2015 Poster Presentations
Abstracts (Alphabetical)

Symbols:
** = Graduate Student
* = Honors Project
^ = Received an Undergraduate Research Grant

Chanse Adams, Paul Hill
Mentor: Robert Mans, Biology
Detecting Arc Protein in the brain in response to spatial learning
It has been suggested by previous neurological studies in rodents that an increase in the concentration of Arc protein in the brain is a critical step in the process of memory acquisition and storage. Instead of rodents, our research specimen will be zebrafish (Danio rerio). Throughout this semester we will be conducting a variety of behavior and biochemical experiments to determine if the Arc protein plays a similar role in the brains of zebrafish as it does in rodents. Our primary objective will be to adapt published protocols for our custom built Y maze and behavior arena to test spatial memory in adult zebrafish. We will accomplish this goal by acclimating adult zebrafish to a Y-shaped maze structure for two weeks in order to establish a set protocol to alleviate the stress that would be associated with introduction to a new environment and handling procedures. In order to avoid a null experiment we will need to verify if there is an arm preference within the y-maze and other experiment pitfalls. Once it is determined that fish have an equal tendency to explore all three arms, we will train and construct a series of novel environment based test for the zebrafish in the y-maze. In order to assess if spatial memory was stored, we will dissect and homogenize segments of the brain for Western blot protein analysis to verify if an Arc protein concentration has been produced after exposure to the maze.

Cynthia Alexander
Mentor: Jennifer Zettler, Biology
Attack behavior and capture techniques of larval antlions
Larval antlions (Neuroptera: Myrmeleontidae) construct pits in sandy soils to trap invertebrate prey. These predators use symmetrical values to detect vibrations made when prey
attempt to escape. Using a highly sensitive sensory system consisting of mechanoreceptors located across the surface of the body, these ambush predators are able to detect approaching prey. Larvae that are the most successful in prey capture shorten their development time and more rapidly mature to the adult stage. In our study, we investigated if capture success is dependent on the relative size of the predator to its prey. We also noted if the antlions’ approach to prey capture techniques differ as size of the prey changes. In repeated trials using three larval stages, antlions were presented with ant species that were grouped according to size. We predicted that each capture technique has a different cost and benefit relative to time and energy spent on prey handling. By minimizing kill time and maximizing energy gained, there is an energy tradeoff for these ambush predators. We found that the antlions’ predatory strategies, ability to capture various sizes of prey, and time to subdue and consume each prey item are important factors that optimize the efforts of handling time with the energy gained from consuming prey.

Krystin Allaire, Kayla Lord, Shana Robinson
Mentor: Todd Hizer, Chemistry and Physics; Catherine MacGowan, Chemistry and Physics

*Investigating the interaction of poly acrylate hydrogels with multi-valent cations in situ.*

This project is a continuation of a summer (STEP) undergraduate research project investigating the interaction of poly acrylate hydrogels with multi-valent cations (e.g. Cu$^{2+}$, Ni$^{2+}$ and Fe$^{3+}$). The concentration of metal ions remaining in solution after adsorption were determined by atomic absorption spectroscopy. Preliminary results indicated that the hydrogel beads were very effective for the remediation of divalent metal ions but not trivalent metal ions. Hydrogel efficiency was determined to be concentration dependent (e.g. ≤ 100 ppm) with the binding of the metal ion to the hydrogel being irreversible. In this study we investigated the role pH and salt water had on the extent of hydrogel hydration and metal remediation. In addition, the extent of hydration and remediation efficiency of the gels was examined in pond, rivers, and ocean waters and compared to distilled water.

Bilal Ali
Mentor: Cameron Coates, Engineering Studies

*Pressure Distribution in a Hovercraft Skirt: Accuracy of Theoretical Assumptions and Predictions*

Several hovercraft design calculators for the hobbyist may be found online. The typical approach used by these calculators is based on Bernoulli’s equation. This investigation seeks to deconstruct the methodology used by the popular online calculators, quantify the extent of the inherent assumptions and determine the limitations of these simplified design calculations. Bernoulli’s assumptions will have a significant effect on design calculations for small geometrical and mechanical deviations from ideal models provided online. We develop a simple Computational Fluid Dynamics (CFD) model of a hovercraft (hobbyist level) that allows the prediction of pressure values and velocities at select locations within the hovercraft skirt. Pressure is also physically measured at these locations, using a hot wire anemometer, in a fully attached hovercraft skirt. Pressures are calculated using Bernoulli’s theory. These measured and predicted pressure values are compared with each other as well as results predicted from Bernoulli’s theory. Measured pressure values deviate from predicted values by 10-20%, however comparisons and results are still ongoing. The 1-D steady flow, friction effects, constant density assumptions are modified using computational methods and estimates of their effects presented.
Based on results thus far, the accuracy of the practical use of Bernoulli’s equation is most limited by the effect of friction due to the skirt material and duct system.

** Rena Ali
Mentor: Ella Howard, History

*William Blake in Albion's Voice*

So, you thought you left William Blake behind when you finished all your literature courses. Well, he's back and he was scattered across *Albion's Voice*. This exhibit for the *Albion’s Voice* Project revolves around William Blake. William Blake’s poems and mythologies were used throughout the five of the six issues of *Albion’s Voice*. Blake did not appear in the fifth issue of the newspaper. The title of the newspaper itself was an allusion to William Blake’s mythology of Albion. Additionally, since Blake is one of the fundamental voices in Romanticism, the similarities and differences between British Romanticism and the United States 1970’s Revolution is an interesting point that will be discussed, to some extent. Blake’s influence on *Albion’s Voice* was extensive and clear. His ideologies, mythologies, and poems were used in articles and titles. Some of his works were presented in the newspaper as separate items. William Blake was a god within *Albion’s Voice*. Technology opens up ways for so many people to communicate. The Internet allows us to share and learn information. The best part of new technology is the willingness and creative of people that create programs and sites for free for the use of others. Connecting with others across the globe and share knowledge and opinions and eventually creating together is one of the greatest values of new technology.

Fahad Altaf
Mentor: Sara Gremillion, Biology

*The Golgi apparatus is key in the growth of the mold, Aspergillus nidulans*

Filamentous fungi expand the tips of their cells into new environments. This new growth is maintained by the continuous delivery of new cell wall and plasma membrane materials from the Golgi apparatus. In order to maintain proper Golgi function, this organelle must continually recycle membrane and enzymes lost by departing vesicles. The Conserved Oligomeric Golgi (COG) complex is a tethering complex involved in the retrograde transport, or recycling, of vesicles within the Golgi. In the filamentous fungus *Aspergillus nidulans*, we have studied the COG complex and its eight subunit proteins. Fusion PCR and cell transformations were used to create new strains of *A. nidulans* to determine which subunits are important for the function of this complex, and therefore, important for new growth.

Robert Altman
Mentor: Marshall Green, Psychology

*An Investigation of Variables Contributing to Student Performance in College*

Investigations of concepts such as Motivation (Vallerand et al., 1992) and Self-Efficacy (Bandura, 1997) have shed light on what encourages students to attend to or continue in their studies. We theorize that Commitment to Academic Success is a psychological construct entailing an individual student’s mindset for learning in school. Alternatively, Motivation and Self-Efficacy are related to academic outcomes and their effect on belief in one’s self, respectively. Our initial measure is a 42 item 7-point Likert Scale. Commitment to Academics is hypothesized to be composed of two separate factors: Self-regulated management and Socio-
Environmental Influences, although preliminary principal components analyses with Varimax rotation indicates only one component related to general academic commitment (Eigenvalue = 13.53, 18 items with component loadings greater than .70, valid N = 53) These preliminary results suggest that commitment may be more related to internal factors such as drive and self-regulation, and that social and environmental influences may be unrelated to an individual’s mindset for learning in school. The investigation is currently ongoing.

**Lara Kate Anderson, Ashleigh Aubrey**  
Mentor: April Garrity, Communication Science and Disorders

*Joint Communication Training of Individuals with Traumatic Brain Injury, Their Communication Partners, and Healthcare Professionals Versus Untrained Individuals*

Traumatic brain injury (TBI) affects 1.4 million people in the U.S. (Center of Disease Control, 2007). Individuals with TBI exhibit communication deficits in a number of areas, including holding conversations, referred to as discourse. One method that has been proposed to assist in this area is joint communication training, extensive training in social communication skills for individuals with TBI and their frequent communication partners (FCP). Our research seeks to answer the question: “Is joint communication training of individuals with TBI and their FCP, as well as healthcare professionals with the families more or less likely to improve communication skills than untrained individuals?” We explored available literature and performed a systematic review of their findings. Four studies were identified as resourceful: Duff, et. al (2002); Lefebvre, et. al (2007); Sim, et. Al (2013); and Togher, et. al (2012). These studies used a variety of measures to examine the utility of joint communication training, including quantitative measures, qualitative interviews, as well as an analysis of discourse behavior before and after joint communication training. Research evidence suggests that the communicative training improved overall outcomes for communication between individuals with TBI and their caregivers, such as implementation of helpful questions, information tracking, and negotiation. Qualitative studies resulted in healthcare professionals to develop improved partnerships with the families. The impact of communication training and introduction of an educational partnership in clinical settings proves to be beneficial in terms of the patient, the family, the professionals, and therefore the healthcare system.

