Program Book for JSEHS
January 2012

Biomedical Explorations: Bench to Bedside

UNIVERSITY OF FLORIDA
CENTER FOR PRECOLLEGIATE EDUCATION AND TRAINING

BIOMEDICAL EXPLORATIONS:
Bench to Bedside
UNIVERSITY of FLORIDA
The 49th Annual
Junior Science, Engineering and Humanities Symposium

University of Florida
Center for Precollegiate Education and Training
January 29 – 31, 2012

The United States Army Research Office

Office of Naval Research

Air Force Office of Scientific Research

Academy of Applied Science
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Welcome to JSEHS!

We are so excited to have the opportunity to work with fantastic high school science teachers from across the state of Florida in this partnership. We hope that you gain many new experiences during your time at the University and will translate the current research into your classroom curriculum.

As partners, your feedback is absolutely essential. The program will continue to grow with a new cohort of teachers next year, and we hope to improve the program each time. Your comments will help make that happen.

We’re looking forward to our time together over the next few days, hearing about the progress that everyone has made to educate their students and colleagues about clinical/translational research. We’re also excited to work with you all over the coming months to complete your Action Proposals and utilize the diverse resources available through CPET and the University of Florida.

Go Gators!
JSEHS General Schedule

Sunday, January 29, 2012
3:00 PM - 5:00 PM............................... Hotel and Program Registration
                   Cabot Lodge Meeting Room 2
5:30 PM - 7:00 PM............................... Student Pizza Social with SSTP and ScienceQuest
                   Summer Program Counselors and Alumni
                   HPNP Gallery
5:30 PM - 7:00 PM............................... Teacher Gathering
7:00 PM - 8:30 PM............................... Opening Ceremony / Research Panel Presentation
                   HPNP Auditorium
8:30 PM - 9:15 PM............................... Student Speaker Introductions
9:15 PM - 9:30 PM............................... Symposium Orientation
10:00 PM - 11:00 PM............................. 11th and 12th Grade Speaker Meeting
                   Cabot Lodge Meeting Room 2

Monday, January 30, 2012
6:30 AM - 7:30 AM............................... Continental Breakfast at Hotel
7:30 AM - 8:15 AM............................... Transportation to Reitz Union at the University of Florida
8:15 AM - 9:00 AM............................... Poster Session Set-up
                   JWRU 2nd Floor East and West Gallery
9:00 AM - 7:00 PM............................... Poster Session
                   JWRU 2nd Floor East and West Gallery
9:30 AM - 10:00 AM............................... Lab Visit I
10:30 AM - 11:00 AM............................... Lab Visit II
11:30 AM - 12:00 PM........................... Lab Visit III
12:00 PM - 1:30 PM............................... Lunch in Rion Ballroom
12:00 PM - 1:30 PM............................... UF Colleges, Depts, and Pre-professional Organizations Fair
1:45 PM - 3:45 PM............................... 9th and 10th Grade Speaker Presentations in Reitz Union
3:45 PM - 5:45 PM............................... Free Time
6:00 PM - 7:00 PM............................... Poster Presentations
JWRU 2nd Floor East and West Gallery

7:00 PM - 8:00 PM................................. Banquet in Rion Ballroom
8:00 PM - 8:30 PM................................. Humanities Presentation in Rion Ballroom
9:00 PM - 11:00 PM................................. Student Mixer/Dance in Rion Ballroom

Tuesday, January 31, 2012

6:30 AM - 7:30 AM................................. Continental Breakfast at Hotel and Hotel Check-Out
7:30 AM - 8:15 AM................................. Transportation to Reitz Union at the University of Florida
9:00 AM - 10:00 AM................................. Student Speaker Session I
10:15 AM - 11:15 AM................................. Student Speaker Session II
11:40 AM - 12:40 PM................................. Science Presentation in Reitz Union Auditorium
1:00 PM - 2:00 PM................................. Lunch and Awards Presentation in Rion Ballroom
Schedule of Teacher Events

Sunday, January 29, 2012 – ICORE and Bench to Bedside
3:00 – 5:00pm Check-in for JSEHS at Cabot Lodge
5:30 – 6:45pm Summer Institutes Reunion Dinner Location: Biomedical Science Building Atrium
7:00 – 9:30pm JSEHS Opening Ceremony Location: HPNP Auditorium

Monday, January 30, 2012 – ICORE
8:30 – 9:00am ICORE Presentation set-up; coffee available Location: Room 346, Reitz Union
9:00 – 11:30am ICORE Teacher Presentations Location: Room 346, Reitz Union
11:30 – 12:30pm Lunch (Box lunches available) Location: Rion Ballroom
12:30 – 1:30pm Curriculum Review / Field test opportunities Location: Room 346, Reitz Union
2:00 – 4:00pm ICORE Teacher Presentations Location: Room 346, Reitz Union
4:00 – 5:00pm ICORE Program Discussion Location: Room 346, Reitz Union Action Proposal Implementation Reports Reflections on Program

Monday, January 30, 2012 – Bench to Bedside 8:30 – 9:00am Bench Presentation set-up; coffee available Location: Room 347, Reitz Union
9:00 – 11:30am Bench Teacher Presentations Location: Room 347, Reitz Union
11:30 – 12:30pm Lunch (Box lunches available) Location: Rion Ballroom
12:30 – 1:30pm Curriculum Review / Field test opportunities Location: Room 347, Reitz Union
2:00 – 4:00pm Bench Teacher Presentations Location: Room 347, Reitz Union
4:00 – 5:00pm Bench to Bedside Program Discussion Location: Room 347, Reitz Union Action Research Implementation Reports – Drs. Barnes Reflections on Program Evaluation Follow-up – Drs. Cooper and Barnes

Rejoin JSEHS scheduled events Monday evening and Tuesday
2011 PARTICIPANT INFORMATION

Ms. Jane Beebe
Forest High School
Marion
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AP Biology, Hon Biology (9-12)

Mr. Jonathan Benskin
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AP Biology (10-12)

Ms. Jody Bertram
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Biology, Physical Science (9)

Mr. Brandon Boswell
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AP Biology (10-12)

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Physical Science, Biology, Chemistry, Home-bound Chemistry, Content Area Reading (9-12)

