennessee**
  Brent Linville; East Tennessee State University
  Liz Schmitt; East Tennessee State University

- **Characteristics of Pre-Service Middle and Secondary Science Teachers' Whole-Class Questioning Patterns**
  Melissa L. Shirley; University of Louisville
  Stephanie B. Philipp; University of Louisville

- **Development of Pre-Service Teachers’ Questioning Practice Through Self-Analysis**
  Stephanie B. Philipp; University of Louisville
  Melissa L. Shirley; University of Louisville

- **Ending the Cycle of Continued Evolution Controversy: Can We Start in Elementary School?**
  Ron Hermann; Towson University

- **A Comparison of Inquiry and Traditional Biology Courses in Relationship to Content Attainment and Retention for Pre-Service Elementary and Middle Grades Teachers**
  Carol Wymer; Morehead State University
  Elizabeth Roland; Morehead State University

11:00 a.m. - 11:20 a.m.  Snack Break/ D.P. Culp Center/ Tennessee Room/ Set up Poster Presentation

11:30 a.m. - 12:30 p.m.  Presentations (Continued)

- **Classrooms in the Clouds**
  Chih-Che Tai; East Tennessee State University

- **Using Geospatial Technologies in Environmental Education for Pre-Service and In-Service Science Teachers**
  Rita Hagevik; The University of Tennessee, Knoxville

- **Physics Challenge Labs**
  Robert W. Arts; Pikeville College
12:30 p.m. - 1:30 p.m.  Lunch/ D.P. Culp Center/Tennessee Room

1:30 p.m. - 2:30 p.m.  View Posters

- **Farm to School: Cultivating the Next Crop of Educators**  
  Patricia Bricker; Western Carolina University  
  Emily Jackson; Appalachian Sustainable Agriculture Project

- **Professional Development Designed to Change Science Teaching and Learning**  
  Jack Rhoton; East Tennessee State University

- **Traffic Cameras: A Citizen Science Approach**  
  Matthew Perkins; Oak Ridge High School

- **Elementary Students' Science Learning: Indoor and Outdoor Experiences**  
  Sarah J. Carrier; North Carolina State University  
  Linda Tugurian; North Carolina State University

- **SYMBIOSIS: A Landmark Assessment Study of an Integrated Bio/Math Curriculum**  
  Audrey Depelteau; East Tennessee State University  
  Aimee Lee Govett; East Tennessee State University  
  Kirsten E. Borger; East Tennessee State University  
  Trina M. Wooten; East Tennessee State University

- **A Meta-analysis of Giftedness in Science Education**  
  Bennett Adkinson; University of Tennessee, Knoxville

2:30 p.m. - 3:30 p.m.  Presentations (Continued)

- **Bolstering Confidence and Collaboration During Student Teaching Through Implementation of Elementary Guided-Inquiry Science Modules**  
  Tina Cartwright; Marshall University  
  Carrie Adams; Marshall University

- **Place-based Science Education in Thailand**  
  George Glasson; Virginia Tech

- **Mobility Impaired Students' Perceptions of Field-Based Learning Experiences**  
  Christopher Atchison; Ohio State University

3:30 p.m. - 3:40 p.m.  Snack Break/ D.P. Culp Center/ Tennessee Room

3:40 p.m. - 6:00 p.m.  Presentations (Continued)

- **Environmental Research Experience for Teachers of the Deaf and Hard of Hearing: A Pilot Study**  
  Shannon C. Graham; The University of Tennessee, Knoxville
• The Growth of a GK-12 Program: Problems and Solutions
  Debra Hemler; Fairmont State University
  Aimee Lee Govett; East Tennessee State University

• Relationships Among Student Perceptions of Learning and Student Metacognition and Teacher Awareness in Connected Science Classrooms
  Soonchun Lee; Ohio State University
  Karen E. Irving; Ohio State University
  Douglas T. Owens; Ohio State University
  Stephen J. Pape; University of Florida
  Melissa L. Shirley; The University of Louisville

• Science Teachers’ Views of Prior Knowledge and Conceptions as a Function of Conceptual Learning
  James H. Roberson; The University of Tennessee, Knoxville
  Rita Hagevik; The University of Tennessee, Knoxville

• Pre-Service Elementary and Middle Grades Students’ Factual Retention After an Inquiry or Direct Instruction Earth and Space Science Course
  Elizabeth Roland; Morehead State University
  Jennifer O’Keefe; Morehead State University

6:00p.m. - 7:00p.m.  Dinner  D.P. Culp Center; Tennessee Room

7:00p.m. - ?...