**Megan Armbruster, Mor Osovsky**  
Mentor: April Garrity, Communication Science and Disorders

*Effects of Educational Intervention on Dementia Caregivers*

Dementia is a progressive disease projected to affect nearly fifteen million Americans and their families by 2050 (Centers for Disease Control and Prevention, 2013). Care facilities are a costly burden on families’ out-of-pocket expenses. In an effort to reduce costs, families often provide in-home care to loved ones. This supervision is a cumbersome task that requires significant time and responsibility. Dementia caregivers may present with clinically significant depression, anxiety and stress which often leads to negative effects on caregivers’ physical and mental health (Kajiyama et al., 2013). Our research focused on answering the question “Are dementia caregivers who receive coping strategies through an educational intervention program more likely to exhibit reduced risk of depression, anxiety, stress and exhibit improved quality of life (QoL) when compared to caregivers who receive little or no intervention?” To answer this question, we conducted a systematic review of current research evidence. We identified four related studies examining caregiver perspectives with various questionnaires and assessments
administered before, during and after educational intervention. Study results suggested caregiver educational intervention improves QoL and decreases depression, stress and anxiety. The evidence also indicates that secondary difficulties also improved including disturbed sleep and eating patterns. Evidence suggests educational intervention can be an effective strategy for increasing caregiver QoL. While not evident for all dementia caregivers studied, intervention was shown to be an effective way to manage caregiver burden when facility placement is not a primary choice (Kuo, et al., 2012).

** Brandi Bazemore, Elizabeth Finley
Mentor: April Garrity, Communication Science and Disorders

* A Comparison of Constraint Induced Language Therapy and Music Therapy for Patients with Aphasia

Aphasia is an acquired communication disorder that causes problems in speaking, listening, reading, and writing. As speech-language pathologists, we must engage in clinical practice that is informed by research evidence. Evidence suggests that speech and music share neural pathways, and persons with nonfluent aphasia can usually sing, although they may have significant difficulties with speaking. Constraint induced language therapy (CILT), sometimes referred to as constraint induced aphasia therapy (CIAT), supports the notion that treatment intensity using the impaired channel (i.e., speech) is vital for communicative success and promotes changes in neuroplasticity and brain reorganization. Our research seeks to answer the question: “Do patients with aphasia significantly improve speech and language outcomes if they participate in constraint induced language therapy or in various types of music therapy?” In general, data suggest that both CILT and music therapy are effective treatment methods based on improvements in expressive language. We conducted a systematic review in order to determine the specific therapeutic outcomes associated with these methods. Four studies were identified as useful: Kavian et al. (2014); Kirmess and Lind (2011); Tomaino (2012); and, Schlaug et al. (2008). Data show significant gains in repetition, fluency, sentence completion and naming tasks following music therapy. Evidence suggests that CILT produces improvements in informativeness, noun production, word recall, and specific verb use. When considering therapeutic options, clinicians should consider patient’s specific speech and language deficits and preferences in order to select those likely to be most effective.

^ Christopher Belflower
Mentor: Sarah Zingales, Chemistry and Physics

* Design and synthesis of novel chalcones as anti-cancer therapeutics

Chalcones, molecules characterized by two aromatic rings joined by an α, β unsaturated carbonyl system, have shown a wide variety of biological activity including selective toxicity against a variety of human cancer cell lines. Our lab synthesized a library of chalcone analogs that were evaluated for cytotoxicity against bacterial strains: *S. aureus, K. pneumoniae, and P. aeruginosa*; antibiotic resistant bacterial strains: *Vancomycin-Resistant Enterococcus and Methicillin-Resistant S. aureus*; and, most recently, human cancer cell lines. Chalcone analogs were synthesized via the aldol reaction and their structures were confirmed by ¹H NMR, ¹³C NMR, and HRMS. Most chalcones tested showed selectivity against resistant bacterial strands only at very high concentrations (512 µg/ml). In the future, bacterial and cancer cytotoxicity data will allow us to expand our library based off the structure-activity relationships between the compounds and their biological properties.
Taylor Benson, Harrison Kirch, William Short  
Mentor: Priya Goeser, Engineering Studies  
*Technical, Economical, and Environmental Evaluation of Underwater Turbines being implemented in US Coastal Waters*

Based on the current consumption of nonrenewable energy resources, such as petroleum and coal, it is estimated that within the next few generations the natural gas and oil reserves will be depleted. Despite the fact that there are already renewable energy sources, they currently only supply a small percentage of the energy consumed in the United States. More sustainable renewable power sources would help aid the energy crisis. Considering the technical, economical, and environmental factors involved with implementing underwater tidal turbines, it is possible to drastically reduce the United States’ current dependence on limited energy resources. More specifically, control volume analysis can be used to understand the energy needed in the form of work and determine if this form and amount of energy will be cost efficient. By testing these underwater turbines for a period of time, potential environmental hazards can also be evaluated. The analysis of these turbines could help lead the way to future design improvements and better efficiency.

Hetel Bhatt, Catalina Cardona, Blake Lamb, Joãosep Peters, Brett Searing  
Mentor: Jennifer Zettler, Biology  
*Fungal Strain Cultivation Flexibility in the Fungal Farming Attine Cyphomyrmex rimosus*

Fungus farming in Attine ants has existed for approximately 50 million years, in stark contrast the development of human agriculture can be traced to approximately 12,000 years ago. Fungal cultivation used by Attine ants has been classified into five major divisions based on agricultural technique. Of these, the yeast farmers are the least studied and as a result, little is known about this ant-fungus interaction. Ants in the genus *Cyphomyrmex* practice yeast agriculture by cultivating *Leucocoprinus* sp. fungi. These fungi are known to grow as a wild type independent of ants, a condition that does not exist in any other fungus farming group. Further, *C. rimosus* symbionts are not known to be susceptible to *Escovopsis* sp., a fungal pathogen exclusive and widespread among Attine gardens. To date, pathogenic fungi are unrecorded in the fungal gardens of *C. rimosus*, and it is unknown how they maintain pure cultures. We intend to determine if colonies of *C. rimosus* collected from the Armstrong campus are capable of cultivating fungal strains that have not been vertically transmitted from the natal colony of a founding queen. Genetic analysis of fungal isolates cultivated from *C. rimosus* colonies will allow us to positively identify fungal components of *C. rimosus* gardens. Isolates sequenced will be presented to experimental colonies sterilized of fungus in order to ascertain if a colony will readily accept and cultivate a foreign strain.

Jordan Bowker  
Mentor: Matthew Draud, Biology  
*Introductory Research on L. Scott Stell Park Turkey Vulture Roost Population: Observational Investigation into the Reasons for Site Occupation and Basic Behaviors*

The turkey vulture (*Cathartes aura*) is found from South America to Canada, which is the largest habitat distribution of the 7 species of New World vultures. The broad geographical distribution is made possible due to their adaptability and superior sense of smell. Semi-permanent roost populations often form with individuals returning daily to these locations. Such
a roost population exists in Chatham County, near L. Scott Stell Community Park. I have been studying this population by road-side and parking-lot observation since August 2014 to find out why vultures gather here and to construct an ethogram. I discovered that the park provides the vultures with three vital things: undisturbed roosting habitat and open sunning spots, constant food source from the highways around the park, and ready access to a landfill that supplies a high vantage point and methane updrafts. In the park the vultures spend the majority of their time grooming or sunning their wings communally. Large groups (sometimes over 60 birds) gather together usually during the hottest portion of the day on the park grounds although interaction between individuals is limited to small conflicts. Turkey vultures appear to be particular about roosting and sunning places and depend on a lack of heavy human traffic. Group grooming and sunning behaviors play an important role in their daily lives, most likely to help them stay free of parasites or bacteria, and maybe even to solidify group bonds.

