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Interdisciplinary STEM Teaching & Learning
Conference (2012-2019)

2014 Interdisciplinary STEM Conference (March
7, 2014)

2014 Georgia Scholarship of STEM Teaching & Learning Conference Program

Georgia Scholarship of STEM Teaching & Learning Conference

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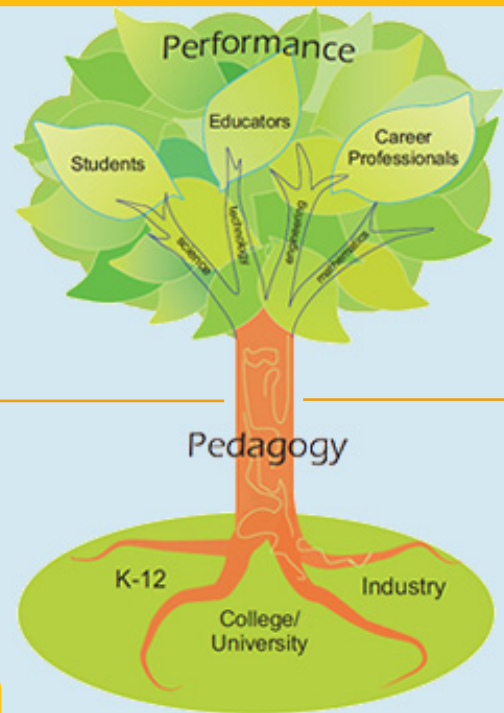
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MARCH 7, 2014 at the NESSMITH-LANE Conference Center, Statesboro, GA

3RD Annual Georgia Scholarship of **STEM** Teaching and Learning Conference



CONFERENCE PROGRAM

This conference will provide space for showcasing and discussing the varied work ongoing at Georgia higher education institutions and in collaboration with K-12 school partners to advance the scholarship of STEM teaching and learning. It will also serve as a link to STEM business and industry and as a channel for extending web-based learning opportunities.

stem.georgiasouthern.edu

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CONFERENCE THEMES

PARTNERSHIP, PEDAGOGY, AND PERFORMANCE

In addition to Partnership, Pedagogy, and
Performance, the seven umbrella themes of
Project Kaleidoscope will serve as organizers
for the conference:

- 1. INSTITUTIONAL TRANSFORMATION**
(exploring what works in engaging people,
policies and practices that make it happen)
- 2. THE HUMAN INFRASTRUCTURE**
(exploring what works in nurturing STEM
leaders, at all career stages)
- 3. THE PHYSICAL INFRASTRUCTURE**
(exploring what works in shaping spaces that
support 21st century STEM learning)
- 4. THE ACADEMIC PROGRAM**
(exploring what works in undergraduate
STEM courses, from the very first courses for all
students through capstone courses for majors)
- 5. THE PEDAGOGICAL TOOLS**
(exploring what works in designing,
implementing and assessing teaching
approaches that have an impact on student
learning)
- 6. THE STATE CONTEXT**
(exploring the social and political context for
attending to the quality of undergraduate
learning in STEM fields)
- 7. THE 21ST CENTURY STUDENT**
(exploring the nature of current and emerging
generations of students)

STEM

SCIENCE TECHNOLOGY ENGINEERING & MATH

THIS CONFERENCE IS SPONSORED BY
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HOSTED BY
THE COLLEGE OF EDUCATION
THE COLLEGE OF SCIENCE AND
MATHEMATICS
AND
THE DIVISION OF CONTINUING
EDUCATION
AT GEORGIA SOUTHERN UNIVERSITY
STATESBORO, GA



GEORGIA SOUTHERN
UNIVERSITY



DOWNLOAD THE PROGRAM



THURSDAY | MARCH 6 HOLIDAY INN

6 — 9 p.m.

Registration

7 — 9 p.m.

* Poster Sessions & Reception

*Poster Session Descriptions on pages 10 - 12

FRIDAY | MARCH 7 NESSMITH-LANE CONFERENCE CENTER



7:15 a.m. — 1 p.m.

Registration

7:30 — 8 a.m.

Continental Breakfast

9 — 9:20 a.m.

* Poster Session

Room 1603

8 — 8:15 a.m. Welcome and Announcements

*Dr. Joy Darley – Associate Professor, Mathematical Sciences, Georgia Southern University, Dr. Thomas Koballa – Dean, College of Education, Georgia Southern University
Dr. Martha Abell – Dean, College of Science & Mathematics, Georgia Southern University, Dr. Brooks Keel – President, Georgia Southern University
Dr. Kamau Bobb – USG STEM Initiative Coordinator, Georgia Board of Regents, Regent Lori Durden – University System of Georgia*

Room 1603

8:15 – 9 a.m.

KEYNOTE ADDRESS

WHY AMERICA'S FAILING SCIENCE & HOW WE CAN TURN IT AROUND

David Pogue, anchor columnist for Yahoo Tech

The STEM fields (science, technology, engineering, and mathematics) drive America's economy: it's no accident that Apple, a tech company, is the world's biggest corporation. Science and technology fuel the country's commerce, defense, and business. But American test scores, graduation rates, and STEM dominance have been declining steadily for 20 years. Fewer than a third of elementary and high school students have a solid grasp of science. Half of American college students start out majoring in a technical subject, but somehow, only 470, 000 graduate in those majors. What's going on? And how can we compete if we don't fix the situation, fast? In this fascinating, cutting-edge presentation, David Pogue looks at our chances for turning around America's science future.



Room 1909

9:30 – 10:15 a.m.

MY NEW FRIEND, THE NUMBER LINE

Ms. Keysha G McIntyre, Lake Forest Elementary

The number line has become the tool of choice with Common Core Math Standards. Participants will use pattern blocks, color tiles, connecting cubes, and other manipulatives to move through the progression of a number line in the CC standards. Learn to add, subtract, and find equivalent fractions all on the number line.

Room 2905

9:30 – 10:15 a.m.

BUILDING LEARNING EXPERIENCES THAT MATTER: USING CIVIC ISSUES TO ENGAGE STUDENTS WITH SCIENCE - PART I

Dr. Julia K Metzker, Dr. Caralyn Zehnder, Dr. Kimberly Cossey, Georgia College

Does planning your course make you feel like you are in a race to complete a list of content from an ever-expanding textbook? Do you dread giving yet another dry lecture? Imagine a classroom where instead of listening to a lecture, students are leading discussions organized around a community or civic issue. Imagine students collaborating in teams to apply the course content to real-world examples instead of recalling facts on an exam. Imagine yourself with a renewed enthusiasm for the craft of teaching. We can provide you with a road map for transforming your classroom into a better learning environment using civic issues. Effectively designed courses can lead to increased student engagement, reinvigorate academic programs and make teaching more enjoyable for you.

Room 1601

9:30 – 10:15 a.m.

A TOUCH OF GLASS

Mr. Daniel E Rivera, Georgia Southern University

Learn more about Google Glass! We will demonstrate how Glass works, provide details on the features, functions, and limitations, and explain where Glass is moving in the future. Why do educators need to know about it? What are the implications of such technology? How is it being used in STEM education?

Room 2911

9:30 – 10:15 a.m.