Ms. Susan Chabot
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Biotechnology I,II,III, Hon Chemistry (9-12)

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Pre-IB Physics, Hon Physics 1, IB Physics 2, IB Physics 3 (10-12)

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Hon Biology, AP Biology AP Environmental Sci

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Biology, Physical Sci, Earth Sci, (9-12)
PARTICIPANT BIOGRAPHICAL SKETCHES AND PROJECT INFORMATION

Ms. Jane Beebe, Forest High School

Biographical Sketch: My name is Jane Beebe. I was born in Meridian Mississippi. I moved to Florida at the age of 12 and graduated from Umatilla High School. I received my B.S. in Medical Technology from Stetson University and worked as a medical technologist focusing on clinical microbiology and blood banking. This was a career that I loved, but I had always wanted to try teaching, so around 1984 I got my teaching certification. I enjoy teaching AP Biology and Honors Biology at this time.

*Project Title: The Effects of Adding Biotechnology Simulations and Labs to Traditional Molecular Genetics Instruction on the Knowledge and Attitudes of AP Biology Students

Abstract: The purpose of my action research was to evaluate the effects of adding biotechnology simulations and labs to traditional molecular genetics instruction on the knowledge and attitudes of AP Biology students. I used 2 virtual simulations-Click and Clone and Virtual PCR; one hands-on simulation-Science Take Out Stem Cell Activity; and 2 labs-AP Biology Lab 6 and Alu-PV92 PCR lab. I added these to my traditional method of instruction using lecture and study guides (AP Lab 6 is also traditionally used). My data clearly shows that the students’ knowledge of molecular genetics increased as measure with a pre and post test. Some questions were on material that was covered with the additional activities and some were on material that was covered by lecture and study guides alone. There was also a difference there as the students show more gains on the questions associated with the activities. My AP Biology students had generally positive attitudes both before and after instruction. In conclusion, using biotechnology simulations and labs increase knowledge over traditional instruction on molecular genetics topics. Attitudes were generally positive both before and after instruction.

Mr. Jonathan Benskin, Boca Raton Community High School

Biographical Sketch: Although I am originally from Ohio, I moved to Florida in 2002 in order to go to school. After school I decided to stay in the area and have been teaching at Boca Raton Community High School for the last 5 years. Currently, I teach Advanced Placement Biology, but have taught all levels of biology and marine science. Additionally, I am heavily involved with Science Olympiad and help coach the weightlifting team here at the school. Last year I participated in ICORE at UF and truly enjoyed the experience and look forward to Bench to Bedside!

*Project Title: A study of the impact of a hands-on approach to teaching protein research and structure on Advanced Placement Biology students’ knowledge and attitudes

Abstract: Students struggle grasping the structural complexity of proteins through lecture alone. This action research project will use a pre/post-test and knowledge assessment to see if using virtual manipulation, real-life modeling/protein crystallization, and clinical implication research can have positive effects on Advanced Placement (AP) Biology student performance and attitude towards the subject.

Ms. Jody Bertram, JW Mitchell High School

Biographical Sketch: I grew up in rural Pennsylvania, one of four children. I attended college at the University of Pittsburgh, earning a degree in Biology and then St. Francis University to earn my teaching certification and Masters in Education. I taught two years in Maryland and then moved to Florida where I have been teaching at J.W. Mitchell High since 2003. More recently I attended USF to get certified in Ed leadership. I have one son who will be off to college this fall at USF.
*Project Title:* The Effect of Applying Biotechnology Skills Through Case-Study Learning on Increasing Biology Student’s Knowledge, Attitudes and Interest Related to Biotechnology Fields

**Abstract:** The purpose of this research is to examine the role case studies play in increasing student interest in the field of Biotechnology. Biotechnology skills will be applied to real-world problems to allow students to make connections to realistic situations with the intention of increasing their interest toward biotechnology careers and science in general. The study introduces each unit with a case study, solved as the students learn more about the subject. Each unit then culminates with a spotlight on a career. Data collection involves an initial and final interest and awareness survey as well as several formative and summative assessments to measure the effectiveness of the curriculum, change in attitude and awareness of career pathways. The majority of the research and collection of data will be done during the Classic Genetics and Cell Reproduction & Protein Synthesis Units of Biology, which are taught during the months of January and February.

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**Mr. Brandon Boswell, Cypress Bay High School**

**Biographical Sketch:** In 2007, Mr. Brandon Boswell followed one of his college roommates to a teaching position at Cypress Bay High School (CBHS) in Broward County, Weston, Florida. At CBHS, he has taught Honors Biology, Chemistry, and Physics. His main responsibility at CBHS, has been AP Biology, and in just two years he was able to elevate the AP Biology passing rate from 43% to 84%. He is also proud to have been an inaugural member of the 2008 HHMI ICORE (Interdisciplinary Center for Ongoing Research / Education) where he developed a Flash-based game that helped students learn about the virtual use of biotechnology. In 2009, he was awarded an Excite Grant by the Lemelson-MIT foundation to attend the 2009 EurekaFEST at MIT (Massachusetts Institute of Technology), and then was awarded a Lemelson-MIT InvenTeams grant ($10,000) to lead a group of high school students to develop a human-powered, portable, water filtration device with an expected cost around $20. Mr. Boswell and his student team traveled to MIT in order to present their device at the 2010 EurekaFEST.

*Project Title:* Investigation of the Effects of an Inquiry-Based Version of AP© Lab 6b (Gel Electrophoresis) on Students’ Knowledge of the Methods, Utility, and Application of Biotechnology Techniques

**Abstract:** The AP© Biology course will be changing dramatically in 2012-2013 to include inquiry-based laboratory exercises. Based on knowledge gained from the 2011 Bench to Bedside Summer Institute at the University of Florida (UF), and from materials on loan from UF CPET (Center for Precollegiate Education and Training), an inquiry-based version of AP© Biology Lab 6b will be completed by Cypress Bay High School AP Biology students in December 2011. Student laboratory groups will determine the identity of the bacterial DNA sample provided. All students will have to use restriction fragmentation followed by a gel electrophoresis of the nucleic acid fragments. Students may elect to use plasmid maps or BLAST searches to identify their bacterial pathogen. Research data will be collected through a pre-test and post-test administration design. Additionally, a rigorous laboratory assessment will be administered following Lab 6b that is identical to the assessment administered to students in AP© Biology 2010-2011 in order to provide additional quantitative data.