Angela Brown, Destiny Bynes
Mentor: Heather Joesting, Biology

*Investigating the role of phenotypic plasticity in *Hydrocotyle bonariensis*

*Hydrocotyle bonariensis* (large-leaf pennywort) occupies multiple habitats along the Atlantic coast, including inland coastal plain and coastal sand dune habitats. These two habitats differ significantly in several environmental factors, including soil type, soil moisture, nutrient availability, and daily sunlight exposure. Phenotypic plasticity is common in plants and is defined as variation in morphology and anatomy in response to environmental variables. The purpose of this research was to determine if there is a phenotypic plastic response in *H. bonariensis* to the different environmental variables of coastal inland and sand dune habitats by comparing leaf morphology and anatomy between individuals collected from Armstrong State University and Jekyll Island, GA. Fragments of plants from Jekyll Island and Armstrong campus were replanted in the Armstrong Greenhouse in their native soil. Four pots of Armstrong *H. bonariensis* and six pots of Jekyll Island *H. bonariensis* were maintained in the greenhouse and watered weekly. Leaves from each pot were collected weekly, leaf fresh and dry weight, petiole length and width, and leaf area were measured, and stomata peels of both the front and back of leaves were prepared to estimate stomata density. Preliminary results suggest that *H. bonariensis* from Jekyll Island has more stomata per leaf and greater water weight compared to leaves from the Armstrong campus. Future data collection will focus on comparisons of leaf anatomy between Jekyll Island and Armstrong campus *H. bonariensis* to determine if there are any differences in internal leaf structure.

^Kathryn Brown, Jessica Futch
Mentor: Sarah Zingales, Chemistry and Physics

*Synthesizing Chalcones for Anti-bacterial Therapy*

There is a real need for discovering new molecules that can target drug-resistant bacteria. In the US alone, more than 2 million people become infected with antibiotic-resistant bacteria each year and 23,000 of those infected die due to their infections. Chalcones are natural products produced by plants for defense against various pathogens. Chalcones, comprised of two aromatic rings joined by an α-β-unsaturated ketone, have shown potential as agents to inhibit bacterial growth. Previous research in Dr. Zingales’ lab has shown that simple chalcones have efficacy against anti-bacterial resistant strains such as VRE (vancomycin-resistant-*enterococci*). As part of Dr. Zingales' research team, we have synthesized new chalcones that will be evaluated for
their medicinal properties. The synthesis was completed through an aldol condensation reaction utilizing various aldehyde and ketone starting materials. After synthesis, structural identification, and purification, the chalcones will be tested to determine their anti-bacterial properties by our collaborator, Carol Jordan, in the Medical Lab Science program at Armstrong. Jordan and her students will test the new chalcones’ ability to inhibit bacterial growth by introducing the chalcones to plates coated with bacteria. Once we receive these results, we will analyze and evaluate structure to function relations in order to develop a better chalcone product.

**Emily Brunner, Desiree Fordham**
Mentor: Jennifer Zettler, Biology; Aaron Schrey, Biology

_Do insect exoskeletons serve as microbial protection for _Cyphomyrmex rimosus_ fungus?_

_Cyphomyrmex rimosus_ belongs to a large group of fungus farming ants (Formicidae: Attini) that feeds nearly exclusively off the fungi that it cultivates. To grow its crops, ants collect insect excrement, which serves as a substrate for fungal development. In addition, ants gather the remnants of insect exoskeletons and place them in piles within the fungal gardens. Why this debris is collected and how it is used in the fungal gardens is unknown. In our study, we asked, do these insect parts harbor bacteria that produce antimicrobial factors that protect cultivars from pathogens? Studies have shown that some antibiotic-producing actinomycetes have chitinolytic activity that can utilize the components of insect exoskeletons. To test for the presence of actinomycetes in ant nests, we removed insect parts from field-collected ant colonies. These exoskeletons were placed on TSA plates inoculated with a lawn of bacteria and then were incubated at 37°C for 16h. Samples with a zone of inhibition around new microbial growth were isolated. Using 16S primers, DNA was extracted and samples were sent to the Georgia Genomics Facility to be sequenced and then compared to databases for potential matches. Our results showed that our bacteria do not resemble any strain of _Actinomycetes_, but the samples did resemble two known bacterial strains, _Pseudomonas_ and _Bacillus._

Tecoya Brunner, Rita Massie, Erin Steele
Mentor: Jean Neils-Strunjas, Communication Science and Disorders

_Family Viewpoint on the Improvement of Quality of Life Treatment in People with Aphasia_ This research project is to further investigate beneficial treatments that improve the Quality of Life in People with Aphasia. Our group members received approval from Armstrong State University’s Institutional Review Board for this research study. We will conduct structured, 10-15 minute long interviews that will be audio recorded with 5 family members of People with Aphasia to assess their views on their loved ones Quality of Life during treatment with a Speech-Language Pathologist. Once we have gathered their input, we will closely document, compare, and analyze the results to compare and contrast each family members view of Quality of Life in People with Aphasia.

**Karli Cannon, Keali Lay**
Mentor: April Garrity, Communication Science and Disorders

_Music Therapy for Individuals with Dementia: Effects on Psychosocial Well-being and Behaviors_ Dementia is a neurogenic disorder associated with memory loss, cognitive deficits, and negative behavioral changes. Research suggests potentially detrimental effects of sustained pharmaceutical intervention for individuals with dementia, and healthcare providers are
becoming more cognizant of the benefits of naturalistic intervention approaches such as music therapy. This study is motivated by the need for healthcare providers to implement effective, non-pharmaceutical and/or behavioral interventions for this population. Our research seeks to answer the question: “In comparison to general therapy and care alone, does music therapy have a positive effect on psychosocial well-being and behaviors in individuals with dementia?” To answer this question, we examined three components of evidence-based practice: external scientific research, clinical expertise, and client/caregiver perspective. We conducted a literature search and analysis of current information on our topic. Objective and subjective data were included in all sources used for analysis. Four studies were identified as resourceful: Han et al., (2010); Lin et al., (2011); Ridder et al., (2013); Vink et al., (2013). Results of the studies provided levels of evidence deemed clinically significant suggesting that music therapy intervention can provide a variety of psychosocial and behavioral benefits for individuals with dementia. Music therapy as a component of an overall plan of care can be effective, and by some measures, more effective than a general plan of care devoid of this element. Music therapy may alleviate some of the negative symptoms and behaviors associated with dementia as part of a holistic approach to intervention and treatment for this population.

Yanairie Caraballo, Michael Underwood
Mentor: Brent Feske, Chemistry and Physics

**Biocatalytic Reductions of Chalcone and Chalcone Derivatives**

Biocatalysis has proved to be a more efficient and environmentally friendly alternative to chemical synthesis, producing higher yields and higher enantiomeric excesses. Through our library of keto-reductases, we have enzymatically reduced a variety of chalcone derivatives. 1,3-diphenyl-2-propen-1-one (chalcone) is a compound composed of two aromatic rings connected through an enone, that possess anticancer, immunosuppressive, antiviral, and antibacterial properties among other biological activities. Currently trans-chalcone, 1-(4-fluorophenyl)-3-phenyl-2-propen-1-one, (4-fluorochalcone), and (E)-3-(4-methoxyphenyl)-1-phenyl-2-propen-1-one, (4-methoxychalcone), have been screened against our twenty-three keto-reductase library as well as baker's yeast to convert the chalcone's prochiral ketone to the respective alcohol producing a chiral center. As a comparative standard for the enzymatic synthesis data, the chalcones were first chemically synthesized using Sodium Borohydride in denatured Ethanol and analyzed through gas chromatography-mass spectrometry. After several reproductions of the NaBH₄ reduction, we realized that the gas chromatograph was destroying the samples. A new method was applied using high-pressure liquid chromatography. The data proved to be an adequately reliable means to proceed with our biocatalytic reduction approach.

* Robbie Carl
Mentor: Melanie Link-Perez, Biology

**Living Microscope Slides: An Alternative Method of Examining Plant Biological Systems**

This research examines alternative methods for making microscope slides. It continues previous research on how to teach leaf structure and function and associated biological systems. Earlier work identified easytогrow plants and tested their effectiveness for making slides using clear packing tape without a preserving agent. This method provided quality slides and was effective for leaf and fungal observation. However, plant choice was critical. The best candidates were ZZ plant (Z amiioculcas zamifolia ) and inch plant (T radecantia zebrina ). The current project used inch plants and wheat, oat, and barley seeds. To reduce fungal growth
an absorbent medium was introduced. Notecards did not allow enough light for microscopic examination, although they did reduce moisture and fungal growth. Notebook paper allowed sufficient light while still reducing moisture and fungal growth. Another method was growing seeds in hard or soft plastic cardholders using a variety of media. The cardholders acted as both a growing environment and a microscope slide. Hard (not soft), clear plastic holders were effective as microscope slides, and absorbent paper offered the best medium. Methods of providing water were examined, and string inserted into the cardholder with a length extending into an external water source containing liquid fertilizer proved to be the best system. This process can keep a plant alive for up to three weeks allowing observation of how root growth is directed downwards while shoot growth is directed upwards. Under a microscope root growth, root hairs, microorganisms, and fungus can be observed. The process is inexpensive, hands-on, and visual.