Annual 2010 MAASTE Social at the Carnegie Hotel

Held in the Presidential Suite at the Hotel Carnegie for the fabulous networking social of the year!
Saturday, September 25th, 2010

7:30 a.m. - 8:30 a.m.  Breakfast / D.P. Culp Center - Tennessee Room

8:30 a.m. - 10:15 a.m.  Presentations

- **Pre-Service Elementary Teachers’ Perceptions of Integrating Language Arts and Science**
  Leslie Bradbury; Appalachian State University
  Lisa Gross; Appalachian State University

- **Meeting NSTA Standards for Science Teacher Preparation through Electronic Portfolios**
  Mythianne Shelton; Virginia Tech
  George Glasson; Virginia Tech
  Jessica Stephenson; Virginia Tech

- **Science and Mathematics Integration for Literacy Enhancement: Project SMILE**
  Pradeep (Max) Dass; Appalachian State University

- **Using Paleontological Research as Interdisciplinary Teaching Tool**
  Nathan Noll; East Tennessee State University

10:30 a.m. - 10:40 a.m.  Snack Break / D.P. Culp Center/ Tennessee Room

10:40 a.m. - 12:30 p.m.  Mid-Atlantic ASTE Business Meeting

12:30 p.m. - 1:30 p.m.  Lunch/ Conference Wrap-up / D.P. Culp Center/ Tennessee Room

1:30 p.m. - ???  Gray Fossil Site Tour and Dig
Abstract of Paper Presentations

Physics Challenge Labs
A paper presented by:

Robert W. Arts; Pikeville College; rarts@pc.edu

I have been very dissatisfied with many of the traditional cookbook laboratories offered in physics. Additionally, I have experimented with a number of alternative laboratory practices such as inquiry based, activity-based, and project-based; none of which I really felt connected with. As such, I have taken to incorporate a number of "challenge" laboratory activities in each semester of my general physics course for science majors. As David Jones described it in his 2009 *The Physics Teacher* article, "A 'challenge lab' is basically an experiment where physics students attempt to obtain a specific outcome under some sort of constraint conditions set by the instructor. The students must work within the constraints set by the instructor and they must work only with the equipment given by the instructor." In this presentation I will describe this type of lab experience and provide specific examples of student outcomes.

Mobility Impaired Students’ Perceptions of Field-Based Learning Experiences
A paper presented by:

Christopher Atchison; Ohio State University; Atchison.6@osu.edu

Assuming that knowledge is independent of one’s physical ability, a strong assumption exists that most traditional geologic field environments are inaccessible to students with mobility impairments. An objective of this study was to first determine how first-hand experience assists in the construction of cave geology content knowledge. Evaluating this field experience also required an understanding of how students with mobility impairments interact with their environment. This exploration was not intended to differentiate them from the rest of society by what they do or do not know, what they can or cannot do, but to assist them in obtaining the accessibility and content knowledge of a traditional geoscience field-based curriculum. This presentation discusses the preliminary results of a study focused on understanding the potential environmental and physical barriers that students with mobility impairments perceive with respect to field-based education.