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**Ms. Brenda Braitling, J W Mitchell High School**

**Biographical Sketch:** In the medical field, have served people as a charge nurse, a visiting nurse, a practice manager, a wardmaster and medic in combat, a surgical technician, a sterile supply manager and an operating suite manager. I have earned a BA in biology from SUNY New Paltz and a Masters in Information Systems Management from Keller Graduate School. My expertise is in Systems Theory and I apply these principles to problem solving across all fields. As a secondary science educator I have involved my students in a Youth Energy Summit, developed inquiry labs and research projects with my colleagues, and helped write district curriculum alignment for Biology and Anatomy and Physiology. I believe that we need to prepare our students for the
economy of the 21st century. This means many jobs, life-long learning and continuously seeking to make the world a better place for everyone. Biotechnology will become a major industry and may be a great way to earn a living and make a difference. Our rural suburban county needs to encourage industry and biotech may be a great industry to attract.

*Project Title: Engaging At-Risk Students with Biotechnology

**Abstract:** My research identifies key elements required by Federal, State and Local recommendations that relate to at-risk students and biotechnology issues in a Biology classroom setting. As of January 30, 2012 I will not have had the opportunity to fully implement my action proposal due to rigidly timed common testing requirements on other topics in tenth grade Biology. I have been trying to build a work ethic and rapport with my at risk students in preparation for the molecular genetics unit which starts in February. I have also been designing the assessment instruments that I intend to use to evaluate materials I usually incorporate vs. materials that I am adding from my Institute experiences.

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**Ms. Susan Chabot, Lemon Bay High School**

**Biographical Sketch:** I have been teaching science in Charlotte County at Lemon Bay High School for the last 8 years. I earned a degree in Clinical Laboratory Science and worked in a variety of clinical settings, ranging from fertility to mosquito control over the course of my laboratory career. I am the mother of 3; Trey is 19 and is completing his freshman year at Florida State University. He is studying for a degree in Environmental Science. My daughter Madson is a freshman at Lemon Bay High School, and daughter Riley is in the 8th grade. I spend much of my free time with my children at various athletic events, dance practices, and other school-related events. I am interested in pursuing a Master’s Degree in Public Health, either epidemiology or global health policy.

**Project Title:** Learning Biotechnology through the Study of Sickle Cell Anemia

**Abstract:** The purpose of this action research is to use an integrated approach to facilitate students’ learning of biotechnology by focusing on a specific genetic disease. Sickle cell disease can focus on the basic biological concepts of genetics, protein biology, and biochemistry and can direct student learning by concentrating on a single condition. Biotechnology can be introduced as a mechanism of not only diagnosing the disease but also in the ability to offer viable treatment options if not now, in the future. A variety of assessment tools can be used to guide the student through several text, internet, and hands-on laboratory experiences.

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**Ms. Jacqueline Curls, North Fort Myers High**

**Biographical Sketch:** Upon completion of my bachelor’s degree in Biology from the University of Georgia, I had NO idea what I wanted to do, but KNEW I did not want to be a teacher or nurse. As I was wallowing in indecisiveness and managing a retail store, my uncle suggested I go back to school for my Masters, which led me to two of the most amazing years of my life obtaining my degree in secondary science education. After completing that program, I began my teaching career in Georgia, met my husband, got married and relocated to Florida where I currently teach at North Fort Myers High and am an adjunct at Edison State College. Along the way, I was blessed with two children, Jonathan and Samantha and if I had not chosen teaching, would probably be a nurse. Because learning is a favorite pastime of mine, I attended ICORE last summer and met some PHENOMENAL people, so would truly love to have that chance again with Bench to Bedside.

*Project Title: Using Case Studies, Hands-on Activities, and Simulations to Increase Cognitive Skills and Interest in High School Biology Students

**Abstract:** The purpose of this study is to use the case study method, hands-on activities, and simulations in order to enhance the cognitive skills and interest level of Biology Honors students. As incoming 9th graders, students seem to have a negative attitude about science and lack many basic laboratory skills. Utilizing current, ongoing research in an innovative manner will hopefully change perceptions about science and have positive academic outcomes for students and teachers.
Dr. Kim Dahl, Seminole County Public Schools

Biographical Sketch: Mrs. Leslie, my 6th grade teacher, gave me my first taste of inquiry-based instruction and I haven’t looked back since then. We went through swamps and brooks, we collected bugs and bark, and we generated and analyzed data. We spent a week in the woods in February in New Hampshire and we all had a blast! The *report* created based upon that experience is a treasure artifact to this day. The more I learn, the more questions I have and opportunities abound! Learning is my hobby, finding out why or how are my main interests.

*Project Title: Facebook with CPET: The Surveyed Affects of a Biomedical Lecture Series on Educational and Social Attitudes and Potential Value of High School Students in an Experimental Science Class Through the Use of Social Networking

Abstract: This study would examine the educational and social attitudes of students in science classes of nine teachers. Students will be exposed to a biomedical lecture series, using a Facebook page as a method of communicating. The lecture series would include topics from Bench to Bedside such as biomedical ethics, introduction to stem cells, and current trends in stem cell research. The lectures would be further supported by the students reading the lecturers research.

Ms. Marcia De Meza, Lake Gibson High School

Biographical Sketch: I am a secondary science teacher who has had 42 years of experience teaching almost every science. My love of science and my enthusiasm have been the spring boards for many of my students to pursue medical careers. I teach Anatomy & Physiology Honors, Forensic Science, Chemistry, and Biotechnology. My interest in biotechnology began in 2004, and I pursued programs and workshops to help me develop a dream. That dream has become a reality as I am now the director of the Industrial Biotechnology Academy in Polk County. This is the first three-year biotechnology academy in our county. UF has been an important part in helping this academy to materialize.