Rebecca Carter, Kayla McKissick
Mentor: Ho Huynh, Psychology

How do students respond when their expectations are manipulated?

Research indicates that people respond differently to the same objective outcome based on their personal expectations for that outcome. Additionally, people can manipulate others’ expectations in order to receive a desired response. In this study, we examined this expectation management framework in a lab setting with a paradigm that is more applicable to students. We recruited 100 undergraduate students enrolled in psychology courses through the SONA system. We provided participants with a one-page passage of literature to read. We informed participants before they read the passage that they will have to complete either a) quiz with 5 questions, b) a longer quiz with 15 questions, or c) an exam with 25 questions afterwards. However, all participants received the longer quiz (15 questions). We measured their behavioral aggression (via a hot sauce measure) and their self-reported anger. We hypothesized that participants will be more aggressive when outcomes meet expectations, rather than when outcomes exceed or fall short of expectations. We found the opposite to be true; people were less aggressive when their expectations were met, rather than when outcomes fell short of or exceeded their expectations. Our findings will help people better understand negative responses associated with expectation management in the future.

Adela Casas
Mentor: Brent Feske, Chemistry and Physics

Optimization of reaction conditions for an amine dehydrogenase reaction and new substrate synthesis

The amine functional group is abundant in both biological systems and in pharmaceuticals. Plenty of synthetic routes exist for generating it; however, techniques for asymmetric synthesis are limited. Recently new promiscuous amine dehydrogenases have been developed that are capable of performing the asymmetric reductive amination of a ketone using free ammonia. Since these biocatalysts are relatively new, little has been published about their reactivity profile, especially concerning the optimal conditions under which they perform their catalysis. Parameters such as pH, reaction duration, and cofactor concentration that could influence the rate of enzymatic catalysis were investigated, and optimal conditions were
developed by identifying those which gave the highest conversion. The synthesis of new substrates for these enzymes will also be described.

**Ashlee Casey  
Mentor: Ella Howard, History  

Yellow Jack in Savannah  

In August of 1876, Savannah was hit with a yellow fever epidemic that would ultimately be the cause of death for over 1,000 citizens. When word spread of the outbreak, 5,000 Savannahians fled the city in one week’s time. This was not the first Yellow Fever epidemic in Savannah, but it was the most deadly. While the exact carrier and cause of the disease, the mosquito, was still unknown to science at the time, citizens knew that proper drainage and sanitation was key. They also looked questioningly to the port as ships brought in countless foreigners that might be infected with yellow fever. City records stored at Savannah’s Municipal Archives indicate how the city tried to protect itself by improving drainage ditches and sewage and quarantining ships. “Yellow Jack in Savannah” is a digital history project that not only tells the story of the 1876 yellow fever epidemic but brings primary sources from the city and places both the narrative and the resources before the public, online. Using free open source tools and web platforms this project is an exercise in utilizing resources readily available to create online exhibits that can be viewed by anyone in Savannah and beyond in an effort to bring history to the broader public. Due its digital platform, “Yellow Jack in Savannah” experiments with new ways of presenting historical information through informational visualization and digital design.

Pheng Jui Chua  
Mentor: Floyd Josephat, Medical Technology  

Laboratory Features and Diagnosis of Ebola Virus Disease and Its Potential Therapies and Prophylaxis

The Ebola Virus Disease (EVD) is part of a group of viral hemorrhagic fevers that is considered to be a relatively rare disease, caused by an infection with either one of the five zoonotic Ebolavirus species under the Filoviridae family of RNA viruses (Feldmann & Geisbert, 2011). The disease, which is transmitted via direct contact with bodily fluids, affects both humans and non-human primates (NHPs) and is often severe and life-threatening with mortality rates up to 90% in some cases (Teirno Jr. & Lifshitz, 2011). EVD has recently been highly publicized due to the current epidemic in West Africa, one of the largest and most severe outbreaks of the disease since it was first discovered in 1976 in Africa (WHO Ebola Response Team, 2014). The complexity and severity of the epidemic has raised the importance of establishing rapid laboratory assays able to provide accurate diagnosis of EVD (World Health Organization [WHO], 2014c) as well as intensified the efforts by the medical research community to come up with clinically proven treatments and vaccine for the disease (Hoennen & Feldmann, 2014). This paper aims to discuss the basic laboratory features and methods of diagnosis of patients with EVD as well as reviews the potential post exposure therapies and upcoming experimental vaccines for EVD currently undergoing research.

**Stephanie Cianflone, Julia Kiningham  
Mentor: April Garrity, Communication Science and Disorders  

The effectiveness of two types of rehabilitation towards the academic success for children with traumatic brain injury.
Traumatic brain injury (TBI) is one of the leading causes of disability in childhood. It alters children’s development in cognitive and psychosocial areas, such as attention, memory, and inhibition. This alteration has a severe effect on a child’s academic success. As speech-language pathologists, our clinical practice is guided in part by the efficacy of different treatment methods. Our research examines two such methods used with children with TBI. Family-supported rehabilitation is a therapy method directly involving the family in the rehabilitation process, whereas clinician-delivered services are directly supporting the client without the family’s involvement. We set out to determine whether indirect family-supported rehabilitation is more effective than direct clinician-delivered services towards the academic success for children with traumatic brain injury. We examined external scientific research published in scholarly journal articles. Four studies were identified as useful resources: Braga (2005); Foster, et al. (2012); Gan, (2006), and Patrick, et al. (2012). The results of the studies provided evidence that suggest that clients whose family members are engaged in rehabilitation have better academic outcomes than those who do not participate. Positive outcomes are strongly associated with healthy functioning of the client’s family on a variety of assessment instruments. Clinician-directed services are beneficial to the rehabilitation of the client. However, when the family is actively involved in the process, there is a higher efficacy for recovery. This suggests that managing the stress of the caregivers as well as one-on-one therapy is beneficial for the client’s improvement.

^Hannah Clements  
Mentor: Ho Huynh, Psychology

Replicating Social Psychological Findings

Prior research called into question various findings from social psychology and raised the need for replication projects (Klein et al., 2014; Open Science Collaboration, 2012). For example, researchers should seek to replicate their findings with participants from various geographical location, socioeconomic status, gender, age, and other demographic factors. The Many Labs Project approaches this task by recruiting researchers from around the world to participate in large-scale replication projects. The current presentation compares data from our data collection site (Armstrong State University) to data collected from the whole project. Undergraduate students (n=92) were recruited from Introduction to Psychology Courses to complete an online questionnaire in a laboratory setting. Participants were greeted in one research room and escorted to another research room with two computers set up side by side, with a divider in between. They were told they would be taking a questionnaire consisting of vignettes that represent the original studies, short answer responses, as well as multiple choice questions. Differences exist in participant demographics between our sample (students at Armstrong) and other samples in the project. It is important to consider variability within a sample (one collection site) and between samples (between data collection sites) when completing replication projects. Replication continues to be an important step in the scientific method. Researchers should seek to replicate their findings in a variety of settings with a wide range of participant demographics.

^John Counts, Joshua Grier  
Mentor: Heather Joesting, Biology

Investigating the function of leaf inclination in the sand dune herb Hydrocotyle bonariensis

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Coastal sand dunes can be an inhospitable habitat for plants. In addition to unique abiotic factors (i.e., salt spray and periodic saltwater inundation), the sand dune environment is characterized by high incident sunlight, especially at midday, during the growing season. *Hydrocotyle bonariensis*, a large-leaf herb common to sand dunes, has been shown to increase leaf angle from horizontal during the growing season, thereby reducing midday leaf sunlight incidence. The aim of this study was to investigate the function of leaf inclination in *H. bonariensis* by comparing diurnal leaf sunlight exposure, leaf temperature, and photosynthetic efficiency between naturally inclined leaves (control) and experimental leaves restrained in a horizontal orientation monthly from June to August 2014. Results showed that experimental leaves received 5–7 times more incident sunlight on the top leaf surface than the bottom surface at midday, compared to 2–4 times more sunlight exposure on the top leaf surface in control leaves. This increased sunlight exposure on top surfaces in experimental leaves corresponded to significantly greater diurnal leaf temperatures compared to control leaves in each month measured. Furthermore, photosynthetic efficiency (measured as $F_v/F_m$) was significantly lower in experimental leaves during midday in August, suggesting that these leaves experienced higher light stress compared to control leaves. These results indicate that increased leaf inclination during the growing season in *H. bonariensis* functions to reduce negative effects associated with high sunlight absorption (i.e., increased leaf temperature and reduced photosynthesis), and therefore likely facilitates daily photosynthetic carbon gain in the sand dune habitat.