CREATING, DEVELOPING, AND SUSTAINING SUCCESSFUL PARTNERSHIPS AMONG SCHOOLS, UNIVERSITIES, AND SMALL BUSINESSES TO CREATE NOVEL IMMERSIVE LEARNING ENVIRONMENTS FOR SECONDARY STUDENTS

Dr. Georgia W. Hodges, Dr. J. Steve Oliver, University of Georgia; Dr. Tom Robertson, David Ducrest, IS3D; Suzanne Eason, Jennifer Maloney, Jessica Holden, Pam Perry, Mill Creek High School

Bring your laptop and join our team as we explore the SABLE System, a Skills and Assessment Based learning environment that we created with teachers for teachers to use in the secondary science setting. Scientists, science educators, science teachers, and computer technicians from the team will be on site to introduce you to a novel use of technology and prepare you to deploy multiple learning experiences, from games to case studies, in your secondary classroom.

Room 2903

9:30 – 10:15 a.m.

WHAT SCHOOL ADMINISTRATORS CAN DO TO SUPPORT K-12 STEM TEACHERS

Dr. Robert H. Costlow, Richard McCombs, Ashley Crosby, Statesboro High School

Retaining good teachers has and continues to be a major issue for all levels of K-12 Education. However, many things can be done at the school level to keep your good teachers. This interactive session is designed to give you good ideas about retaining your teachers from both an administrative and teacher viewpoint, as well as give you an opportunity to ask specific questions in a guided discussion format so that each of us can learn from each other.

Room 2908

9:30 – 10:15 a.m.

CRITICAL THINKING AND THE LANGUAGES OF STEM

Dr. Connie H. Rickenbaker, Sally Gilbreth, Georgia College

Participants in this session will learn about the critical thinking strategy of SEEI (Nosich, 2011) as used by both high school and university students. SEEI (State, Explain, Example, Illustrate) has a strong connection with the languages of STEM (Baber, 2011) which will be shown by the presenters. Participants will have the opportunity to implement and share their own SEEs as part of the group discussion.

Room 2901

9:30 – 10:15 a.m.

LITERACY MATTERS IN SCIENCE AND MATHEMATICS

Mrs. Gladys T Hamilton, Glenn Hills Middle School

Where are literacy opportunities in the CCGPS Science and Mathematics standards? Lets dig into the standards and discover the opportunities.

Room 2904A

9:30 – 9:50 a.m.

IMPROVING STUDENT LEARNING IN AN ENGINEERING GRAPHICS FOR DESIGN COURSE THROUGH DIFFERENTIATED AND PROJECT-BASED INSTRUCTIONS

Dr. Barry Hojjatie, Valdosta State University

The Engineering Graphics for Design course is one of the most important courses in freshman engineering. However, one of the main challenges in teaching this course at Valdosta State University is handling a relatively large computer lab-based course and a wide range of skills and learning abilities in students. Many of our students are quick in learning computer tools and Commands in programs such as AutoCAD. Also, some students have good CAD drawing background from high school. But many have difficulty understanding 2-D or 3-D geometric and angular relations, geometric and trigonometric laws, and logical reasoning associated with fundamentals of engineering graphic. Recently, we have explored various pedagogical techniques to allow students to work on various self-paced CAD projects that are related to their field of interest in engineering. Also, we have included some team-based filed projects to increase interaction and collaborations among students. Furthermore, we added many online resources in D2L, and increased in-class and out-of-class support for students. Initial results shows an increased student success and course satisfaction among the students.

9:55 – 10:15 a.m.

THE EFFECTIVENESS OF PEER TUTORING IN INCREASING RETENTION AND REDUCING THE FAILURE RATES

Mr. Said Fares, Dr. Mary Fares, Valdosta State University

It is well known that introductory computer programming courses are difficult and that retention rate is low and failure and withdrawal rates are high. The aim of our project was to reduce the high failure and withdrawal rates in learning to program. This paper presents a number of changes in module organization and instructional delivery system in teaching CS1. Peer tutoring and out of class help sessions were applied during semesters. Seven tutors participated in the tutoring services daily from 12 noon to 7 p.m. Two years of data was collected and analyzed. The primary results show that Peer tutoring helped to reduce the failure and withdrawal rates. An additional benefit of the tutoring system was that the tutors gained the experience that makes them better learners as well as better teachers. Student surveys indicate a positive evaluation of the modified instructional approach, overall satisfaction with the course and consequently, higher success and retention rates. Furthermore, we added many online resources in D2L, and increased in-class and out-of-class support for students. Initial results shows an increased student success and course satisfaction among the students.

Room 2904B

9:30 – 9:50 a.m.

HITTING PAUSE ON ORGANIC CHEMISTRY

Dr. Jenny B Vu, Valdosta State University

Written procedures for performing organic chemistry experiments are replaced by visual demonstrations that allow students to watch these videos at home and/or in the laboratory. These previously recorded demonstrations allow students to watch, pause, and rewind the video to better understand laboratory techniques.

9:55 – 10:15 a.m.

DEVELOPMENT OF A PRE-GENERAL CHEMISTRY COURSE AT VALDOSTA STATE UNIVERSITY

Dr. Donna L Gosnell, Valdosta State University

I will discuss this past year's development and implementation of a pre-general chemistry course at Valdosta State University. The purpose of this course is to enhance preparation for the majors' general chemistry course sequence, particularly in mathematics. Our hope is to increase retention and to lower the percent of D's, F's and withdrawals.

Room 1909

10:30 – 11:15 a.m.

PALEO-PEDAGOGY: ENGAGING STUDENTS WITH EVOLUTION LAB ACTIVITIES

Mr. Matthew L. Gibson, Portal Middle/High School

Of all of the biology standards, evolution (SB5) is one of the most difficult to model or test in the classroom. In fact, many teachers have to rely on the same evolution labs, if they have any laboratory activities in the unit at all. This interactive session will expose teachers to various new laboratory activities they can use to get students excited about evolution on an affordable budget. Teachers will learn how to simulate sediment deposition and fossilization as well as get to "dig" for their own fossils material. No one will leave empty handed!

Room 2905

10:30 – 11:15 a.m.

BUILDING LEARNING EXPERIENCES THAT MATTER: USING CIVIC ISSUES TO ENGAGE STUDENTS WITH SCIENCE - PART II

Dr. Julia K Metzker, Dr. Caralyn Zehnder, Dr. Kimberly Cossey, Georgia College

Does planning your course make you feel like you are in a race to complete a list of content from an ever-expanding textbook? Do you dread giving yet another dry lecture? Imagine a classroom where instead of listening to a lecture, students are leading discussions organized around a community or civic issue. Imagine students collaborating in teams to apply the course content to real-world examples instead of recalling facts on an exam. Imagine yourself with a renewed enthusiasm for the craft of teaching. We can provide you with a road map for transforming your classroom into a better learning environment using civic issues. Effectively designed courses can lead to increased student engagement, reinvigorate academic programs and make teaching more enjoyable for you.

Room 1601

10:30 – 11:15 a.m.

GOOGLE CHROME: MORE THAN A BROWSER

Mr. Daniel E Rivera, Georgia Southern University

Chrome is more than a browser. It's an operating system in itself, and it's transforming the educational computing experience. Come learn about Chrome's features such as data syncing across computers (bookmarks, passwords, settings, etc), and most importantly, Chrome-specific apps. Learn about Chromebooks as well - those powerful, fast, and cheap laptops that are spreading like wildfire.

Room 2911

10:30 – 11:15 a.m.