*Project Title: What’s It All About? A Study of the Impact of Instruction about Stem Cells on Biotech Students’ Knowledge and Attitudes

Abstract: This project was introduced at the end of September with a pretest and a Likert scale pre-survey. Students watched animations and learned vocabulary from NOVA clips on Embryonic Development and Differentiation. They engaged in an interactive activity about the basic differences between embryonic and adult stem cells and viewed a video on In Vitro Fertilization. They participated in two Web Quests and then used the Science Take-Out kit that simulates the development of a stem cell line for research. The class explored various case studies in which people received stem cell treatments for diseases. Each group then chose a particular type of stem cell - embryonic, adult, or cord blood - to design a poster for information and education. The project concluded with a post-test and the Likert scale survey on stem cells. The students really enjoyed doing all the different activities. They became literate in stem cell terminology and really added to their knowledge base.

Mr. Nicholas Eliason, East River High School

Biographical Sketch: After growing up in a suburban/rural area outside of Philadelphia I went to Saint Joseph's University. For eight years after college I worked as a biomedical editor before moving to Florida. I did the alternative education certification program and became a science teacher. This is my fifteenth year teaching, primarily chemistry. The career as a biomedical editor was responsible for my interest in a wide range of bioscience topics, especially health related. My life is busy with family, teaching, coaching and home maintenance. My family includes a fiancé and three children - 12, 11 and 4. I teach AP Chemistry and Chemistry
I, and coach bowling and wrestling at the high school and my youngest's soccer team. It seems that I always have a home project and get volunteered for friend's and family projects. But I enjoy the work. Most summers I have managed to get a position with a local university or research institute for personal enrichment. I look forward to the opportunity to learn about scientific advances for my personal interest and to bring back to the classroom.

Project Title: Impact of Biotechnology Laboratory Investigations on (1) Student Curricular Knowledge and (2) Attitude/Interest toward Chemistry in Rural/Suburban High School Students

Abstract: The effect of adding several biotechnology laboratory investigations on learning gains and attitudes will be studied in a group of rural/suburban high school chemistry students. The learning gains focus will be on the principles of chemistry used in the biotechnology labs and procedures. Changes in attitudes toward chemistry will be measured before and after the labs with regard to confidence and interest in chemistry. The emphasis of both measures is on the impact of hands-on learning that provides context for the students so that the principles are meaningful and adopted because they make sense and are useful. Student knowledge in the principles of chemistry will be measured pre and post labs with a teacher-made test of the covered topics. Attitudes will be measured pre and post labs with a Likert Scale adapted from a previously published version. (Nieswandt, 2007)

Ms. Ybelise Escoto, Freedom High School

Biographical Sketch: Ybelise Escoto, graduated in 1998 from Suffolk University, Boston, MA with BS degree in Biology and graduate education courses from Salem State College. Florida issued educator professional certificate in Biology and ESOL. Biology high school teacher with nine years of experience. Currently teaching biology at Freedom High School in Orlando, FL. Summer of 2010 participated in an introductory training in Biotechnology and Secondary Science PROMISE module training. Involved in the OCPS STEM Program. Seeking to obtain the Industrial Biotechnology Certification to teach in Orange County Schools.

*Project Title: A Study of the Impact of Teaching in-depth Biotechnology Concepts and Laboratory Techniques on the Knowledge, Attitudes and Skills of High School Biology Students

Abstract: The purpose of this research is to measure the effect of the implementation of in-depth biotechnology knowledge, laboratory skills and attitude towards biotechnology. My second period honors biology students have experienced about 75% of my proposed research class lab activities. The activities and labs already performed include the following: DNA extraction and transformation, Cell membrane receptors, pipetting practice, diagnosing diabetes, virtual cloning lab and stem cell lab. Student data was collected by using both qualitative and quantitative techniques. Pre and post surveys accompanied by lab activity assessments have provided me with data for the interpretation of the attitude and high level knowledge gained. According to the data, my students enjoy learning the modern concepts in biotechnology and the acquisition of skills that can later on provide the basis for a career in biotechnology.

Ms. Jackie Insalaco, Rockledge High School

Biographical Sketch: I am currently teaching AICE Biology and AICE Psychology at Rockledge High School. The Cambridge curriculum has been at our school for 6 years now and our school is turning into one of the premiere showcase schools for the curriculum. Schools from around the state and country are coming to visit us when they are considering or implementing the Cambridge Program. We are an International CIE Center.

*Project Title: Implementing the use of the Hayden-McNeil Lab Notebook for AICE Biology

Abstract: Why is a non-science major teacher the college level biology course? Good question! But the answer is two-fold, as a science minded person, I have always enjoyed health and environmental sciences. I always thought they would be my hobby. My job is to teach psychology with a strong emphasis on research. The other half of the answer is the students will always sign up to take my class. Yes, that is pretty presumptuous of me to say that, but they do. So as the administrators were watching our AICE biology class slowly sink into the pits of “I hate biology”, they made an executive decision and put the class in my lap. I could do it, I know most of it, but I have a severe deficit, how does a student keep a lab notebook and how does a teacher grade it? These AICE biology
students will have 33% of the AICE exam score come from a lab and lab write up. Enter CPET and whoever brilliant idea it was to give us instructors the most awesome and fun lab notebook, the Hayden McNeil lab notebook and $200 to spend on our classroom! It took a fraction of a second for me to determine that I would buy my bio students a notebook. When I gave the students the notebooks on the first day of school, they looked as if they were in a candy shop and everything was free. They asked for an additional notebook for their other science classes and our AICE coordinator, seeing the value of pleasing the science minded students, pitched in and bought another case. The results of this lab notebook vary as greatly as the students. There are some books that are impeccably kept, others that look quite rushed. However every page is correlated to a standard from the AICE curriculum and should be duly noted. The students are learning that it takes quite a bit of discipline to keep up high standards, but at the same time they have learned that it only take a large X to mark out information that they do not want to keep. I am still not exactly sure how to grade a notebook. It is too time consuming for me to look for every nuance that should be on each page. The highest motivated students do a pretty good job of monitoring their progress. I would still like to see how other teachers grade notebooks, but only if they are not simply handouts that the students complete, and are bona fide inquiry based lab notebooks. Therefore, my research is still a work in progress for me. I am expecting my skills to improve with more research on my part and more implementation on the student’s part.