Pre-Service Elementary Teachers’ Perceptions of Integrating Language Arts and Science
A paper presented by:

Leslie Bradbury; Appalachian State University; upsonlk@appstate.edu
Lisa Gross; Appalachian State University; grossla@appstate.edu

This study investigated the experiences of 21 pre-service elementary teachers (PSETs) who developed and implemented integrated lessons (science and language arts) for their course practicum. Data collected include the PSETs’ criterion for literature selection, teaching reflections, and interviews. Findings indicate that the PSETs consistently chose fiction books over nonfiction books in the lesson planning, believed that the corresponding science activity must be “hands-on,” and often referred to nonfiction selections to expand their existing science knowledge. The pre-service elementary teachers were consistent in their interpretation of “integration” as evident in their use of literature selections during planning and implementation. Summative assessments tended to focus on language arts skills rather than science content objectives. Findings of the study have implications for the ways in which elementary science methods courses are taught including determining ways to broaden PSETs conceptions of integration.

Bolsering Confidence and Collaboration During Student Teaching Through Implementation of Elementary Guided-Inquiry Science Modules
A paper presented by:

Tina Cartwright; Marshall University; tina.cartwright@marshall.edu

To foster collaboration between mentors and student teachers as they implemented a new guided-inquiry elementary science unit, three pre-service teachers attended a summer elementary science workshop with in-
service teachers from the local district. Then, for their subsequent student teaching experiences, each pre-service teacher was placed with a mentor teacher who also attended the summer science workshop. The pre-service teachers and mentor teachers who participated in this study had similar thoughts on the importance of (and appreciation for) science education. Through qualitative methods, this study examines how collaboration between the mentor teacher and pre-service teacher was fostered through the summer science workshop, how collaboration continued in the classroom during student teaching, and the impact of this collaboration on the pre-service teacher’s confidence during their student teaching experience. The summer science workshop led to better collaboration in the following ways: less of a power struggle, greater confidence, and joint perception of co-teachers.

**Science and Mathematics Integration for Literacy Enhancement: Project SMILE**

A paper presented by:

**Pradeep (Max) Dass;** Appalachian State University; dasspm@appstate.edu

Project SMILE, a 3-year, NSF funded, exploratory project seeks to study the effectiveness of integrated science and mathematics instruction for improving middle grades teachers’ ability to teach scientific inquiry and mathematical problem solving, using InspireData as the integration tool and the Science, Mathematics, Technology & Society (SMTS) as the pedagogical approach. The SMTS pedagogy provides real life relevance to math and science course content by exploring this content in the context of real world situations, problems, issues, etc. With 20 middle grades science and mathematics teachers in North Carolina, the project is investigating the extent to which use of InspireData aids in integrating scientific inquiry with mathematical problem solving in instruction; and how effective this tool turns out to be in enhancing teachers’ ability to teach these components of STEM “literacy”. This presentation will focus on project design, plans for assessing project impact, and what has been accomplished so far.

**Place-Based Science Education in Thailand**

A paper presented by:

**George Glasson;** Virginia Tech; glassong@vt.edu

This paper describes a professional development program for elementary teachers in rural Thailand that focuses on place-based education and inquiry teaching. Elementary school classroom teachers worked as a team with a Thai science educator to design and teach lessons related to ecology and sustainability. Working in collaborative groups, children tested water samples in the local river, conducted experiments, and observed local plants and soil types. The children observed and recorded their results through notes, drawings, and graphing and they presented their results to community members. Following the lessons, the primary school teachers were actively involved in discussions on critical thinking and problem solving as related to the lessons. Although elementary students rarely learn science through inquiry science teaching in rural Thailand primary schools, teachers were able to learn how to actively engage students through activities that connected to the local community and culture.

**Environmental Research Experience for Teachers of the Deaf and Hard of Hearing: A Pilot Study**

A paper presented by:

**Shannon C. Graham;** The University of Tennessee, Knoxville; sgraha10@utk.edu

Research in professional development for educators of the deaf and hard of hearing (D/HH) in the sciences is limited. The purpose of this study is to describe teachers’ experiences of professional development and understanding of research processes, and highlight pertinence in instructional practice. From a naturalistic inquiry approach, the researcher conducted interviews with three teachers of the D/HH who participated on a research team for two weeks in 2008. Instructional materials developed in reference to teachers’ experiences in the field were collected. Teachers prefer specific types of professional development and gained a better understanding of research processes; however, teachers’ efforts in applying their new knowledge to teaching were diverse.
**Using Geospatial Technologies in Environmental Education for Pre-Service and In-Service Science Teachers**