REAL WORLD STEM: THE POSSIBILITIES FOR TRANSFORMING TEACHING AND LEARNING THROUGH INQUIRY

Dr. Sandra M Webb, Jim Fuerniss, Georgia College; Donna Walker-Thompson, Dr. Melanie Mitchell, Justen Eason, Guy Storm, Monica Williams, David Peterson, Northeast High School

How can real world questions support STEM learning? Join us and discover the potential of using multidisciplinary inquiry design for engaging adolescents, improving learning, and building capacity for school reform. In this session, faculty and teachers from a STEM learning community will lead participants in multidisciplinary planning for an inquiry-based approach to integrating subject learning and exploring real world problems.

Room 2903

10:30 – 11:15 a.m.

THE INTERVIEW PROJECT: LEARNING CHILDREN'S MATHEMATICS

Dr. Angel R. Abney, Doris Santarone, Georgia College

In a course for teachers called Math 2008 we have imbedded a research project where prospective elementary teachers conduct an interview with a child and situate the child's responses within research on whole number development. They also mathematically analyze any strategies the child uses. During our session, we plan to discuss how engagement in this research project contributes to the prospective teachers' mathematical knowledge for teaching as well as their awareness of how children know and understand mathematics.

Room 2908

10:30 – 11:15 a.m.

WORK SMARTER, NOT HARDER AND INCREASE STUDENT ACHIEVEMENT!

Dr. Pamela Anita Bouie, Accelerating Excellence

Practical, powerful strategies proven to reduce classroom disruption, increase student achievement, gain parental support and empower teachers are presented in an exciting and interactive format. Participants will learn how to eliminate multiple warning and repeated requests, create a positive learning and environment and increase the instructional time in their classrooms by 5-9 hours each week! As a result, STEM teachers will be more effective in the classroom and students will be better prepared to succeed in the subjects of science and mathematics!

Room 2901

10:30 – 11:15 a.m.

INNOVATIVE COMMUNITIES: THE IMPACT OF EMBEDDING SPECIAL EDUCATION FACULTY IN GENERAL EDUCATION METHODS COURSES

Ms. Jill Williams, Dr. Patricia Alvarez McHatton, Kennesaw State University

Teacher educators face a need to prepare general educators to support students with disabilities. Teams with embedded special education faculty may ensure infusion of special education at the intersection of content and student learning needs. This session describes initiatives where Special Education faculty were embedded into Elementary STEM and secondary Science courses. Special education faculty co-taught with science faculty and visited candidates' classrooms. Results from surveys will be presented.

Room 2904A

10:30 – 11:15 a.m.

FLIPPING THE CLASSROOM - TRANSFORMING THE IN-CLASS LAB LECTURE FOR GENERAL CHEMISTRY I AND II INTO AN ONLINE COURSE.

Dr. Giso Abadi, Valdosta State University

With the evolution of technology, we realized that the classroom needed to evolve as well. By flipping the classroom, using tools including Ispring pro 7 software, students now have ample opportunity to be fully prepared for labs. The information is now accessible on demand as opposed to a one-time lecture at the beginning of the week. This method is also being used for organic chemistry I and II, to improve student engagement and preparation before attending labs. Strategies, approaches, universal design, successes, and obstacles to flipping a chemistry lab or any classroom will be discussed.

Room 2904B

10:30 – 11:15 a.m.

DEVELOPING COLLABORATIVE PARTNERSHIPS: STEM ON A MISSION

Dr. Kania Greer, Dr. Robert Mayes, Debbie Walker, Georgia Southern University

The Institute for Interdisciplinary STEM Education at Georgia Southern University seeks to develop partnerships with schools, businesses, and research institutes to improve STEM Education in rural Georgia. This is not without its challenges. This session will focus on an overview of the Institute and then engage participants in a round table discussion of best practices to improve partnerships.

Room 1909

11:30 – 11:50 a.m.

BEYOND THE IMPLEMENTATION OF A SUPPLEMENTAL INSTRUCTION PROGRAM LIE THE CHALLENGE TO DETERMINE COURSE-LEVEL GAINS IN LEARNING AND LONGITUDINAL SUCCESS LIKE RETENTION

Ms. Jeanne Haslam, Dr. Mike Gleason, Dr. Gita Phelps, Dr. Darin Mohr, Dr. Kasey Karen, Dr. Catrena Lisse, Dr. Rosalie Richards, Georgia College

Georgia College is in its third year of an institutionally supported program of Supplemental Instruction (SI). From meager beginnings ten years ago the use of SI now encompasses dozens of guided peer-mentors whose role is to supplement classroom instruction to achieve additional learning gains. The program, guided by a coordinator and a group of faculty partners, is assessing hundreds of students each year as they address the challenge of gauging program success for our students at the course-level and longitudinally to graduation.

Room 2905

11:30 – 11:50 a.m.

FACILITATING STEM SCHOLARSHIP OF TEACHING AND LEARNING THROUGH A FACULTY LEARNING COMMUNITY

Dr. Cher C. Hendricks, University of West Georgia

This session will provide participants with an opportunity to discuss ways to encourage and facilitate SoTL among faculty, determine effectiveness, and engage in a reflective process to improve facilitation of SoTL using a faculty learning community (FLC) process. FLCs provide faculty with structured peer-to-peer support in an environment that encourages collaboration, making them particularly well suited for supporting SoTL activities.

Room 1601

11:30 – 11:50 a.m.

"I DIDN'T KNOW SCIENCE COULD BE FUN!" ENGAGING ADOLESCENTS IN SCIENCE IN AN AFTER SCHOOL STEM CLUB

Dr. Sandra M. Webb, Ruth Eilers, Jim Fuerniss, Georgia College; Jackie Bowman, Northeast High School

This session presents the progress of a school and university partnership in creating a thriving after school STEM Club at a low-performing high school. Sponsored by a Georgia College STEM grant, this after school club, now in its second year, is changing attitudes and stimulating interest in science among a diverse group of adolescents. Topics shared with the audience will include suggestions for beginning an after school club, benefits of forming partnerships, ideas for programs, and impact on students and the school culture.

Room 2911

11:30 – 11:50 a.m.

THE POWER OF ANIMATIONS IN STEM COURSES

Dr. Adrian Heinz, Dr. Xin Xu, Georgia Gwinnett College

We demonstrate educational web-based animations to facilitate teaching and learning in STEM courses. These animations were developed by IT students who closely worked with the researchers and faculty. The animations are later used in the classroom to explain specific concepts to students of STEM disciplines such as chemistry, biology and mathematics. The interactive nature of the animations allows students to become active participants of the learning process. In order to measure their value as a teaching and learning tool, pre and post survey data was collected and analyzed.

Room 2903

11:30 – 11:50 a.m.

FOOD, COOKING AND NUTRITION - ENGAGING A WIDE AUDIENCE TO EXPLORE INTER-DISCIPLINARY SCIENCE TOPICS

Dr. Sharmistha Basu-Dutt, Dr. Victoria Geisler, University of West Georgia

Food and cooking have been a central theme in several courses developed recently at the University of West Georgia. In this presentation, the nature of the content and learning outcomes of these courses will be presented. A unique multi-tiered approach will be offered to show how this theme can be effectively used to engage audiences of all ages and capabilities to use the scientific method. Sample activities will show how to engage the young novice elementary student to explore introductory science concepts in a fun environment and challenge the college science major to design an effective experimental design to answer an open-ended research question.

Room 2908

11:30 – 11:50 a.m.