**Dr. Kathryn Kehoe, Ponte Vedra High School**

*Biographical Sketch:* Dr. Kathryn Kehoe is currently the teacher for the Academy of Biotechnology and Medical Research at Ponte Vedra High School in St. Johns County. Kathryn has an undergraduate degree from Eastern Michigan University, and taught at the secondary level before entering graduate school at the University of Michigan. After obtaining a Masters and PhD degree in Toxicology, Kathryn obtained additional research training in gene regulation at the Universities of Michigan and Minnesota. She came to Florida as an Assistant Professor at Jacksonville University and, after five years and tenure, Kathryn returned to research, studying neurodegenerative disease at the Mayo Clinic, Jacksonville. In 2004, Kathryn left research to return to her original career choice—teaching at the secondary level. She has remained in St. Johns County, developing 4 levels of Biotechnology at a new high school in her community of Ponte Vedra Beach.

*Project Title:* Authentic Classroom Collaborative Research as a Scaffolding Tool to Independent Research

**Abstract:** Student attitudes and interest for independent scientific study were analyzed as a result of authentic collaborative research on genes linked to a human trait or disease. Student research was based bioastronautics tools to explore details of a gene of interest. The twenty students in this study are enrolled in the third course of a four-year curriculum in a career academy focusing on biotechnology and medical research. Biotechnology III is project based, with some components relying on standard activities that cannot be considered authentic research. However, the goal of the course is to prepare students for original projects. The intervention, using genetic data bases, provided students with research skills necessary for the selection of a topic and a direction of study for the fourth year. The student selected topic should be conducive to realistic scientific inquiry as part of the independent research course offered in the fourth year.

**Ms. Charleen Kelley, Columbia High School**

*Biographical Sketch:* Charleen Kelley was raised in a Navy family and loves to travel and see the world. She was blessed to travel to many International Science Fairs with her students. It was a wonderful opportunity to see the United States. Charleen is a graduate of the University of Florida. She taught for the last 34 years at Columbia High School in Lake City, Florida. As an avid Gator fan, she brings her husband and two kids to as many Gator football, basketball, and baseball games as possible. Favorite hobbies include fishing, collecting shells, and shark teeth. Favorite relaxation spot is Cedar Key. Upon retirement Charleen and her family are planning a trip to Alaska.
**Project Title:** The Effect of Integrating Biotechnology Activities, Labs, and Simulations on the Interest Level, Content Knowledge, and Lab Skills of Students in an Advanced Placement Biology Class.

**Abstract:** This study focused on the effect of integrating biotechnology activities, labs, and simulations on the interest level, content knowledge, and lab skills of students in an Advanced Placement Biology class. Techniques used include the movie “Extraordinary Measure” to engage the students in the action research. Students will learn proper pipette techniques in preparation for labs on DNA electrophoresis and transformation. They will complete a web quest, simulations on cloning and stem cells. After watching “Ted Talk”- Regeneration, students will prepare a poster presentation on a cutting edge topic in biotechnology. This research will be assessed in multiple ways including: observations, student and teacher journals, pre and post tests, and interest level surveys (Likert).

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**Mr. Samuel Kunkle, H.B. Plant High School**

**Biographical Sketch:** I grew up in rural Pennsylvania on a hobby farm. I attended Westmoreland County Community College and received my associates degree in Electronics Engineering Technology. From there I went on to study Biology at Slippery Rock University where I minored in Chemistry. I started working in education in Maryland, then Delaware, and finally Florida. While here I met my wife. I went back to school and earned my Masters in Educational Leadership at the University of South Florida. I decided that I wanted to earn my Doctorate and am currently seeking my Ed.D. in Curriculum, Teaching and Teacher Education at the University of Florida. I started teaching middle school when I moved to Florida, but this year I made the move to high school where I teach AP Biology and Biology 1 Honors. I really enjoy the rigorous curriculum and the maturity of my students. My current research interests include improving traditionally marginalized populations performance in AP classes and using mass media to narrow the achievement gap.

**Project Title:** Using Case Studies, Hands-on Activities, and Simulations to Increase Cognitive Skills and Interest in High School Biology Students

**Abstract:** The purpose of this study is to use the case study method, hands-on activities, exposure to university materials, and simulations in order to enhance the cognitive skills and interest level of Biology Honors students. As incoming 9th graders, students may possess a negative attitude about science perhaps due to a lack of basic laboratory skills, and misunderstandings related to the nature of science. By exposing students to current research in biotechnology through the aforementioned methods this study seeks to change negative perceptions concerning science, and provide positive academic outcomes for students.

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**Ms. Paula Ladd, West Shore JR/SR HS**

**Biographical Sketch:** I have been teaching science for 11 years, the last 10 at West Shore JR/SR HS in Melbourne. I have taught Science Research, AP Environmental Science, Honors Biology, and Marine Science. I coach a HS Science Olympiad team and am responsible for the school wide paper recycling program. Whenever I can break away I go tent camping. I spend a lot of time in my yard gardening and planting native plants, although everyone calls them weeds. I kayak when I can; the springs in the Gainesville are great for kayaking. I camped and kayaked 11 miles along Blackwater State Park in the panhandle over spring break in April.

**Project Title:** Overcoming Challenges in the High School Science Research Classroom: A Study of the Improving Internet Research Skills and the Student’s Ability to Design and Conduct a Scientific Experiment

**Abstract:** This paper outlines an action research plan to be used in a high school science research class. Each student is required to research a topic of their choice, write a research paper on the topic, design, implement, and analyze an experiment based on a question formed from their research, and finally compete in the regional science fair. The intervention is designed to improve students’ internet research skills and to help them create a controlled experiment. These interventions are based on biotechnology
Ms. Vanessa Lopez, Cypress Creek High School

**Biographical Sketch:** I was born in Chicago (I love that city!) but I’ve been in Orlando for the majority of my life. I’m currently teaching Anatomy and Physiology to juniors and seniors at Cypress Creek High School. I attended UCF (go Knights!) where I earned my bachelors degree in Molecular Biology and Microbiology. I enjoy anything related to science and medicine... because it’s cool.