A paper presented by:

*Rita Hagevik;* The University of Tennessee, Knoxville; rhagevik@utk.edu

Current national reform recommendations in the United States have largely neglected nature study and place-based learning as an explicit component of scientific content and literacy. The role of nature study needs to be expanded in both science instruction and science teacher preparation. One way to do this is to use a curriculum grounded in nature study and ideally contextualized in the local environment to address a number of current reform movements in science education. Web-based applications such as Google Earth allow easy-to-use access to all types of environmental data. Nature study and GIT were used in a science teacher education course through field experiences on Ossabaw Island in Georgia. It was found that through collaborative learning communities, students became immersed in the natural world and were able to investigate their own questions. GIT helped students to visually see and analyze relationships in the environment.

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**The Growth of a GK-12 Program: Problems and Solutions**

A paper presented by:

*Debra Hemler;* Fairmont State University; dhemler@fairmontstate.edu

*Aimee Lee Govett;* East Tennessee State University; govett@etsu.edu

*Science First!* is a collaboration between the College of Arts and Sciences at East Tennessee State University and Johnson City Schools that is supported through a grant from the National Science Foundation Division of Graduate Education GK-12 program. ETSU faculty and graduate fellows are working with the principal and teachers at North Side Elementary School of Math, Science and Technology to develop resources and revise the curriculum to one that is focused around science and mathematics. At the same time this provides an opportunity for the fellows, graduate students in mathematics, biology and chemistry, to work with the teachers and students and to learn to communicate math and science to different audiences. Cohort 3, which includes seven new fellows, began an exciting year as the GK-12 Summer Institute got underway on July 28, 2010. We will look back at the previous years and discuss the growth of this program.

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**Ending the Cycle of Continued Evolution Controversy: Can We Start in Elementary School?**

A paper presented by:

*Ron Hermann;* Towson University; rhermann@towson.edu

In recent years many evolution education researchers have come to realize that interventions occurring at the secondary school level result in minimal enduring effects in increasing students’ understanding and acceptance of evolution. As such, there is a need to introduce evolutionary concepts at the elementary level. But, do elementary teachers have the capacity to teach evolution? A pilot study of 74 pre-service elementary education students indicates a generally low understanding of evolution, but fairly high acceptance of evolution. Those students who expressed greater religiosity were significantly less accepting of evolution. Interestingly, the 7 students who attended religiously affiliated private high schools had a greater religiosity, but also a greater understanding of evolution (p>0.10). The baseline data acquired will help science educators design programs of study that increase understanding of evolution in a manner sensitive to students’ religious beliefs.

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**Relationships among Student Perceptions of Learning and Student Metacognition and Teacher Awareness in Connected Science Classrooms**

A paper presented by:

*Soonchun Lee;* Ohio State University; lee.3552@osu.edu

*Karen E. Irving;* Ohio State University; irving.8@osu.edu

*Douglas T. Owens;* Ohio State University; owens.93@osu.edu

*Stephen J. Pape;* University of Florida; spape@ufl.edu

*Melissa L. Shirley;* The University of Louisville; melissa.shirley@louisville.edu
Science teachers strive to create learner-centered classroom environments that address both learning and self-engagement by encouraging students to take on productive ways of learning. Learning goals can be achieved by active collaboration between the teacher and students by fostering metacognition and teachers’ awareness of learning. The results presented here are based on student focus group (SFG) interviews and survey data conducted as part of a larger research project Classroom Connectivity in Promoting Mathematics and Science Achievement (CCMS). Preliminary data analysis indicates that learner-centered environments can be facilitated with two features: (1) teachers’ awareness of students’ learning (TA), and (2) students’ metacognitive awareness about their learning (SM). The technology facilitated communication provides a variety of information not only for the teachers but also for the students. This result provides teachers information about how students view the connected classroom and how teachers can better facilitate learner-centered science classrooms with the technology.