UNIVERSITY OF WEST GEORGIA INSTITUTIONAL STEM EXCELLENCE (UWISE)

Dr. S. Swamy Mruthinti, Dr. Anne Gaquere, Dr. Rebecca Harrison, Dr. Scott Sykes, Dr. Cher Hendricks, Dr. Farooq Khan, Dr. Myrna Gantner, University of West Georgia

UWise, funded by the GA BOR STEM II initiative, provides support to STEM majors through a summer bridge program, freshman learning community and freshman seminar courses. UWise also supports faculty with mini-grants for projects that focus on improving instruction and enhancing the success of students in STEM courses and involving them in faculty-directed undergraduate research. Within three years of funding, UWise has made significant progress in students' enthusiasm for STEM courses, retention and grades. We continue to modify and improve our program. An example is STEM to STEAM model, a product of interdisciplinary collaboration between English and the STEM disciplines.

Room 2901

11:30 – 11:50 a.m.

SUCCESSFUL USE OF GROUP ASSESSMENT PROCEDURES IN AN UNDERGRADUATE STEM COURSE

Dr. Kelly P Massey, Georgia College

Assessing content heavy STEM courses using a Group Assessment Procedure (GAP) can assist with cognitive domain objectives by allowing groups to rely on each other in order to recall important content as well as formulate well-rounded explanations using course content during application exercises. Presentation includes ideas on how to implement a successful GAP testing protocol.

Room 2904A

11:30 – 11:50 a.m.

BREAKTHRU: THE GEORGIA STEM ACCESSIBILITY ALLIANCE

Dr. Nathan W Moon, Mr. Christopher Langston, Mr. Robert Todd, Georgia Institute of Technology; Dr. Gerri Wolfe, Dr. Noel Gregg, University of Georgia

This presentation discusses BreakThru, a project of the Georgia STEM Accessibility Alliance (GSAA), which is an NSF-supported collaborative effort between the University of Georgia and Georgia Institute of Technology. BreakThru works with participating institutions to increase student confidence and participation in STEM classes through virtual worlds and other online platforms. BreakThru offers an environment in which students of all levels of ability can meet with mentors and receive the extra attention they need to excel in these courses.

Room 2904B

11:30 a.m. – 11:50 a.m.

ENGAGE IT AND PHYSICS STUDENTS BY DEVELOPING EDUCATIONAL VIDEOS WITH BLENDED DIGITAL MEDIA

Dr. Cuilan Wang, Dr. Qing Shao, Georgia Gwinnett College

In this presentation, we will introduce a hands-on teaching module that engages IT and Physics students by developing educational videos for science explanation. The resulting videos not only explain the abstract concepts using text, equations, diagrams, and animations, but also show the experiments that demonstrate the real-world applications of the physics concepts. Strategies for successfully implementing such as a cross-disciplinary project will be discussed. Examples of educational videos developed by students will be presented.

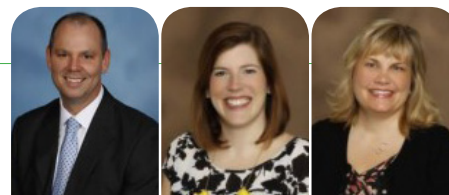
FRIDAY MARCH 7 | LUNCH - 12 - 12:30 P.M.

Room 1603

12:30 – 1:10 p.m.

**LUNCHEON KEYNOTE PANEL
CONNECTIONS: FORGING INDUSTRY AND
EDUCATION PARTNERSHIPS**

*Dr. Jeff Mathews, Principal, Peachtree Ridge HS
Mrs. Molly McAuliffe, Internship Coordinator, GSMST
Mrs. Sheila Hughes-Harmony, PhysEng Teacher, GSMST
Students via teleconference, GSMST*



KEYNOTE PANEL

This panel will discuss a successful "Partnership Program" currently active at the Gwinnett School of Mathematics, Science, and Technology (GSMST). This program partners university and industry experts with high school students to complete in-depth work assignments and projects. During this four year program, ninth graders enjoy a speaker series, sophomores experience job readiness and job shadowing, juniors are involved in a Junior Fellowship Experience, and seniors complete what is called a Senior Capstone Project. All junior and senior students participate in an internship or fellowship experience during both their junior and senior years. Many times these experiences involve internships with extensive research and industry opportunities normally reserved for graduate students. These experiences allow students to connect with a mentor who is a current practitioner in applied science, technology, mathematics, and/or engineering fields and are scalable to many school frameworks. At the conclusion of these experiences, students present to a panel of judges.

1:15 – 1:30 p.m.

CONSIDERING OUR STANDARDS: THE FOUNDATIONS OF UNDERGRADUATE STEM EDUCATION

Dr. Kamau Bobb – USG STEM Initiative Coordinator, Georgia Board of Regents

Student success in STEM fields in Georgia is directly tied to the academic standards they are held to. State-level success in STEM education requires K-12 and higher ed alignment on expectations and standards for students. Dr. Bobb will discuss the implications to higher ed of the current K-12 standards in math.



Room 1909

1:45 – 2:30 p.m.

MAKING SCIENCE MORE THAN A DISCONNECTED CONGLOMERATION OF FACTOIDS - A HANDS-ON WORKSHOP WITH ACTIVITIES YOU CAN TAKE BACK TO THE CLASSROOM

Dr. Leslie Sandra Jones, Valdosta State University

Year after year, we are directed to dutifully dump piles of information on our students to follow whatever the grade level standards happen to dictate. The problem is that there is rarely time to help students understand the coherence of scientific information. It is little wonder that students are unable to construct a conceptual framework about what science is, much less retain so much disjointed information. This session will be strictly activity-based with ideas that can be taken directly to K-12 classrooms for application.

Room 2905

1:45 – 2:30 p.m.

USING INTEGRATED SCIENCE (ISCI) COURSES TO FOSTER FUTURE ELEMENTARY TEACHERS' INTEREST IN SCIENCE: A SHARING OF PRACTICE

Dr. Christy C Visaggi, Dr. Marion Reeves, Georgia State University

ISCI 2001 and 2002 were designed to not only teach content to future elementary teachers, but model best practices in teaching science. Several models have been developed throughout the state. This is an opportunity to share with each other the various ways we implement these courses. With the advent of NGSS, the course will most probably be altered. Come share ideas on how to best prepare future elementary teachers with a conceptual overview of science content.

Room 1601

1:45 – 2:30 p.m.

GEORGIA K12 STANDARDS AND PERFORMANCE: LET THE DATA TALK

Mr. John D. Keltz, Atlanta Public Schools

Proficiency rates play a major role in school accountability and are well-publicized. However, many people have a weak understanding of the level of knowledge required for proficiency. John will use student and school-level data to help participants better understand proficiency and education performance in Georgia.



Room 2911

1:45 – 2:05 p.m.

STEMULATING THE MINDS OF YOUNGER LEARNERS

Ms. Ashley S Green, Shirley Hills Elementary School

Most STEM programs have focused on the needs of the secondary learners, however the primary students are just as engaged and eager to learn about STEM and STEM careers. In this session we will take a look at different activities that can be used to engage the minds of younger learners. We will also explore ways that students can become engaged with robots, coding, and other STEM related projects. In addition to learning about ways STEM can be implemented in schools, this session will highlight a special group of students that decided to take things into their own hands in order to begin learning about STEM.

2:10 – 2:30 p.m.