**Title of Project:** Who Runs the World: The Effect of Case Studies and Biotechnology Laboratory Techniques on the Confidence, Problem Solving Skills and Science Career Interest of Minority and Female Students

**Abstract:** This action research will present the findings of using a combination of case studies and biotechnology techniques on the overall confidence, problem solving skills and science career interest of underrepresented high school Anatomy and Physiology female students. The use of biotechnology labs and case studies will be used throughout the 2011-2012 school year. Students’ overall attitudes and knowledge of the science field and its careers will be measured via surveys and questionnaires that will be taken throughout the school year.

Ms. Debbie Northcutt, Ida S. Baker High School

**Biographical Sketch:** My name is Debbie Northcutt. I am originally from Normal, Illinois. I received my bachelor’s degree from Illinois State University in 1989, with a major in Biology Education and a minor in Chemistry. I had originally hoped to pursue a career in Medical Research, but with a family and responsibilities, plans changed. I taught middle school for about six years, then moved on to high school, where I have been teaching Chemistry for the past five years. I thoroughly enjoy teaching, and am also still very interested in the medical field.

**Project Title:** A Study of the Use of Hands-on Biotechnology Activities for the Conceptualization of Mathematics in Science.

**Abstract:** The purpose of this Action Research Proposal is to study the effectiveness of “Hands-On” activities at developing students abilities to quantify experimental data. Ideally, the intended outcome is to develop student connections between math and science in the natural world. By using lab techniques common in Biotechnology, students will be exposed to interdisciplinary scientific procedures with “real world” applications.

Dr. Inga Pinnix, Sandalwood High School

**Biographical Sketch:** I am Inga Brandon Pinnix and I currently work at Sandalwood High School in Jacksonville, Florida. I have taught various Biology and Chemistry courses over the past 7 years. Prior to that, I worked several years as a post-doctoral researcher at Mayo Clinic Jacksonville and Emory University in the areas of genetic neuroscience and cellular biochemistry. I am married, have 3 children, and enjoy reading, gardening, cooking, crafting, and volunteering in the community.

**Project Title:** A Study of the Impact of Translational Medical Research and Biotechnology Laboratory Applications on Student Understanding of Biomolecules and Attitudes toward Stem Cell Practices
Abstract: Students in advanced biology courses often face an overwhelming amount of facts and processes as they strive to understand cellular mechanisms and the many functions and processes of biomolecules. As a result, student motivation can drop during instruction, leading to lower student comprehension and performance. The goal of this proposal is to implement biotechnology and translational medicine midway through the curriculum to add focus, excitement, and a connection to real life situations. Biotechnology labs, a virtual computer lab, and current medical research applications will be presented to the students along with the standard curriculum normally presented in class. Analysis of student surveys, academic performance, and teacher reflections will be performed to determine if a shift in attitude and motivation will occur and if student understanding will improve.

Ms. Retha Presod, Atlantic High School

Biographical Sketch: Retha Prescod graduated in 2003 from Florida Atlantic University, receiving a Bachelor of Arts in Biological Sciences. In 2005 she graduated with honors from Sanford Brown Institute with a Surgical Technology diploma. In summers 2008 and 2009 respectively, she completed internships at Scripps Research Institute and ICORE where she was introduced to laboratory techniques and cutting edge information in the fields of biotechnology, molecular genetics, bioinformatics, and neuroscience. Currently she is an AP Biology and Anatomy and Physiology Honors teacher at Atlantic Community High School in Delray Beach, Florida. She enjoys teaching science due to its rigorous and fascinating nature. Bench to Bedside training will increase her ability and awareness of identifying and managing emerging pathogens that impact both the local and global community. The infusion of knowledge into her teaching curriculum will ensure her students a better understanding and respect for the fields of biotechnology and research.

Project Title: Evaluating the Effectiveness of Inquiry Based Biotechnology Lessons on Attitudes and Real-World Application of Information to Multi-Ethnic International Baccalaureate Students

Abstract: This paper serves as a vehicle to explain the effectiveness of inquiry-based instruction of biotechnology lessons on attitudes and applications of multi-ethnic groups in the IB program. The aim is to study the effects of integrating inquiry-based learning into the curriculum and measuring student retention and receptiveness towards topics subjects across the biotechnology curriculum.

Mr. Loren Price, Northeast High School

Biographical Sketch: I was born and raised in sunny Fort Lauderdale, Florida. I graduated from Coconut Creek High School in 1991 and Florida State University in 1995 with a bachelor’s degree in Biological Sciences. While at Florida State, I was an officer of Zeta Beta Tau fraternity, a lifeguard/swim instructor, and studied amoeboid locomotion/sperm motility for two semesters. I particularly enjoyed hands on lab courses and field courses like botany and lower vertebrates. I have coached swimming for 21 years and water polo for the past 14 years where I have been named coach of the year many times and won states twice. I also am assistant coach for boys’ soccer. After I earned my BS degree from FSU, I took education courses at FAU and BCC to become professionally certified in education. Through coaching, I made connections and was offered the opportunity to teach high school science at Northeast High where I have taught earth/space, biology, and marine science, the past 11 years. I am proud of the impact I have had on the lives of the students and athletes I have taught over the years.

*Project Title: A Study of the Effects of Using Hands on Lab Activities and Simulations, to Improve Student Attitudes and Knowledge about Biomedical Science Technology, Genetic Disorders, and Disease.

Abstract: The purpose of this study is to describe the effects of using hands on lab activities and simulations to excite students about biomedical science technology and improve students understanding of genetic disorders and disease. My 9-12 grade Biology students were given a survey a few weeks into the course regarding their attitudes toward science, all subjects, and varied learning styles. The questions also addressed attitudes toward biotechnology uses, ethics, and knowledge of techniques. In the pre survey, Students showed a neutral to generally positive attitudes toward science, biotechnology, and hands-on activities like labs and simulations and negative attitudes toward textbook learning of facts. The survey will be re administered at the end of the course and
data analyzed. The themes of Bench to Bedside and some of the resources, labs, simulations, and links discovered through B2B have been used and will continue to be infused into the course at various times. Many of the resources, links, and labs have been used also with my Marine Science classes as well as having been shared throughout my department, especially within my small department biology common planning community, and the coordinator of our school’s after school wacky science club.