Joy Creighton  
Mentor: Alex Collier, Biology; Brett Larson, Biology

*Chemosensory Detection by Black Widow Spiders (Latrodectus mactans)*

Recent studies suggest that spiders rely on chemical cues from potential prey in order to select the best microhabitat in which to construct their webs. In this study, we examined the ability of female black widows (*Latrodectus mactans*) to detect various chemosensory cues positioned at either end of a small T-maze. Each maze was constructed of PVC pipes and the caps on both ends were drilled with small ventilation holes. During each trial, one female was placed inside an open pipe in the middle of the chamber which was then sealed with a rubber cork. This effectively limited visual cues inside the maze. After a minimum of 12 hours, the T-maze was disassembled and the position of the female in her web was recorded. Our results provide additional evidence that female spiders selectively construct their webs in the presence of chemical cues of potential prey (grasshoppers). Females also constructed webs in the opposite end of the T-maze when potentially more aversive cues of fire ants were introduced. In additional trials, females were presented with their own egg sac positioned at one end of the maze and that of a competitor’s isolated at the opposite side. The results of these trials clearly showed that females were able to detect their original egg sac and responded by constructing a new web to protect it. Our findings support the notion that spiders rely on a mix of chemosensory cues that help them determine where best to construct their webs.

Tiffany Cronin, Zachary Martin  
Mentor: Marshall Green, Psychology

*Exercise Motivation*

Exercise motivation is extremely important because it is the key to accomplishing one's fitness and health goals. We need to measure exercise motivation in order to try and accurately pinpoint what it consists of exactly. We are having our participants take a questionnaire that
pertain to items about social, emotional, and health factors, intrinsic and extrinsic motivation, activity level, exercise preference, and general demographic questions. We hypothesize that all motivational forms will be positively correlated with higher activity levels, but the intrinsic motivation will be more highly correlated with higher activity levels. We also predict that group sports participants will be more extrinsically motivated because the team atmosphere will motivate teammates to workout in order to better the team. We predict that individual sports participants will be more intrinsically motivated to workout because of the solitary nature of individual sports, and they will be more self-driven. We predict that high intensity exercise will be positively correlated with all forms of motivation, but that the relationship intrinsic motivation has with exercise intensity will be stronger. This scale would be used to derive the most successful workout plan tailored to each individual based off of their responses.

** Breyana Davis  
Mentor: Sara Plaspohl, Health Sciences  
*Evidenced Based Benefits Offered by Local Farmers’ Markets to Promote Public Health*  
Healthy People 2020 is comprised of established topics and objectives that promote healthy development of all people, aiming to decrease health disparities affecting individuals and increasing health care access to services, providers, and other sources of prevention. One of the topics pertains to Nutrition and Healthy Weight Management. The goal of this topic is “promote health and reduce chronic disease risk through the consumption of healthful diets and achievement and maintenance of healthy body weights” (Healthy People 2020, 2014). For many, access and affordability to healthy food sources is an issue, as evidenced in the literature. Due to the increase of local farmers markets and their acceptance of Electronic Benefit Transfer (EBT), people can have better access to nutritious locally grown food. A review of the literature identifies and supports many community benefits yielded by local farmers markets. This research will summarize these benefits to include improved access and affordability for community members, thus promoting the local farmers market as a key source of primary prevention to support quality of life and good health.

Jonathantan Davis, Christopher Edwards  
Mentor: Aaron Schrey, Biology  
*Measuring susceptibility of bacteria in the oral mucosa using conjugation*  
Oral bacteria are plentiful in the human mucosa; certain strains in abundance can cause bad breath, various systemic diseases, and even tooth decay. These medical disorders do not arise independently, but in a conjugative community, swapping genes that increase their chances of survival and therefore influence the longevity of undesirable states. The objective is to evaluate the susceptibility of certain oral dwelling bacterium taken from the oral mucosa. We will cultivate the selected strain in the presence of the antibiotic, amoxicillin. We will observe the change of impedance when in the presence of *E. coli* resistant to amoxicillin. Initially, under the selective growth conditions, the isolates were taken from two willing test subjects (Subject A and Subject B) via sterile mouth swabs. We inoculated the two samples on separate Tryptic Soy Agar (TSA) culture media for 3-5 days under microaerophillic conditions. Later that week we inoculated two TSA plates with 5% sheep blood under the same conditions. The plates preferred were the TSA plates that contained the 5% sheep blood, which generated the maximum growth. The studied colonies were randomly selected and will be classified in later PCR runs or by identification of the metabolism pathways.
Shawna Defreitas, Morgan Lamb, Amanda Sanchez, Madison Sox, Madalynn Walker  
Mentor: Jennifer Brofft Bailey, Biology; Kathryn Craven, Biology  
Temporal and Spatial Comparison of Bacteria Present in Failed Loggerhead Sea Turtle Eggs on Jekyll Island, GA.

The goal of this project is to determine the significance of microbial infection in the embryonic death of loggerhead sea turtles. Previously, culturing was used to identify potentially pathogenic bacteria in eggs from Jekyll Island that did not hatch (“failed eggs”). Our current approach uses molecular tools to identify the microbes present regardless of their culturability. During 2010 and 2012, 57 failed eggs from 14 nests were collected from three regions (northern Driftwood beach, central beach and the underdeveloped southern end) of Jekyll Island. DNA was extracted from failed embryo samples. PCR amplified 16S rRNA genes were then cloned and sequenced. 674 sequences were analyzed using NCBI’s BLAST to determine the identity of the corresponding bacteria. Potential bacterial pathogens were detected in both years (e.g., *Vibrio vulnificus, Hahella chejuensis, Corynebacterium ureicelerivorans, Clostridium subterminale*)

Bacterial diversity was high, yet most organisms were found in a single egg or nest. Over 50 bacterial groups were collectively detected, with 6 representing the most prevalent types in both sampling years (e.g., *Vibrio, Enterobacter, Pseudomonas, Alcaligenes, Pseudoxanthomonas* species). Few spatial patterns in bacterial composition were observed. The most abundant bacterial groups were recovered from all three regions of Jekyll Island. Exceptions were *Alcaligenes* and the *Rhizobiales* family; both groups were not detected in Driftwood Beach eggs but were commonly recovered elsewhere on the island. Future studies will determine the source of these bacterial groups (i.e., mother or nesting sand) as well as whether they also invade failed eggs throughout the Georgia coast.

Pallav Desai  
Mentor: Aaron Schrey, Biology  
Next-Generation Sequencing of the Florida Scrub Lizard

I plan to study the genetic characteristics of the Florida Scrub Lizard, a species of conservation concern in Florida. I have access to a large number of samples, which will make this project very efficient. I will use DNA sequencing to study their molecular ecology. I will analyze individuals from five different geographic sites in Florida with different time since last fire. All of the sites are from an endangered habitat, the Florida scrub. My major research question will be to determine if the different fire history has caused changes in the genetic characteristics of these individuals. I will be able to compare my results to previous findings of other species from the same areas. This will allow me to determine if the Florida Scrub Lizard has a unique response to fire.

** Victoria Do  
Mentor: Ella Howard, History  
Urban Renewal in Savannah: The Intersection of West Broad Street and Interstate 16

My project is a digital history presentation that investigates the urban renewal of Savannah’s West Broad Street, now Martin Luther King, Jr. Blvd. During the mid-twentieth century, national policy pursued the appraisal and attempted rejuvenation of city sections through infrastructure development. However, these endeavors often tore down and restructured local neighborhoods, which resulted in a profound loss of community for the locals affected by
the intrusion of new construction. I plan to present my findings from Savannah’s Municipal Archives on a website that teaches the narrative surrounding the appraisal documents of the housing and business centers in Savannah that represent the once thriving African American community in Savannah. Through visual and data driven applications, I would like to frame the current attempt to remove the I-16 flyover and restore Savannah’s West Broad Street with the historical process that interrupted its legacy. On a broader scale I will attempt to tie the local consequences of community loss to the national effort of Urban Renewal. I think this web-based platform is an innovative and interactive approach to history that combines new approaches in the field with local history and connects it to current civic issues.