UTILIZING INTERNAL RESOURCES TO INSTITUTIONALIZE STEM

Dr. Cynthia Y. Lester, Georgia Perimeter College

The Georgia Perimeter College Office of STEM Initiatives provides college-wide leadership for all STEM-related programs and activities. However, in order for these programs to be effectively implemented, to be beneficial to participants and to be successfully sustained, coordination between academic units, student services and administrative offices must happen. The presentation will discuss effective strategies for implementation and will present the internal resources and support utilized in institutionalizing GPC's STEM programs.

Room 2903

1:45 – 2:30 p.m.

CREATING EFFECTIVE 21ST CENTURY STEM EDUCATORS THROUGH PERSONAL RESEARCH EXPERIENCES

Dr. Mare Timmons, Mary Sweeney-Reeves, University of Georgia Marine Extension

This session will present seventeen years of teacher training program ideas and discuss information to develop, implement, and evaluate teacher research efforts. Conducting simple but scientifically relevant experiments allows teachers to problem solve and develop confidence in making predictions and clear scientific arguments. The presenters will walk the audience through the workshop, allowing them to see how teachers collected and analyzed data and made presentations and produced short scientific peer reviewed papers.

Room 2908

1:45 – 2:30 p.m.

WORKSHEETS DON'T GROW DENDRITES: 20 INSTRUCTIONAL STRATEGIES THAT ENGAGE THE BRAIN

Dr. Pamela A. Bouie, Developing Minds, Inc.

Have you ever wondered why some students cannot understand or recall important content after a 24-hour period? If your students are not learning the way you are teaching them, then you must teach them the way they learn! Experience instructional strategies (based on brain research and learning style theory) that maximize memory and minimize forgetting. Increase learning for all students when strategies like drawing, metaphor, movement, music, and storytelling are used to teach curriculum objectives and meet international standards. Ensure that brains retain key concepts, not only for tests, but for life! This session has been called both professionally and personally life-changing and lots of fun!

Room 2901

1:45 – 2:30 p.m.

WEANING STUDENTS AWAY FROM DEPENDING WHOLLY ON FORMULAS TO SOLVE MATH PROBLEMS, USING OPEN ENDED PROBLEMS

Dr. Ramakrishnan Menon, Georgia Gwinnett College

Many under prepared undergraduates depend on memorized formulas to solve problems, and believe there is only one correct answer to a math problem. So, when they cannot get the correct answer by applying formulas, they get discouraged. We discuss examples of open ended problems that encourage mathematical thinking, and wean students away from depending wholly on formulas.

Room 2904A

1:45 – 2:30 p.m.

WALKING WITH TECHNOLOGY THROUGH GENERAL AND ORGANIC CHEMISTRY: REFLECTIONS FROM THE JOURNEY

Dr. Mai Yin Tsoi, Georgia Gwinnett College

Chemistry has historically been seen as one of the “gate-keepers” of STEM majors. Both General Chemistry and Organic Chemistry encompass a wide range of topics, learning skills, and spatial thinking. With the increasing use of technology in education, educators have touted computers and mobile devices as the newest “silver bullet” for lagging engagement. This presentation attempts to chronicle our institution’s “journey” through this new territory and report our findings on the efficacy (or lack of) of several technology interventions implemented in General and Organic Chemistry, including mobile clickers, electronic flashcards, mobile app development, and lecture videos. As a nature walk can often have highs and lows, we believe our journey can also be described as such but with meaningful observations along the way that can inform our path direction(s) in the future as we attempt to continue increasing persistence of students in STEM fields.

Co-authors: Dave Pursell, Sonal Dekhane, Richard Pennington, Julia Paredes.

Room 2904B

1:45 – 2:05 p.m.

REAL STEM: SCIENTIFIC RESEARCH FOR RURAL GEORGIA HIGH SCHOOL STUDENTS

Mrs. Deborah M Walker, Dr. Robert Mayes, Ms. Raushanah Oglesby, Georgia Southern University; Mr. Rich McCombs, Statesboro High School

This is the story of creating a STEM research experience for students through a partnership between research institutes, University Faculty and high school teachers. The story of Real STEM will include a discussion of how the grant work is structured, barriers to implementation and successes that spur us on to continue to bring STEM experiences to rural, southeast Georgia.

2:10 – 2:30 p.m.

COMPLEX ADAPTIVE SYSTEMS AND QUANTITATIVE REASONING IN AN INTERDISCIPLINARY STEM MATHEMATICS CLASSROOM

Dr. Robert Mayes, Dr. Kania Greer, Georgia Southern University

In this presentation we will share outcomes from the Real STEM project, which provides professional development for rural teachers in the Georgia Coastal Plains supporting implementation of interdisciplinary STEM courses as well as STEM modules in mathematics and science courses. Real STEM includes a number of innovative student-active strategies for teaching including: Understanding by Design (UbD) approaches to teaching for understanding, problem-based learning (PBL), place-based education (PBE), complex adaptive systems (CAS) thinking, and quantitative reasoning (QR). QR is the mathematical underpinning of the projects. The projects are ongoing so we will report our results on impact on teacher practice and student learning to this point. We will conclude with a discussion of how the projects may address issues of engagement for rural, low socio-economic status student populations in STEM in Central America and the Caribbean.

Room 2905

2:45 – 3:30 p.m.

INQUIRY-BASED ACTIVITIES FOR LIFE AND EARTH SCIENCE COURSE FOR PRE-EARLY CHILDHOOD EDUCATION MAJORS

Dr. Christine Mutiti, Dr. Lyndall Muschell, Dr. Sam Mutiti, Georgia College

A presentation of the outcome of the first of two phases of incorporating inquiry-based activities into a science content course for pre-early childhood majors and how this has improved student learning and knowledge retention.

Room 1601

2:45 – 3:30 p.m.

THERE IS MUCH MORE TO TEACHING EVOLUTION THAN JUST PRESENTING THE BIOLOGICAL SCIENCE

Dr. Leslie Sandra Jones, Valdosta State University

Students with strong religious worldviews are likely to have serious reservations about the theory of evolution. While it is not appropriate to teach religion such as creation science or intelligent design in the science classroom, there is nothing wrong with explaining why religious and scientific explanations are incongruent. It is most important to explain that the evolution/creationism controversy is a social issue. Students should be told that science does not deny God or attack scripture, if they are concerned about this. Evolution is not a matter of belief; we accept the theory as an explanation of the history of life.

Room 2911

2:45 – 3:30 p.m.

UPDATES FROM AND LESSONS LEARNED IN DELIVERING A SERVICE LEARNING COURSE TO ENHANCE ELEMENTARY STEM EDUCATION IN GWINNETT COUNTY

Dr. Clay Runck, Dr. Judy Awong-Taylor, Dr. Allison D’Costa, Dr. Bernadette Peiffer, Georgia Gwinnett College; Dr. Melissa Kinard, Gwinnett County Public Schools

Georgia Gwinnett College’s (GGC) School of Science and Technology (SST) is continuing a science investigation partnership with a local elementary school. College interns use hands-on investigations to help 5th grade students solve a science mystery. Updates on progress since last year’s presentation, including the design and delivery of a new science mystery involving elementary chemistry and physical science, as well as program modification based on participant feedback will be presented.

Room 2903

2:45 – 3:05 p.m.