Ms. Tia Pridgen (Brown), Forest High School

Biographical Sketch: My name is Tia Pridgen but it will be changing to Tia Brown on April 16th, 2011. I am getting married in Homosassa, FL. I live in Citrus Springs, FL. My soon to be husband’s name is Jacob. We have an American Bulldog named Bruiser and a Savannah cat named Taz. I maintain a 120 gallon saltwater fish tank. Jacob & I love the ocean. We are always out on the boat snorkeling, scuba diving, spear fishing and taking pictures. If we are not doing that we are riding ATV’s at the local mud hole.

Teaching is my fourth career. I worked at H. Lee Moffitt Cancer Center for 18 months in the Clinical Trials Unit processing samples. This is where I got my background in research. Before Moffitt, I was an Animal Specialist at Busch Gardens in Tampa, FL and a Microbiologist for a pharmaceutical company in North Carolina. I have been teaching science for 5 years. I am Content Area Reading certified so I integrate reading into my Biology classes. I truly enjoy teaching and I am always looking for ways to better myself. I am excited about this course and the opportunity to meet all of you.

Project Title: The impact on critical thinking and writing skills when biotechnology activities and a case study approach are incorporated into a high school anatomy course.

Abstract: The purpose of this paper is to share the results of a study focused on incorporating a case-study approach and biotechnology activities to observe the impact on critical thinking and writing skills of high school anatomy students. This method tracked five high school students chosen according to their reading FCAT level one through five. The students were challenged with two case studies, two virtual labs, one hands-on lab, and a science article. The students were assessed using the two case studies, the hands-on lab and the science article. All answers were graded for correctness and the extended writing responses were graded with a writing rubric. The assigned student numbers correlate with their Reading FCAT scores. Student one, three and four struggled the most with the hands-on lab but overall writing and critical thinking improved. Student two gradually improved skills throughout the study. Student five remained fairly consistent. It was surprising that so many students struggled with the hands-on lab since many students generally do better with kinesthetic activities. Overall, all students improved or remained consistent with their writing and critical thinking skills during this study.

Ms. Stephanie Quintero, Steinbrenner High School

Biographical Sketch: Never in my worst nightmares did I ever think I would be teaching high school chemistry. Alas, it has become a passion I never knew I had! The class I most hated in school has made me determined to improve the experience for my students. This is my first full year of teaching chemistry, though I have had temporary positions ranging from special education to biology and physical science courses. In 2010 I graduated with my master’s degree in Science Education from the University of South Florida. Prior to teaching full time, I worked as a transplant coordinator with the Lion’s Eye Institute. There I restored vision to over 500 people through the successful recovery of cornea tissue. I earned my bachelor’s degree in Neuroscience and Art History from Tulane University in New Orleans, La in 2008. Through college I interned in a lab studying chronic pain. In addition to being a science geek, I love to paint, play the piano and bake cookies.

*Project Title: The effect of exposure to current biomedical themed activities related to chemistry on student situational interest, attitudes and self-concept in chemistry.
Abstract: The purpose of this study is to use biomedical-themed activities related to chemistry in the beginning of the school year to measure the changes on student situational interest, attitudes and self-concept in chemistry. This study will examine how creating a positive affect towards chemistry early on in the school year influences the success of students throughout the course.

Ms. Deirdre Riggs, Baker County High School

Biographical Sketch: Born in Sao Paolo, Brasil, Deirdre moved to Miami, Florida at 13 years of age. Deirdre attended Syracuse University in upstate New York to run track throughout her college career. She took a love for sports and started her degree in nutrition, exercise science, and physical therapy. Her sophomore year of college, Deirdre began working as a teacher assistant in a second grade classroom. She fell in love with teaching (probably because both her parents are teachers!) and decided to pursue a teaching degree. Not needing anymore student debt, Deirdre completed college and did not receive her teaching degree. She went on to get a job at Mayo Clinic in Jacksonville to work with the physical therapy department. After two weeks of working with mid-aged men and being away from children, Deirdre decided she needed to be back in the classroom. She posted her resume online and hoped for the best. In August, she received a phone call from the Vice Principal at Baker County High School. Two days later she submitted her two weeks’ notice to Mayo and began her teaching career with her very own classroom. Aside from spending countless hours preparing labs and lessons for her students in a tiny portable, she also coaches girls track and field. She loves running, going to the beach, and anything that includes being outdoors!

*Project Title: The Effect of Discovery Learning through Biotechnology on the Knowledge and Awareness of Type 2 Diabetes and its Genetics Affects on Lower Income Students in a Rural Community

Abstract: Over the course of a week, my students had their first experience in a science lab...ever! These students, for the most part, have been raised in rural Baker County where the middle school has no science labs and the high school has two science labs that are set aside for chemistry and physics classes. We spent two days understanding the lab and its safety equipment, learning how to use the pipette, and growing knowledge of different techniques with science equipment. The third day, we finally got into the meat of the experiment. The students started by running gels to see a group of patients who were diagnosed with sickle cell anemia. Having discussed this disease in depth, it was easy to help them in understanding what the family tree for the 24 patients was based on the DNA samples we were given. After running the gel and understanding the genetics of the disease, we then incorporated this same technique to understand the idea of the research behind the diabetic disease MODY. We used the diagnosing diabetes lab to understand the basis of diabetes. In the mean time, my Biology 2 students created digests for DNA samples of patients with type 1 diabetes, type 2 diabetes, and incorporating the idea of maturity onset diabetes that has been deemed as genetic showing symptoms in those under the age of 25. Based on their knowledge in the lab, the project culminated with each student writing a paper on whether they believe MODY is environmental or, if research is on the right track, and it is a genetic disease. Students had to use evidence from the lab and other research sources. I will be bringing four girls with me to the symposium to report their findings, their stand, and their beliefs based on their new found scientific discoveries!