**Integrating Scientific Research into Elementary Education Standards: A Closer Look at GK-12 in East Tennessee**

A paper presented by:

**Brent Linville** – East Tennessee State University; [zblj22@goldmail.etsu.edu](mailto:zblj22@goldmail.etsu.edu)

**Elizabeth Schmitt** - East Tennessee State University; [Schmitt@goldmail.etsu.edu](mailto:Schmitt@goldmail.etsu.edu)

The ability of scientists to successfully communicate current research and information to young audiences is imperative for growth and sustainability of scientific fields. Explaining complex scientific concepts to elementary school students is the primary challenge associated with the GK-12 NSF grant at East Tennessee State University and North Side Elementary School in Johnson City, TN. Graduate students in math and science have the ability to enter elementary school classrooms to teach the Tennessee State Standards while integrating their research. Fellows bring in outside resources, content knowledge, and real science scenarios to young minds. While reiterating the state standards, fellows also represent a source of knowledge and experience in a field seldom understood or explored by elementary students. The ability to excite these young students about science and math benefits both the fellow and student on multiple levels. Teachers also benefit by using the fellow as an additional source of content knowledge. Fellows have successfully implemented research about social spiders, extinct carnivores, and evolutionary based concepts into early elementary classrooms, which has improved the communication abilities of the graduate students while reaching the students and exciting them about scientific research and opportunities.

**Using Paleontological Research as Interdisciplinary Teaching Tool**

A paper presented by:

**Nathan R. Noll**; East Tennessee State University; [nollnr@goldmail.etsu.edu](mailto:nollnr@goldmail.etsu.edu)

Paleontology integrates geology, biology, chemistry, physics, and math, but also seemingly “further removed” topics such as writing and art. Breaking paleontological case studies into small lessons allows students of all ages to understand the progress of scientific investigations, and gradually build an understanding of complex phenomena. Analogies and allowing students to use their senses have proven to be effective learning tools. For example, tasting warm and cold soda can help them learn that cold water holds more gases than warm water. Teaching students that real scientific journals can be used to share scientific findings with the world can make writing and illustrating in student science journals more exciting. When tested, first grade students were able to use complex tools such as stratigraphy, relative dating, and mineralogy to make interpretations about sequences of events recorded in the fossil record. Performing a play can allow students to visualize the final paleontological story.

**Development of Pre-Service Teachers’ Questioning Practice Through Self-Analysis**

A paper presented by:

**Stephanie B. Philipp**; University of Louisville; [stephanie.philipp@louisville.edu](mailto:stephanie.philipp@louisville.edu)

**Melissa L. Shirley**; University of Louisville; [melissa.shirley@louisville.edu](mailto:melissa.shirley@louisville.edu)

An important feature of formative assessment is teacher awareness of student understanding. Teachers can elicit student understanding using skillful whole-class questioning, including higher-order thinking questions, increasing
wait time and encouraging student participation in interactive discussions. How teachers develop expert questioning skills is not clear. The purpose of this pilot study is to examine how pre-service teachers (PSTs) consider and then transform their questioning practices through self-analysis of transcribed excerpts of whole-class instruction. Preliminary findings show that most PSTs chose to categorize the cognitive level of questions they asked, although some PSTs focused on teacher-student interactions, such as teacher feedback to students and effect of student behavior on class discussion. PSTs identified tools, such as referring to lists of question prompts, as the main strategy for increasing the cognitive level of questions, which would improve class discussions. The findings from this study should help teacher educators prepare novice teachers more effectively.