SIGNATURE RESEARCH EXPERIENCES FOR STEM UNDERGRADUATES

Dr. Dabney W. Dixon, Dr. Paul Ulrich, Dr. Gigi Ray, Georgia State University

We are developing Signature Research Experiences at Georgia State University to help students establish critical thinking and technical skills. Fewer than 9% of STEM majors at Georgia Southern University engage in research each year. We seek to broaden exposure via cooperative, team-based projects. Our model for scaling up research experiences to our large student body taps leadership by all the faculty, but particularly non-tenure track faculty. Examples of specific projects and an analysis of student perceptions will be presented.

Room 2903

3:10 – 3:30 p.m.

COMMUNITY MAPPING FOR PLACE-BASED LEARNING AND EXPLORATION WITH THE GEORGIA GEOGRAPHIC ALLIANCE

Ms. Amber J. Boll, Dr. Timothy L. Hawthorne, Dr. Christy C. Visaggi, Georgia State University

Community geography and community mapping both place explicit emphasis on identifying the spatial thinking and local knowledge that emerge from neighborhood residents' experiences and seeks to affect positive community change in a variety of ways. As a research and educational framework dedicated to community-engaged scholarship and citizen science, the approaches hold promise for developing a more inclusive and societal relevant curriculum focused on place-based learning. In this hands-on workshop, we discuss a set of community geography, mapping and GIS tools sponsored by the Georgia Geographic Alliance as a way to broaden participation of teachers, youth, and under-represented groups in geographic research and education and to increase spatial knowledge production in local neighborhoods. The hands-on workshop focuses specifically on the development and implementation of a participatory smart phone mapping application to engage community members in explorations of their communities.

Room 2908

2:45 – 3:05 p.m.

A DISCUSSION OF A FLIPPED CLASSROOM MODEL (FOR CALCULUS), AND OF THE USE OF SELF-GRADED HOMEWORK.

Dr. Frédéric Mynard, Georgia Southern University

The intent is to share my experience with a flipped Calculus course using resources I have developed: instructional videos, e-books, and a comprehensive set of resources for self-graded homework. I have also used this technique successfully for other non-flipped courses, and this may be of interest whether one wants to flip the classroom or not.

3:10 – 3:30 p.m.

ADAPTIVE TEACHING: AN EFFECTIVE APPROACH FOR LEARNER-CENTRIC CLASSROOMS

Dr. Rami J. Haddad, Georgia Southern University

The difference in the students' level of achievement in any specific course is mainly due to the difference in the students' aptitude for learning "Learning Style". Unfortunately, the static traditional teaching style "Chalk-&-Talk" which is still being used does not adapt to the changes in the cognitive profile of the student cohorts. This reflects negatively on the students' achievement and performance. Therefore, we propose the concept of adaptive teaching as an effective approach to the next generation learner-centric classrooms.

Room 2901

2:45 – 3:05 p.m.

THE TUTORING PROGRAM IN COMPUTER SCIENCE

Dr. Gita C Phelps, Dr. Yi Liu, Georgia College

Computer science programs have a retention problem in the entry-level courses national-wide. We will discuss the effect the peer tutoring program has had for students taking the entry-level computer science courses. We believe the tutoring program strengthens CS majors both in number and in knowledge learned and support non-science students taking CSCI 1301 and CSCI 1302 to fulfill core requirements.

3:10 – 3:30 p.m.

MATH 1113 PRECALCULUS EMPORIUM: A MULTI-INSTITUTIONAL ONLINE PRE-CALCULUS COURSE

Dr. Kris Biesinger, Dr. Chuck Kutal, University of Georgia; Dr. Nathan Moon, Georgia Institute of Technology

One stumbling block for students considering becoming a STEM major has been introductory math courses. A new, innovative precalculus course being developed and delivered by five USG institutions may provide a solution. MATH 1113e Precalculus Emporium combines lessons learned from the Math Emporium model pioneered at Virginia Tech with elements of MOOC delivery to create a highly interactive and support rich online course model. While the pilot debuted in January 2014 with students and faculty from five institutions, the larger vision is for the course to become available for all USG institutions in the near future.

Room 2904A

2:45 – 3:30 p.m.

A SPREADSHEET-BASED MANIPULATIVE TO SUPPORT TEACHING CONVOLUTION

Dr. Jim Rowan, Georgia Gwinnett College

Blurring an image is fairly common but the question is, how does one blur a digital picture? The simple answer is to apply a blur filter... but how does that blur filter blur a picture that is stored as numbers? If it were a physical charcoal drawing the artist would smear the charcoal out with his finger to transform a sharp, dark line into a wider, lighter gray line but your camera produces images that are collections of numbers. How does that work?

Convolution calculations underlie many of the filters found in bitmapped image processing programs like GIMP and Photoshop. In Georgia Gwinnett College's Digital Media class we "peek under the covers" to see how things work because we believe that knowing a little about what is going on helps dispel the idea that it is all magic performed by wizards. In the process of doing that the hope is to empower the student by demonstrating that he can understand what is going on and is not simply a slave to the gods of computing. One of the "under the cover peeks" we take is to look at these convolution calculations and how they cause digital images to blur. Having developed a "tool" based on a spreadsheet, students can manipulate the convolution kernel directly resulting in a statistically significant improvement in their performance on convolution questions.

Room 2904B

2:45 – 3:30 p.m.

"WHEN SCIENTISTS LOOK AT THEIR DATA, THEY DON'T KNOW THE ANSWER:" TALKING SCIENCE IN A UNIVERSITY INTRODUCTORY SCIENCE COURSE

Dr. Victoria M Deneroff, Dr. Rosalie Richards, Georgia College; Ms. Markeeta Clayton, Oak Hill Middle School

We use conversation for instruction in our introductory level physical science course. The content focuses on science as a way of knowing, particularly the ways in which scientific claims are backed by evidence. We find our 21st Century students do understand consensus building and have some skill in listening to each other's ideas, and are learning to harness these strengths for instruction.

PROJECT SENSE: SCIENCE EDUCATION NETWORK FOR THE SOUTH EAST AT THE GEORGIA SOUTHERN MUSEUM*Ms. Ruby Ashley, Georgia Southern University*

Project SENSE has touched the lives of over 80,000 students since its inception in 1989 with the philosophy of “hands-on, minds-on science.” Science content and pedagogy are supported concurrently, through summer workshops and distribution of classroom activity kits. Over 400 different activity kits and exhibits are available for teachers to use in their classrooms. Lesson plans are correlated to national and state standards. All consumable materials to perform the experiments are included in the kits. Kits are delivered/picked-up directly to/from the classroom and a full year of curriculum may be ordered at the beginning of the school year.

INCORPORATING SMALL-GROUP ACTIVE-LEARNING MODULE ACTIVITIES TO ENHANCE STUDENT ACHIEVEMENT IN A GENERAL EDUCATION GEOLOGY COURSE*Dr. Christopher A. Berg, University of West Georgia*

Knowledge of geologic principles and their impacts on society is critical, yet many students have limited familiarity with scientific processes in general. To provide students more hands-on experience and help student performance, a series of active-learning modules is being implemented in an introductory physical geology course taught at UWG. These activities provide opportunities for non-science majors to be exposed to course topics via techniques and approaches not available in a traditional classroom or typical lab classroom setting.