Ms. Elizabeth Searl, Duncan U. Fletcher High School

Biographical Sketch: My name is Elizabeth Searl and I am presently a teacher at Fletcher Senior High School in Neptune Beach, Florida. I have been a biology teacher for over twenty one years. I am happily married to Mr. Michael Searl and we have seven children. I also have two sets of twins. I realize that as a parent and a teacher it takes a community to raise a child and that children are very powerful when they are educated. I believe it is important to engage students in a variety of interactive activities as well as promote new scientific equipments for technological advancement in the real world. I have a Bachelor's degree in Biology and a Master's degree in Education from the University of North Florida. I am also a 2000 Presidential Awardee in Math and Science.

*Project Title: Using Biotechnology to Motivate High School Students to Study Science

Abstract: The main goal of my study is to use biotechnology techniques in my biology classes to determine if these techniques will
motivate students to study science. I think when students are impressed with how to correlate what they learn in the classroom with real world applications they are more inclined to become interested in science. If students are not interested in science they will not make any effort at all when a lecture or lab is presented. I developed questionnaires to the students at a suburban school in Neptune Beach, Florida. Based on the findings, I concluded that the degree interest shown by the students were greater and they asked more questions when they were presented with biotechnology activities. Therefore, exposure to various topics in biotechnology aroused curiosity and enhanced their desire to know more about topics aligned with the Next Generation Science Benchmarks. As a result, hands-on applications using biotechnology definitely improved the attitudes of students towards science. The use of biotechnology skills motivated students to study science and aided in determining acceptable evidence of understanding with performance tasks.

Mr. Kyle Smith, St. Petersburg High School, IB

Biographical Sketch: I was born and raised in St. Petersburg and graduated from Northeast High School. I was granted an appointment to the United States Air Force Academy and graduated with a double-major in General Engineering and Military History. My Air Force career was mainly spent flying and instructing in the KC-135 Stratotanker. I participated in Desert Storm and Iraqi Freedom, then retired after 21-years to teach middle-school math (where the real battles started). I was given an unbelievable opportunity to teach some of the brightest and most talented students in the country at St. Petersburg High School's International Baccalaureate program. I have never worked so hard in my life trying to keep up with these kids, but I'm loving every minute of it. My goal in attending this program is to further expand their knowledge of physics through its applications to biomedical concepts and research methods. Being able to participate in a program at UF will be icing on my birthday cake. My father, brother and sister are UF grads, my oldest daughter, Reshelle and her fiance' Leo, are graduating from the UF medical school in May along with middle daughter Vicky getting her BS in psychology. Go Gators!

*Project Title: Expanding Student Understanding of Biotechnology Fields of Study By Use of Professional Networking Websites

Abstract: Research shows that students are increasingly becoming disenchanted with science careers. This is due to a lack of science literacy when it comes to current advances in science and the types of career fields open to them. In contrast, about 70% of incoming college freshman state that they would like to become doctors when only 1-2% of them actually will. The confluence of these factors results in many bright and talented students not pursuing careers in sciences like biotechnology. My proposal is to open their eyes to what is currently going on in biotechnology and its diverse career opportunities and fields of study. I will do this by sharing the presentations I was given at the Bench to Bedside Institute, by having students research topics and careers in biotechnology through the professional networking site LinkedIn, and by attending either the Junior Science, Engineering, and Humanities Symposium, the USF Engineering Expo, or a field trip to UF.

Ms. Deborah Vasconi, Tarpon Springs High School

Biographical Sketch: Being an experienced Science teacher of twenty years plus, I was galvanized by Carl Sagan’s observation that “all children start out as scientists, full of curiosity and questions about the world around them. Unfortunately, typical school programs destroy their curiosity before middle school” I want to be an agent of change, I want to make the difference and I have made it my mission to provide high quality, relevant, hands-on experiences for my Tarpon Springs High School Biology I Honors, AP Environmental Science and AP Biology students, that engages and motivates them.

*Project Title: The Impact of Understanding of Current Biotechnology Research and Protocols on Student Biotechnology Attitudes, Knowledge, and Skills

Abstract: The purpose of this action proposal is to assess and study student’s preconceived understanding and attitudes about biotechnology and changes after a thorough study unit. Implementation of this action research proposal began January 4, 2012, with the formative assessment component of a modified Likert document to measure prior knowledge and attitude. Starting January 9, 2012, after units about DNA, replication and eukaryotic gene expression, students completed the activities Designer Plates, Water
Microarray, and Modes of Inheritance from the UF Equipment locker. After the first semester exam week, students will start a biotechnology unit that includes Power Points and the simulations from Science Take Out: Diagnosing Diabetes and Stem Cells, and Bio-Rad Bacterial Transformation pGlo. In February, I will measure and analyze the understanding gains and attitude changes about biotechnology.

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**Mr. Lloyd Wade, Walton High School**

**Biographical Sketch:**
- Graduated with a BS from Troy State University.
- Graduated with a M of Ed from University of W Fl.
- Currently working on Doctorate in Education.
- Taught middle school and high school science for 5 yrs at Paxton High School.
- Taught high school science for 6 months at Walton High School.

* Have been married for 34 years to a career teacher.
* Have helped several students to successfully participate in science fair at the state level.
* My goal in education is to help at-risk students find motivation to succeed through the study of science.
* The satisfaction that I derive from teaching science comes from my passion to learn and a desire to help others develop a similar passion.

**Project Title:** A Study of Type II Diabetes

**Abstract:** This action research project is composed of related activities designed to promote the awareness and knowledge of tenth grade biology students in the area of type 2 diabetes. Students will engage in activities structured to promote reading, technical writing, use of computer technology, and lab skills. Upon completion of this project, several science standards will be addressed and relevant biology curriculum will be presented in a manner appropriate to address the various learning styles of my students. This program will accompany instruction including cellular structure, cellular respiration, endocrinology, and select topics in the area of human physiology. Student work will be subjected to formative and summative assessment processes designed to reflect student’s cognitive development. The overall goal of this project is to equip students with knowledge about diabetes that will help them to make critical lifestyle choices that could serve to proactively offset the impact of this condition in their own lives.

* indicates presentation to be made at JSEHS

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**Don’t miss out on our 2012 Summer Program Opportunities!**

**ICORE:** Sunday, June 10 – Saturday, June 23, 2012

**Bench to Bedside:** Sunday, July 15 – Saturday, July 28, 2012

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