Science Teachers’ Views of Prior Knowledge and Conceptions as a Function of Conceptual Learning

A paper presented by:

James H. Roberson; The University of Tennessee, Knoxville; jrober61@utk.edu
Rita Hagevik; The University of Tennessee, Knoxville; rhagevik@utk.edu

Prior knowledge and conceptions have a functional role during science learning and operate through interplay with new conceptions introduced during instruction. Hewson and Hewson (1983) offered four perspectives on teaching strategies educators can use to remediate inappropriate conceptions; Integration, Differentiation, Exchange, and Conceptual Bridging. These same four strategies can be viewed as conceptual change process mechanisms associated with learning science concepts. The research literature suggests exchange as the proper mechanism for establishing the correct science conception in a student. The purpose of this study was to investigate which of the four processes elementary and secondary science teachers view as the mechanism at work during learning earth science topics. Some topics in earth science are difficult to negotiate due to the influence of learners’ prior knowledge and conceptions. Results of interview data reveal the teachers view integration as the process that learners use when learning earth science related concepts.

Pre-Service Elementary and Middle Grades Students’ Factual Retention After an Inquiry or Direct Instruction Earth and Space Science Course

A paper presented by:

Elizabeth Roland; Morehead State University; e.roland@moreheadstate.edu
Jennifer O’Keefe; Morehead State University; j.okeefe@moreheadstate.edu

Several pre-service science content courses have been developed and implemented at many institutes of higher education. These courses utilize constructivist teaching methodologies which stress conceptual knowledge. In this study, pre-service teacher content knowledge attainment and retention, based upon course type, was investigated using a multiple-choice test. Students in science methods had either the inquiry pre-service course or the traditional didactic course prior to methods. This study analyzed student knowledge, as tested on Praxis, at the beginning and end of science methods. 220 pre-service elementary and middle grades teachers completed the study. Analysis suggests students taking the inquiry methods course generally had increased content attainment and over the semester demonstrated increased retention. An unexpected finding was an increase in earth and space content knowledge with preference to students taking the inquiry content course. Findings support the continuation of the inquiry course in earth and space sciences with targeted course revision.

Meeting NSTA Standards for Science Teacher Preparation through Electronic Portfolios

A paper presented by:

Mythianne Shelton; Virginia Tech; happycat@vt.edu
George Glasson; Virginia Tech; glassong@vt.edu
Jessica Stephenson; Virginia Tech; jesteph3@vt.edu

This paper describes the process for meeting National Science Teachers Association (NSTA) standards for science teacher preparation as part of the National Council for Accreditation of Teacher Education (NCATE) accreditation process. Throughout the course of the year, students enrolled in Virginia Tech’s Graduate Secondary Science Licensure Program complete assessments that meet the NSTA standards. The assessments, including unit plans, effect on student learning data, science safety, research and investigation, and the contextual content of science, are documented on electronic portfolios. The portfolios are presented to faculty and are scored by faculty and
doctoral students. Data is compiled and analyzed to make decisions for program improvement that is necessary for becoming accredited by NCATE. Examples of student electronic portfolios and assessment rubrics will be shared.

**Characteristics of Pre-Service Middle and Secondary Science Teachers' Whole-Class Questioning Patterns**

A paper presented by:

*Melissa L. Shirley*; University of Louisville; melissa.shirley@louisville.edu

*Stephanie B. Philipp*; University of Louisville; stephanie.philipp@louisville.edu

Formative assessment, a process whereby teachers and students identify levels of student understanding, has the potential to increase learning and achievement. One method of implementing formative assessment is the questioning of students during whole-class discussions or lectures. Although many teachers engage in oral questioning, how teachers become proficient at questioning is not well-understood. The work presented in this session represents an initial step in clarifying teachers’ acquisition of questioning skills. Pre-service teachers enrolled in a science methods course were asked to transcribe a brief segment of their whole-class oral questioning. In the current study, we provide an initial characterization of pre-service teachers’ questioning patterns. Aspects analyzed include the depth of questioning as indicated by the degree of teacher probing, cognitive level of questioning, and quality of teacher follow-up moves and student responses. Understanding features of novice teachers’ questioning skills is an important precursor to improving formative assessment implementation.