CENTER FOR WILDLIFE EDUCATION AT GEORGIA SOUTHERN UNIVERSITY*Ms. Casey Corbett, Georgia Southern University*

The Center for Wildlife Education and The Lamar Q Ball, Jr. Raptor Center strives to provide quality environmental education for visitors of all ages. The Center exists to support Georgia Southern University in its environmental education programs, as well as to provide wildlife encounters for the school children and citizens of this region. All species of native Georgia fauna are within the scope of the Center’s endeavors. The critical role of humans in the environment is the unifying theme for its programs. All of our programs do reflect the Georgia Performance Standards (GPS) for each grade level. The Common Core GPS has also been included for math. Specific or a combination of modules can be selected for your field trip.

INQUIRY ACTIVITIES FOR A LEARNER – CENTERED GENETICS COURSE*Dr. Michael L. Gleason, Dr. Ellen France, Dr. Kasey Karen, Georgia College*

This is a preliminary report on a 2013/14 funded mini-STEM grant initiative that was undertaken at Georgia College. The main goal is to improve student learning in genetics, a four-credit course taken early in the biology major; this course includes a two-hour weekly lab. We will report on our progress toward a backward design from learning objectives to an evaluated redesign of labs and related lecture-based activities and present some preliminary assessment data from the fall semester.

CLAY MODELING OF THE MUSCULOSKELETAL SYSTEM: DOES ACTIVE LEARNING INCREASE RETENTION AND COMPREHENSION*Dr. Kelly Massey, Georgia College*

The focus of a Structural Kinesiology course is a detailed study into the musculoskeletal system and joint action. The course contains a lot of memorization: skeletal muscle origin, insertions, innervations and muscle/joint actions but there is also an applied component for the content. Group study has been incorporated into the course to increase knowledge retention and comprehension however group interaction has been seen to be minimal. Two studies have looked at group construction of skeletal muscle models using clay during class time in assisting with the active learning of muscle origin, insertion and actions (Cruz-Espallat et al., 2010 & Waters et al., 2011). Both of these studies had good end results. Adding this active learning instructional method into the course could be beneficial in examining the issue of how active group interaction and group discussion of the material can assist in each student’s individual attainment and understanding of the course material. The goal of this study is to have each student in each group participate in the creation of clay skeletal muscles for every muscle in the human body. Objectives include each student successfully identifying origins, insertions, innervations and actions of every muscle at each joint during both group assessment as well as individual testing.

UNIVERSITY OF WEST GEORGIA INSTITUTIONAL STEM EXCELLENCE (UWISE)*Dr. S. Swamy Mruthinti, Dr. Anne Gaquere, Dr. Rebecca Harrison, Dr. Scott Sykes, Dr. Cher Hendricks, Dr. Farooq Khan, Dr. Myrna Gantner, University of West Georgia*

UWise, funded by the GA BOR STEM II initiative, provides support to STEM majors through a summer bridge program, freshman learning community and freshman seminar courses. UWise also supports faculty with mini-grants for projects that focus on improving instruction and enhancing the success of students in STEM courses and involving them in faculty-directed undergraduate research. Within three years of funding, UWise has made significant progress in students’ enthusiasm for STEM courses, retention and grades. We continue to modify and improve our program. An example is STEM to STEAM model, a product of interdisciplinary collaboration between English and the STEM disciplines.

OUTGROWTHS OF USG STEM INITIATIVES: SERVICE LEARNING COURSES AND A STEM HONORS CAMP*Dr. Tim Howard, Dr. Kimberly Shaw, Dr. Cindy Ticknor, Columbus State University*

We examine two programs that have developed out of USG STEM Initiative projects. With the first STEM Initiative, Columbus State University initiated an Academy of Future Teachers that has led to an expanded STEM Honors Camp for recruiting university students into high school teaching and heightening high school students’ interests in STEM careers. With STEM Initiative II, Columbus State launched a Project FOCUS replication that contributed to the establishment of the UTeach Columbus program for preparing high school STEM teachers.

ASSESSING A “MAIL MAN” ANALOGY TO UNDERSTAND NOMENCLATURE TOPIC IN ORGANIC CHEMISTRY COURSE

Ms. Shannon Rhodes, Dr. Shainaz Landge, Dr. Diana Sturges, Dr. Trent Maurer, Georgia Southern University

The present study will share the findings of the semester I of a two-semester project evaluating the effects of a “Mail Man” analogy on student learning and perceptions in the teaching of a nomenclature (naming organic compounds) topic in an organic chemistry I course. Two sections of an organic chemistry I course were targeted for the fall semester in which the short and long term effects of student learning were assessed. Pre-test/post-test, exam 1 and final exam data were analyzed to examine gains in student learning. One section served as a control group and was presented with a lecture, whereas the study group learned about the nomenclature topic through a “Mail Man” visual analogy. An additional survey on student perceptions was administered to both sections after teaching the nomenclature topic. The initial results indicate that both groups improved significantly from pretest to post-test, but there was no significant difference between the groups on the post-test, exam I and student perceptions on the survey. The long term effects of the analogy will be analyzed after the final exam data is processed.

STEM II @ GEORGIA COLLEGE: BUILDING CAPACITY

Dr. Rosalie A. Richards, Dr. Charles Martin, Dr. J. Ryan Brown, Georgia College

At Georgia College, implementation of the USG STEM II Initiative is flourishing, multi-faceted, and built on a rich tradition of excellence in scholarship, teaching, and outreach. The GC STEM Initiative offers faculty opportunities to engage in a vibrant culture that values the scholarship of STEM teaching and learning. Similarly, students are deeply engaged in peer-facilitated supplemental instruction for hundreds of students in entry-level STEM courses or in K12 STEM teacher support in regional classrooms. Between 2007 and 2013, Georgia College observed significant increases in STEM/STEM Education majors and in STEM/STEM education degrees conferred. STEM II at Georgia College has not only made a positive impact on student performance and retention but also has helped support an environment that fosters creativity and innovation as well as institutional, statewide and national recognition of STEM-related work. *Supported by USG STEM Initiative.*

DEVELOPING CREATIVE LABORATORY SKILLS THROUGH STUDENT SELF-DEVELOPED ACTIVITIES

Dr. Qing Shao, Dr. Joseph Ametepe, Georgia Gwinnett College

In this research project, students are required to self-develop activities for formulating protocols of collecting data, analyzing, and making conclusions and writing formal lab reports for a semester long series of realistic physics problems. The purpose is to train students in being able to be creative, critical, and trouble shoot simple problems during experimentation. Students’ performances are assessed by pre-and post- surveys as well as carefully developed rubrics based on scientific research and reporting standards.

IMPLEMENTING DESIGN-BASED LEARNING TO IMPROVE LEARNING OUTCOMES

Dr. Joycelyn L. Streater, Georgia Gwinnett College

This research explores use of Design-Based Learning as a means of improving knowledge of the design process, design outcomes, and student motivation. Though the findings are preliminary, they provide a significant contribution to the current understanding on pedagogical approaches for motivating students and improving learning outcomes. Design-based learning engages students in design activities that reflect authentic contexts and guide students through generating specifications, outcome prediction, artifact creation, evaluation and communication. As students step through iterations of each stage they develop reasoning and critical thinking skills needed to address open-ended design challenges in the real world. The results show that the design process knowledge is significantly correlated with design outcomes indicated as peer design rating and peer usability rating. The study also finds that using Design-Based Learning pedagogical approach has the potential to increase students’ understanding of the design process through engaging in active and authentic learning projects.