^ Julianna Edwards, Emily Flingos, Esmeralda Rivas-Torres, Sierra Rothbarth, Brittany Smith
Mentor: Scott Mateer, Biology

Understanding Enzyme Stereoselectivity and Substrate Specificity of Aldo-Keto Reductases

We are currently working to understand enzyme stereoselectivity and substrate specificity of the model yeast reductase, YDL124w. YDL124w is a well-characterized enzyme that requires NADPH-dependent to reduce carbonyl moieties into chiral alcohols. These chiral alcohols are important building blocks in drug manufacturing. Therefore, our efforts have the potential to improve the synthesis of medicine by developing more efficient enzymes. In order to understand how YDL124w works we are currently generating a series of site-directed mutants near its active site at the F125 residue. The mutants are being created through PCR, and transformed into bacteria Next, DNA is harvested and positive clones are selected by restriction digest screening. Digest of positive clones are confirmed by demonstrating the elimination of the PST1 site from the parental/template DNA. The following mutants have been confirmed by restriction digest: F125A, F125C, F125D, F125E, F125G, F125H, F125I, F125L, F125M, F125P, F125Q, F125R, F125S, F125T. We will verify each mutant by DNA sequencing. Once we confirm our mutants, we will then start characterizing them by looking at their ability to reduce various alpha and beta keto-esters.

** Ed Estrella
Mentor: Ella Howard, History

Weapon Development in the Cold War

In the 1970s, the city of Savannah, GA had an underground newspaper, The Albion’s Voice, to shed light at many topics that regular newspapers did not. One of many topics published involved the Nixon administration and his position on weapons development as part of the arms race started in the 1950s under President Dwight D. Eisenhower. Despite the ABM Treaty of 1972, the visit to China and making both the US and China “allies” in the trade market, which was aimed to undermine the Soviet Union. Since the 1960s, after the Cuban Missile Crisis, the Soviet Union had “backed-off” from launching nuclear missiles against US targets. However, the Soviet weapon development and race did not stop. As a result, the US continued its development of ICBMs and ABMs to counter any nuclear strike from the Soviet Union. Albion’s Voice’s Max T. Johns wrote a straightforward article regarding the opinion of many citizens who did not see the point of investing billions of dollars to keep the ABM production and race. Considering the outstanding standard operating procedure (SOP) and security measures the US military had taken to protect its missile silos, there was no reason as to why keep developing and building new weapons. It was true that the Soviet arsenal outnumbered the US three to one and the Soviet defense department and weapon silos were not as heavily protected as the US
counterpart. In addition, the response time of the US military concerning a possible Soviet nuclear strike by any ICBM was considered effective, fast, and capable of neutralizing any target with the ABMs under missile silos.

Shane Farrar, Gunpreet Kaur  
Mentor: Felix Hamza-Lup, Computer Science and Information Technology  

_Haptics Enabled Simulation of Electromagnetic Forces_

Virtual Reality technology is creating huge shifts in the field of education. Learning in the 3D simulation environment is making a huge difference in the way that students think and communicate with computer and technology interfaces. We have developed a 3D virtual simulation of electromagnetic forces to assist the students in learning the concept of Lorentz force. Since forces and fields cannot be visualized in everyday life, we created this project to allow the student to hold the charged particle in his hand and experience the trajectory of the particle when electric and magnetic fields act on the particle. The goal of this project was to present abstract physics concepts from a different perspective and improve the learning efficiency and increase the student retention rate in STEM (Science, Technology, Engineering and Mathematics). The study placed 40 undergraduate participants with physics background in haptics group, which performed the 3D simulation of Lorentz force with the force feedback device and 40 undergraduate participants in non-haptics group which lacked the force feedback element. Discussion about the results are presented in this study.

Shane Farrar, Erik Leon  
Mentor: Felix Hamza-Lup, Computer Science and Information Technology  

_3D Digitization of Patients for Interactive Medical Simulations_

3D boundary representations have been successfully used in the gaming industry to customize avatars, improve the gaming experience and increase the sense of presence/realism. We are exploring 3D B-reps for patients in the context of medical simulations for planning, training and patient education. There are numerous 3D digitization techniques that generate B-reps. We focus on a cost effective solution for the automated digitization of a patient body as well as the processing and optimization of the associated X3D B-rep. We assess the accuracy of the B-rep and its potential for inclusion in web based interactive medical simulations.

** Rebecca Farthing  
Mentor: April Garrity, Communication Science and Disorders  

_Limiting Communication Modalities in Aphasia: Win, Lose or Draw?_

Traditionally, language and communication disorders that affect those with aphasia have been treated with therapy designed to enhance and supplement communication skills after cerebral vascular accidents or strokes. The research presented here asks the question “Is a constraint induced language therapy as efficacious as a multimodal therapeutic approach for treating aphasia?” Some insurance companies still regard constraint induced language therapy (CILT) as experimental and deny coverage to the patient, yet they will in many instances cover the cost of multimodal therapies (MMT), which involve supplementing communication in various modalities such as gesture and writing. Evidence based practice is a three pronged approach to treatment decision making: external scientific research, client/caregiver perspective and clinical expertise/opinion. A search of the available literature was conducted in regards to both aphasia and efficacious treatment approaches with a comparison between the CILT
perspective, which limits the communication modality to verbal expression only and the use of MMT approaches. The four articles, used as resources, Rose (2013), Rose, Attard, Mok, Lanyon & Foster (2013), Kirmess & Lind (2011) and LeFebvre, Pelchat, Swaine, Gelines & Levert (2005) provided an evidence based conclusion suggesting that while both CILT and MMT were efficient at increasing scores on standard aphasia assessments, clients and family members preferred MMT approaches as less restricted and as generating less frustration. Multimodality therapies are proven to be effective and are generally preferred by patients and their families. While CILT are somewhat more effective in raising scores they are less adaptive and less preferred.

Alexis Fields, Dane Zurwell
Mentor: Brandon Quillian, Chemistry and Physics

*Synthesis, Structure, and Reactivity of Novel Ru(II)-cymene Complexes*

We are currently using a novel approach to prepare Ru(II)-cymene complexes as precursors to prepare catalysts that couple carbon-carbon double bonds to aromatic molecules to form alkylbenzenes by a greener approach. Alkylbenzenes are important commodity products that are used in resins, pharmaceuticals, plastics and detergents. Two classes of Ru(II)-cymene compounds were prepared in this study: 1) para-cymene Ru(II) complexes bearing 4-ethyl-2,6,7-trioxa-phosphabicyclo[2.2.2]octane (P(OCH₂)₂C₂Et) and 2) para-cymene Ru(II) complexes with acetonitrile ligands. We will discuss the preparation, structure, characterization and reactivity of these compounds, as well as our future endeavors.

Bridget Frederick
Mentor: Aaron Schrey, Biology

*Next-Generation Sequencing of the Six-lined Racerunner*

The six-lined racerunner is a small, broadly distributed lizard that is a very active disperser. The six-lined racerunner is found in the Florida scrub habitat in central Florida. I am interested in learning how different environmental conditions affect the genetic characteristics of this species. I identified individuals that had been collected from locations with known environmental histories, particularly relating to wildfire. I screened multiple individuals from several locations in Florida. I made a library with restriction digests, followed by adapter ligation and PCR. I combined individual libraries into a common pool and cleaned the reactions. I then performed next-generation sequencing on the Ion Torrent PGM. I will compare DNA sequences from these individuals to determine if the different environments have created different genetic characteristics. I will compare my results to previous research I conducted on this species with different genetic markers and to other species in order to see if there are consistent genetic patterns.

Phyllis Fulton
Mentor: Ella Howard, History

*Savannah’s Municipal Abattoir: A Digital Poster*

In the early 1900s, municipal abattoirs, or slaughterhouses, became standard fixtures in American cities. City officials saw the centralization of slaughtering livestock, overseen by municipal personnel, as necessary in order to regulate and maintain standards of health and sanitation. The City of Savannah had such a municipal abattoir. It was located where City Market now stands. The City Archives of Savannah have blueprints of the abattoir, along with
records and other documents describing issues surrounding the abattoir. It is information that can be brought to life and be made available to the public through the technology used in the digital humanities. Tools such as Omeka allow the efficient and attractive display of historical documents and scholarly work in an online setting.