**Classrooms in the Clouds**

A paper presented by:

*Chih-Che Tai*; East Tennessee State University; taic01@etsu.edu

This presentation demonstrates how to utilize consumer information technology in a science content course for the pre-service elementary teacher education program. Consumer information technology has grown exponentially for the past decade. One of the most appealing pieces of the technology is to integrate the online gadgets into a web-based learning platform at no cost and with wide accessibility. The project involved 28 pre-service elementary teachers to create a learner-centered, Google-Apps-laden and web-based learning environment. The pre-service teachers’ individual web-platforms can be used as their electronic portfolios for an evaluation purpose and an interactive networking for a communicative purpose. Potentially, the outcomes of the project could be expanded to the populations of K-12 in-service teachers. Furthermore, in a long-term vision of the project, we advocate that we should leverage the development of consumer technology to impact the classroom of the future, advance students’ academic performance, and prepare for technology-adept youths.

**A Comparison of Inquiry and Traditional Biology Courses in Relationship to Content Attainment and Retention for Pre-Service Elementary and Middle Grades Teachers**

A paper presented by:

*Carol Wymer*; Morehead State University; c.wymer@moreheadstate.edu

*Elizabeth Roland*; Morehead State University; e.roland@moreheadstate.edu

Research has suggested pre-service science education should include the development of content courses using constructivist, inquiry instruction aligned to national and state curriculum standards. However, concern remains about pre-service teacher’s content acquisition and retention. In the present study, content acquisition and retention of 220 pre-service teachers are measured in a science methods course. Data was collected using a 60-item multiple choice content test at the beginning and end of a methods course taken 1-2 semesters prior to student teaching. Study results indicate that students taking inquiry biology generally had a higher frequency of correct content knowledge and increased content retention over the semester. An unexpected finding was the students taking inquiry biology were more likely to select the correct answer on the post test administered 14 to 15 weeks later. Findings support the creation of content courses targeting pre-service teachers. Additionally, results suggest constructivist, inquiry courses facilitate long-term content retention.
Abstract of Poster Presentations

**A Meta-analysis of Giftedness in Science Education**

A poster presented by:

*Bennett Adkinson*; University of Tennessee, Knoxville; [bennett@utk.edu](mailto:bennett@utk.edu)

This poster presents a review of literature and policies that pertain to giftedness in science education. Though much is known about giftedness in general, little research or description of giftedness in science education is available. Scientific giftedness is discussed as a distinct type of giftedness. Effort is made to distinguish between students who are scientifically gifted as opposed to students who are broadly classified as gifted who are taking science courses. Use of authentic scientific inquiry is discussed as a best-practice pedagogy for both of these classifications.

**Farm to School: Cultivating the Next Crop of Educators**

A poster presented by:

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*Emily Jackson*; Appalachian Sustainable Agriculture Project; [emily@asapconnections.org](mailto:emily@asapconnections.org)

Our research focuses on integrating Farm to School instruction into pre-service elementary and middle grades education and health science programs. During Phase One, educators from the Appalachian Sustainable Agriculture Program worked with Western Carolina University (WCU) students in science methods and nutrition courses through in-class presentations focused on using the components of Farm to School as educational tools. Phase Two focuses on Farm to School implementation in public schools and a workshop for all education and health science students. In the Fall 2010 semester, ten WCU students will implement Farm to School projects within Jackson County Schools while receiving on-site assistance and resources and participating in monthly Farm to School meetings. In our poster, we will share an overall project description, results from Phase One, and a progress update on Phase Two. We hope to connect with colleagues who are interested in Farm to School efforts related to science teacher education.

**Elementary Students’ Science Learning: Indoor and Outdoor Experiences**

A poster presented by:

*Sarah J. Carrier*; North Carolina State University; [sarah_carrier@ncsu.edu](mailto:sarah_carrier@ncsu.edu)
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This planned research will document elementary school students’ experiences at two schools in the same district with rich science instruction: one school where many teachers offer outdoor experiences and another school with few or limited outdoor experiences. Quantitative data from this study will investigate the relationship of indoor/outdoor experiences on students’ attitudes toward the outdoors, science knowledge, and comfort levels in the outdoors. Qualitative data will include classroom observations and interviews with principals, teachers, parents, and students to create a rich description of the culture of the school. The long-range goal of this research is to inform instructional design on the impact of providing elementary school students with outdoor experiences, capitalizing on learning taking place beyond classroom walls. In recent decades more and more children have become disconnected with the natural world and have rarely if ever experienced outdoor exploration (Miller, 2005; Sobel, 1999; White, 2004).
SYMBIOSIS: A Landmark Assessment Study of an Integrated Bio/Math Curriculum