CREATING EFFECTIVE 21ST CENTURY STEM EDUCATORS THROUGH PERSONAL RESEARCH EXPERIENCES

Dr. Mare Timmons, Mary Sweeney-Reeves, University of Georgia Marine Extension

This session will present seventeen years of teacher training program ideas and discuss information to develop, implement, and evaluate teacher research efforts. Conducting simple but scientifically relevant experiments allows teachers to problem solve and develop confidence in making predictions and clear scientific arguments. The presenters will walk the audience through the workshop, allowing them to see how teachers collected and analyzed data and made presentations and produced short scientific peer reviewed papers.

THE GEORGIA GEOGRAPHIC ALLIANCE: CONNECTING GEORGIA TEACHERS, STUDENTS AND COMMUNITIES IN NEW PLACES

Dr. Christy Visaggi, Amber Boll, Dr. Timothy L. Hawthorne, Georgia State University

The Georgia Geographic Alliance (GGA) is a non-profit organization of individuals who believe that geographic knowledge is essential to the success of our state and nation. Our mission is to enhance geographic education and research through the development and promotion of place-based learning opportunities for Georgia K-12 teachers and students across all disciplines especially in Science, Technology, Engineering, and Math (STEM) fields. With this mission, the GGA seeks to ensure that Georgia students, teachers, and community members are global thinkers, geographically-minded problem solvers, and internationally competitive workers. In this poster, we will introduce GA STEM teachers and supporters to the opportunities available to them through The Georgia Geographic Alliance sponsored by the National Geographic Education Foundation.

REAL STEM: SCIENTIFIC RESEARCH FOR RURAL GEORGIA STUDENTS

Mrs. Deborah M Walker, Dr. Robert Mayes, Ms. Raushanah Oglesby, Georgia Southern University

This poster will tell the story of creating a STEM research experience for students through a partnership between research institutes, University Faculty and high school teachers. The poster will provide a visual showing how the grant work was structured, barriers to implementation and successes that spur us on to continue to bring STEM experiences to rural, southeast Georgia.

ASSESSING THE EFFECTS OF A TEACHING COURSE ON BIOLOGY GRADUATE STUDENT TEACHING ASSISTANTS

Dr. Caralyn B. Zehnder, Georgia College

Research was conducted to measure changes in knowledge and perceptions of teaching and learning by biology graduate students enrolled in a Teaching Techniques course at Georgia College. Results show that graduate students exhibited gains in their knowledge of assessment and active learning pedagogies and saw some changes in how they viewed the role of the teacher in the classroom. This research demonstrates that a semester-long teaching course affects graduate students learning and attitudes toward teaching.

TRIG-STAR

James M. Anderson, Immediate Past President - Surveying and Mapping Society of Georgia, Georgia State Trig-Star Coordinator - National Society of Professional Surveyors

A TRIG-STAR is a mathematics student who has demonstrated in competition that they are the most skilled among classmates in the practical application of trigonometry. The competition for the honor is a timed exercise which is the solving of a trigonometry problem that incorporates the use of right triangle formulas, circle formulas, the law of sines, and the law of cosines. The contest helps to promote careers in surveying and mapping to students at the high schools across the country. The award is sponsored by the National Society of Professional Surveyors and cosponsored locally. State winners also have the opportunity to participate in the National TRIG-STAR competition for awards. Visit the Trig-Star website at www.trig-star.info.

ADVENTURES IN SCIENCE, TEACHING, EXPLORATION AND RESOURCEFUL STEWARDSHIP AT THE GARDEN OF THE COASTAL PLAIN AT GSU

Ms. Carolyn Altman, Ms. Kathy Tucker, Georgia Southern University

ASTERS is an extremely successful teacher training program conducted by Garden of the Coastal Plain at Georgia Southern University and the Georgia Southern University Departments of Biology and Education in cooperation with school districts in our rural area. ASTERS provides K-5 teachers with information about plant biology and ecology and shares effective inquiry-based hands-on ways to teach these concepts. This project improves botanical and ecological understanding and aids teacher efforts to meet Common Core/Georgia Performance Standards (GPS) by providing grade-specific CC/GPS aligned units and the materials needed to implement the inquiry based hands-on activities; improves teacher content knowledge and teaching strategies by offering two workshops (K-2, 3-5; 3 PLU each); increases teacher skill and confidence in inquiry-based teaching by providing support, practice and feedback on projects generated in the field; and provides ongoing content and teaching expertise for each unit. Thousands of school children have learned at the Garden through ASTERS, and ASTERS has been extremely effective at meeting teacher training needs; measures of content proficiency show a 40%-60% improvement in content learning, and participant teachers give the training the highest possible scores in improving their content knowledge and helping them implement hands-on learning and meeting GPS.

DETECTION OF GENETICALLY-MODIFIED FOODS VIA PCR, WESTERN BLOT AND ELISA ANALYSES: AN UNDERGRADUATE BIOTECHNOLOGICAL LABORATORY TECHNIQUES COURSE

Dr. Cindy Achat-Mendes, Dr. Jennifer Hurst-Kennedy, Dr. Robert Haining, Georgia Gwinnett College

Georgia Gwinnett College's 4-year Undergraduate Research Experience (URE) aims to give STEM students the opportunity to conduct course-embedded research at every stage in their undergraduate careers. As part of the 4-year URE, Biotechnology Laboratory, a senior-level course that focuses on molecular biology laboratory techniques applied in the field of Biotechnology, has been redesigned to include an inquiry-based project investigating genetically-modified (GM) foods. To reinforce the central dogma of Biology, students tested for genetic modification at both the gene and protein levels. Each student group designed experiments to analyze foods at the DNA level using DNA gel electrophoresis and PCR and at the protein level using ELISA, SDS PAGE, and immunoblotting. These experiments tested for the presence of GM food markers, including *Bacillus thuringiensis* crystal proteins and the 35S cauliflower mosaic virus promoter. Students were especially invested in the research experience since foods originated from their local environment including nearby grocery stores, farmers' markets, vending machines, and campus cafeterias. In addition to biotech skills, students were trained in general laboratory skills e.g. maintenance of lab notebooks and preparation of lab reports. Gains in student learning were assessed using pre- and post-content quizzes. Additionally, attitudinal surveys were administered to gauge student perspectives on scientific research and interest in graduate and professional school. Students have responded favorably to the new lab module, reporting that designing their own experiments gave them more ownership of their work. Overall, this project provided students the opportunity to conduct authentic biotechnological research, to learn laboratory techniques necessary for investigation at the DNA and protein level, and to become more informed participants in the global debate over the use of GM foods.

COURSE-EMBEDDED RESEARCH AND SERVICE LEARNING INTERNSHIPS-GGC'S HIGH IMPACT PRACTICES FOR ENHANCING STUDENT ENGAGEMENT AND LEARNING IN STEM FIELDS - AN UPDATE

Dr. Clay Runck, Dr. Judy Awong-Taylor, Dr. Allison D'Costa, Dr. Greta Giles, Dr. Thomas Mundie, Dr. David Pursell, Dr. Tirza Leader, Georgia Gwinnett College

GGC's STEM Initiative includes a 4-year undergraduate research experience (4-yr URE) initiative designed to promote the success of students in STEM education, and a Service Learning Internship course designed to provide opportunities for STEM undergraduate students to gain teaching experience in science at the K-5 level. We will describe components of our STEM Initiative and progress made to date.