Gabrielle Furrow, Kody Kirkland  
Mentor: Wayne Johnson, Engineering Studies; Thomas Murphy, Engineering Studies  
*An Improved Fabric Contact Sensor and Contact Sensitive Glove*

Contact sensors and a contact sensitive glove system were designed for use in rehabilitation and injury prevention training. The gloves are used to provide accurate contact times (for example, while throwing and catching a ball) during exercises. The initial version of the glove system has two main limitations; current project work involves: 1. Reducing the bulk of the sensors to enable more reliable determination of contact and make the feel of the glove more natural. 2. Make the sensors and wiring/electronics less susceptible to damage from repeated impacts. 3. Improve the attachment of the sensors to the glove to reduce the bulk, enable the glove to be more easily put on/ taken off, and provide for easier maintenance and repair. The new contact sensor design is based off designs developed for wearable electronics. The sensors consist of Velostat™ sandwiched between two layers of conductive fabric with an outer cotton covering. The sensors have conductive fabric tabs with metal snaps for connecting leads. The glove system consists of a hand shaped fabric sensor, battery pack, and interface circuitry. When pressed, the sensors pass current and thus act as a contact sensitive switch. Contact is determined based on a measured voltage level. The new sensors have a much slimmer profile and require little wiring routed along the hand. A prototype glove system using the improved fabric sensor was tested and provided accurate contact sensing. Current tests indicate the sensors will likely fail less often and be much easier to maintain.

Diego Garcia  
Mentor: Gary Guillet, Chemistry and Physics  
*Synthesis of Metal Complexes with a CCC-Pincer Type Ligand*

My research focuses on the synthesis of metal containing compounds that promote unique reactivity. Specifically, I am synthesizing the first terdentate CCC-pincer using cyclopentadiene as a donor group in addition to an aryl ring. This molecule is combined with metal salts to make molecules with highly electron rich metal centers and their reactivity is studied. Synthetic and structural data will be presented.

Krystal Gelow, Karina Varela  
Mentor: Nedra Cossa, Early Childhood Education  
*Compare and Contrast of Theorists: Jacob Kounin and Alfie Kohn*

The purpose of this poster presentation is to compare and contrast the theories of Jacob Kounin and Alfie Kohn. Jacob Kounin and Alfie Kohn are two influential, educational theorists. Jacob Kounin’s classroom management model focuses on preventive discipline. His proactive approach to classroom management focuses on techniques and strategies designed to stop student misbehaviors before they happen. Kounin states students who observed the teacher reprimanding their peers were more likely to be responsive, in a positive manner, while the teacher disciplined the misbehaving students while those who were not misbehaving at all, showed little to no concern about misbehavior (Kounin & Gump, 1958). Jacob Kounin’s theory is aligned with a
balanced student-teacher instruction approach. Alfie Kohn’s theory is aligned with a student-centered instruction approach. According to Kohn (1995), traditional classroom management strategies begin with a negative view of children and the notion that their behavior stems from what is wrong with them instead of other factors such as curriculum and instruction. Alfie Kohn states that many strategies used in the classroom are all about demanding obedience and not about helping children think their way through a problem (Kohn, 1995). He recommends teachers encourage their students to make their own learning decisions and take responsibility for their actions. In conclusion, this poster presentation will explore in more detail, the similarities and differences between the balanced student-teacher approach and the student centered approach.

Tiffany Whetzel, Theresa Reilly, Myra Giddens, Jeremy Haynes
Mentor: Nancy McCarley, Psychology; Joshua Williams, Psychology

The Impact of Providing a Definition to Help Students Identify Relevant Content

As an important study skill for students, note taking provokes the encoding and external storage processes that allow students to retain information. Prior research suggests that students have difficulty in distinguishing between relevant and irrelevant information, which may hinder these processes. This study will examine the effect of providing students with a definition of relevant and irrelevant information on their abilities to distinguish relevant from irrelevant information on PowerPoint slides. At the start of the experiment, all participants will receive a definition of what constitutes a relevant or irrelevant word. In the no feedback condition, participants will only be told the definition. In the general feedback and specific feedback conditions, participants will be given two PowerPoint slides and instructed to highlight the information they believe to be relevant. For each slide, participants in the general feedback condition will be told the percentage of relevant words identified. In the specific feedback condition, participants will be given one minute to review the slide after being told the percentage of relevant words identified. The last part of the experiment will involve a testing session where all participants will highlight what they believe to be relevant information on four PowerPoint slides. We hypothesize that providing students with a definition of relevance and irrelevance, and more precisely with specific feedback, will assist them in distinguishing between relevant and irrelevant information. This may be the most practical intervention for addressing students’ abilities to distinguish relevant from irrelevant information as it has a low cost of implementation.

^ Andrew Goetz
Mentor: Sarah Zingales, Chemistry and Physics

Synthesis of novel tetralone-furan chalcones and their biological properties

Chalcones are organic molecules that consist of two aromatic rings connected with an α,β unsaturated ketone. Chalcones have been found to have anti-cancer and anti-bacterial properties. Tetralone is an aromatic ketone consisting of a fused benzene and cyclohexane. Furaldehyde is a heterocyclic aldehyde. By combining analogs of these two moieties via an aldol condensation, we have created a small library of 10 novel chalcones. Due to slight variations in structure, the ten novel chalcones possess different biological properties. By comparing the biological properties of each chalcone we hope to gain a better idea of how the structure affects the medicinal properties of the chalcone with the intent of creating more effective medications.
Data Analysis for learning and interest in Principles of BIOL 1107 L

This Spring Semester 2015 there has been data analysis to see the progress of learning and interest of students in Principles of Biology Laboratory, BIOL 1107L. Student attitudes were surveyed starting from the fall semester of 2013 continuing through spring, summer and fall of 2014. Their responses were scored on a scale of zero to four; zero being the lowest and four the highest score of learning proficiency. To determine changes in students’s interests and learning experiences in biology research for each semester, charts were created with data collected by semester, then compared. Responses showed improvement over the course of each the semester, which indicates that the new BIOL 1107 L curriculum is engaging students in the process of application of science.

Active Learning Strategies for Textbook Material in Traditional and Nontraditional Students

In academic settings, college students use a wide variety of sources available to study for tests. Among study strategies, students commonly record notes from these sources and review them for further study. Research on the cognitive processes involved in taking notes primarily focuses on the encoding and external storage processes; however, only a limited number of studies examine note taking as an active, generative process. Another study strategy, question writing, which involves creating questions and answers based on study material, has been shown to provoke high-level generative learning. On the other hand, basic reflection on text corresponds to rote learning strategies that require little active engagement in study material. We examined note taking, question writing, and basic reflection on text as generative learning strategies in traditional- and nontraditional-aged participants attempting to retain textbook material. Participants read a chapter on psychosocial constraints in motor development prior to engagement in 1 of the 3 study strategies. We measured information retention with a quiz following the study session in order to examine the impact of each strategy on learning. Results of a 2 (Age Classification) x 3 (Study Strategy) ANOVA revealed no main effect of age or study strategy. Significant interactions showed that nontraditional-aged participants engaged in question writing or note taking outperformed those engaged in basic reflection. Also, traditional-aged participants outperformed nontraditional-aged participants engaged in basic reflection whereas within the question writing group, nontraditional-aged participants outperformed traditional-aged participants. We discuss how cognitive processes involved in generative learning affect students of different age groups to explain our results.

Student Coping Strategies as Predictors of Academic Burnout

Burnout, for the purposes of the development of this scale, has been defined as “a response, drawn out in time, to chronic interpersonal stressors in the workplace” (Maroco & Campos, 2012). This conceptual framework of burnout was derived from the Maslach Burnout Inventory (MBI), originally designed for populations working in human services. The MBI has since been extended to college students with the MBI-Student Survey (MBI-SS) as part of the extension of the MBI to other populations. In spite of its success, there has been disagreement as
to what factors constitute burnout. We developed the Saxon-Haynes Burnout Scale as an alternative to the MBI-SS that may be able to address these issues. The Saxon-Haynes Burnout Scale is a 30 item questionnaire in preliminary testing to assess student burnout based on three factors: harmful and avoidant coping strategies, exhaustion, and academic underachievement. We predict that harmful coping strategies will be associated with exhaustion and perceived academic underachievement. Specifically, we expect that participants will score higher on items intending to measure harmful and avoidant coping strategies, exhaustion, and academic underachievement if they are burned out.

^ Kayla McKissick, Jeremy Haynes, Tiffany Whetzel, Kelly Long, Danielle Mears, Kelli Middleton, Erin Mullin
Mentors: Nancy McCarley, Psychology; Joshua Williams, Psychology

The impact of feedback on students' abilities to detect relevant information on PowerPoint slides

This study assessed college students’ ability to recognize relevant lecture content on PowerPoint slides and ways in which this ability may be improved. Participants were randomly assigned to 1 of 3 feedback conditions: a) general, b) specific, or c) none. In the general condition, participants were given two feedback sessions during which they highlighted what they believed to be relevant content on two slides. After highlighting each slide they received a score denoting the percent of relevant words identified. Then, they highlighted what they believed to be relevant information on four test slides without feedback. The procedure for participants in the specific condition was similar; however, after receiving their score they viewed the graded feedback slides. Then, they highlighted the relevant information on the four test slides without feedback. Participants in the no feedback condition received no feedback sessions and highlighted what they believed to be relevant information on the four test slides. Measures included amount of relevant and irrelevant content identified, captured as a single relevance index. Univariate ANOVAs between feedback conditions showed that the specific condition had significantly higher relevance indices relative to the general and no feedback conditions, regardless of the amount of relevant words presented on the test slides. The general and no feedback conditions had equal relevance indices. Results suggest that if feedback is to be used to help students effectively pick up relevant information it should be specific or not provided at all.