A poster presented by:

Audrey Depelteau; East Tennessee State University; depelteau@etsu.edu
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The Department of Biological Sciences and the Department of Mathematics and Statistics at ETSU propose to implement a bio-math coupled curriculum known as SYMBIOSIS. The purpose of this assessment study is to investigate and compare the standard biology curriculum with the SYMBIOSIS curriculum: documenting student achievement of learning outcomes and understanding of integrated biology and mathematical concepts; and the identification of effective and ineffective teaching practices. We will compare all content pre-, mid-, and post-test data on SYMBIOSIS concepts data with the pilot study of “Traditional Biology Curriculum” that started in Fall 2009. It is important to note that perhaps the best way to address the shortcomings of a pre/mid/post test study is to utilize a control group (Colosi and Dunifon, 2006). Our multifaceted plan gives us the unique opportunity to collect a large data set from the standard lecture-based introductory biology courses over a three-year period as the control.

Traffic Cameras- A Citizen Science Approach

A poster presented by:

Matthew Perkins; Oak Ridge High School; mperkins@orhn.edu

Speed and red-light cameras were recently installed at three traffic intersections in our community, generating much controversy amongst citizens and spectacular revenue for the city. The purpose of our citizen science investigation was to investigate the design of several traffic intersections using a simple mathematical model proposed by Eisenkraft (2010). Students first researched newspapers and online sources to familiarize themselves with the traffic camera debate, as well as intersection design. They next used simple tools (stopwatches, tape measures) and more sophisticated ones (video analysis software) to determine the safety of each intersection.

Professional Development Designed to Change Science Teaching and Learning

A poster presented by:

Jack Rhoton; East Tennessee State University; rhotonj@etsu.edu

If teachers are to address the learning of all students, their professional development must engage them in learning science concepts, understanding how students learn science, practicing and implementing new teaching strategies, and making informed decisions concerning science curriculum and instruction. Aligning professional development with science standards, curriculum frameworks, and assessments can help ensure that what science teachers are learning and implementing in their classrooms is consistent with the goals and polices of the school and district. Establishing consistency across all levels of the system reflects a commitment to long-term, sustained professional development that promotes student and teacher learning. The goal of this research was to determine the impact of the ETSU professional development logic model on science teaching and student learning.
About Gray Fossil Site Tour and Dig

(http://www.grayfossilmuseum.com)

The Natural History Museum is dedicated to discovering, investigating, preserving, and interpreting regional biodiversity through time and to providing enjoyable, experiential educational programming for people of all ages. Disseminating the knowledge gained is accomplished through varied means (exhibitions, visual observation, and hands-on activities). Our programs are developed within three confines: Public Education Programming, Tourism, and Research and Higher Education opportunities.

The Natural History Museum offers unique experiences of an actual, working paleontological site which makes science, nature and history come to life. Traveling exhibits throughout the year offer a broad variety of experiences which enrich and enhance the curriculum standards not only for science, but social studies, math, and language as well.

The Natural History Museum collaborates closely with East Tennessee State University and other researchers/scientists from around the country. Continued research and development of courses of study in the paleontological sciences and related sciences are part of the broad spectrum of benefits associated with the Gray Fossil Site.

Directions
1212 Suncrest Drive
P.O. Box 9221
Gray, TN 37615
423-439-3659
info@grayfossilmuseum.com

From Interstate 81, take Interstate 26 south to the Gray exit 13 (Hwy 75) Turn left (south) at the light. The Natural History Museum and Visitors Center is approximately 1.8 miles south on the left.

Our physical address is 1212 Suncrest Drive, Gray, TN 37615.

Hours of Operation
8:30 a.m. to 5:00 p.m.
everyday
Open year round
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