Alexander Herbert, Maria Moreno, Radford Primrose
Mentor: Priya Goeser, Engineering Studies

Practical Energy Independence in Savannah GA

The purpose of this project is to determine the feasibility of a natural gas fuel cell system and a solar energy-based system to power a 2500 square foot home in Savannah GA in order to lessen the dependence on local energy suppliers. Real usage data, obtained from Georgia Power, will be used from a 2400 square foot house that is located in downtown Savannah GA. The data consists of total energy usage for four occupants and spans a twelve month period. The house was built in 2006 and has energy efficient appliances. Using the total energy bill will allow for the mitigation of errors from usage assumptions and varying power (kW) rates. Each type of system and its components will be investigated after consulting personnel that are experts in the field in order to ascertain the most appropriate system to be used for analysis. The efficiency of each system will then be calculated using appropriate solar data and natural gas power outputs for real world application. The long-term objective of this project is to provide local residents a
tangible analysis that outlines the benefits of alternate energy sources, by providing a comparison of what an average Savannah resident pays in electricity per month with the potential savings of an alternate system.

Cecilia Hernandez, Candace Poole
Mentor: Scott Mateer, Biology

*Characterizing substrate-specificity in the aldo-keto reductases, YHR104w and YOR120w*

Chiral alcohols are highly desirable pharmaceutical building blocks, but their synthesis from carbonyl compounds by chemical and industrial methods can be hazardous, difficult, and costly. One potential strategy to safe, easy, and cost-effective synthesis of these chiral alcohols is the reduction of keto-esters by aldo-keto reductases (AKRs). However, it is often laborious and time consuming identifying the ester/enzyme combination that produces the desired stereochemistry required for a particular medical compound. Our work seeks to explore the stereoselectivity of YHR104w and YOR120w by identifying amino acid residues that are important for substrate binding and orientation. For our analysis we have targeted residues located in the reductases’ Substrate Specificity Loop A (Loop A). The AKR YOR120w primarily produces one diasteriomeric product when reducing α-Chloro-β-keto esters while the AKR YHR104w produces a different diasteriomeric product. Mutagenesis of the residues of Loop A on YOR120w and YHR104w was conducted because the residues of the Loop A region of these aldo-keto reductases dictates the stereoselectivity of the enzymes. The Loop A region of YHR104w was substituted for the Loop A region in YOR120w, and the Loop A region of YOR120w was substituted for the Loop A region in YHR104w to determine if opposite chirality is observed in the reduced products of keto-ester substrates. The wildtype and mutant proteins will be expressed in bacteria as GST-chimeras, and the resulting crude lysates will be used to characterize the reduction of several keto-ester substrates.

^Kyle Hinton
Mentor: Robert Mans, Biology

*Developing a spatial learning paradigm to determine the location of memory storage in adult zebrafish.*

Zebrafish (Danio rerio) have emerged as the third most popular biomedical research model in the neurosciences. Our laboratory will be using them in conjunction with a Y-Maze to investigate the effects of diet on memory. The Y-Maze takes full advantage of the innate tendency of animals to explore novel areas more than familiar ones. However, in order for us to have confidence in the data from our specimens in this experimental model, we must exclude the possibility that the fish have a preference for any of the arms in the Y-Maze. To this end, we have conducted probe trials using adult zebrafish. Our preliminary data indicate a slight preference for one of the arms. Our ongoing experiments will test the hypothesis that the start location in which they begin exploring contributes to the preference. Upon completing these control experiments, we will proceed in the learning trials in which one of the arms is hidden from exploration, and a testing trial where all the arms are open. We expect the fish to display spatial memory by exploring the previously hidden arm than those previously explored. Furthermore, we expect to detect an increase in neural proteins known to be necessary for memory formation. These experiments will contribute to further investigations, including the effects of a gluten-enriched diet on memory acquisition and storage.
Alyssa Holden  
Mentor: Nalanda Roy, Criminal Justice, Social and Political Science  
**Global War and Violence**

Imagine raising a gun, your face on the butt stock, your arm extended out to steady your weapon, one eye closed, using your sight to narrow onto one person. The iron sight is on center mass and you take a deep breath and pull the trigger. After the deed is done, the evidence is destroy and the equipment is put away like it never even happened. This is the problem. On a regular day, countless people lose their life to violence. It could be wrong place; wrong time or they could be caught in the middle of something that is just being to unfold. The estimated number of American combat deaths, including contractors and servicemen, is over 13,500 in Iraq and Afghanistan. The confirmed number will never be known. That is just one country’s number in only two wars. The numbers will start to add up very quickly if you think of everyone who has died fighting for something that they believed in. Is there a way to stop it? Is there anything that we can actually do to save the world from itself? Will the violence end or will war spread?

^Mathew Holmes  
Mentor: Sarah Gray, Chemistry and Physics  
**Measuring Carbon Dioxide Cycling in a Savannah Marsh Using Spectroscopy**

To help understand the carbon dioxide (CO$_2$) cycle in coastal and estuary areas of the southeast, in situ data has been collected from Shipyard Creek, Savannah GA, during three separate field deployments. Each Deployment tracked the same parameters to create and build a more inclusive map of year-round changes. The samples come from the savannah marsh land which the department of natural resources states: is mainly brackish estuary water from local marsh systems. The variables that were analyzed in situ were temperature, salinity, dissolved oxygen (O$_2$) concentration, and pH. The measurements were taken from both the surface and the bottom of the river, with a pressure sensor that calculates water depth in meters. This helps to illuminate the interplay between these variables and the tidal cycles. In order to establish a running scale of CO$_2$ in ppm, non-dispersive infrared (NDIR) sensors were used to measure CO$_2$ fluctuations above the river’s surface. In addition to field measurements, grab samples were analyzed for pH in the laboratory using spectrophotometric techniques that use a meta-cresol purple indicator to determine pH. To further test the accuracy of our in situ CO$_2$ sensors, they are calibrated against a bench-top LI-840 CO$_2$ analyzer in the lab. Field tests show strong correlations between water depth and the measurement parameters. At the river bottom, dissolved O$_2$ concentrations were much lower than dissolved O$_2$ at the river surface. Tidal influences were also observed, with high salinity values at the river bottom and low salinity at the surface during low tides.

Hilary Hunter  
Mentor: Anne Katz, Early Childhood Education  
**Case Study of a Reader and Writer: An Analysis of a First Grade Student's Literacy Skills and Needs**

The purpose of my case study report was to collect data in order to analyze the reading and writing abilities of a first grade student. Through the use of running records and reading passages, I studied data collected to assess the reading level of the student and determine his specific literacy needs and skills. This is an important task for me as a future teacher since I
must be able to skillfully determine a student's literacy level and be able to implement appropriate instruction accordingly. I administered reading and writing attitude surveys that determined the student's feeling towards these literacy endeavors. I also utilized leveled word lists; reading passages in oral, silent, and listening comprehension form; writing prompts; and a range of comprehension questions. This data enabled me to analyze the results to determine the student's strengths and weaknesses. The student's results indicated that he was at grade level in reading fluency and showed strength in reading comprehension. He was a creative thinker, imaginative, and enjoyed adding detail to embellish his stories. He read fluently and with expression. The student would benefit from direct instruction in retelling and generating inferences. In conclusion, I was able to recommend research-based instructional strategies that will enable him to continue to strengthen his reading and writing skills.

Brian Jack, Vuong Tran
Mentor: Priya Goeser, Engineering Studies

Kite Powered Generating Systems

The purpose of this project is to investigate the feasibility and deployment of a kite mounted power system for providing a significant percentage of U.S. power needs by 2025. Currently, the following are two options under investigation: 1. A high altitude deployment system. Since the power that is available through wind generation is proportional to the cube of the wind velocity, the higher altitudes are more desirable. In addition, the winds at higher altitudes have greater velocity and higher reliability. 2. A low altitude deployment system. Inherent to these systems are lower installation and maintenance costs.

In this project, both the high and low altitude systems will be investigated to see what advantages and disadvantages each system offers. Several designs within each category will also be analyzed and the most feasible design will be studied in further detail. These will then be compared with several other currently available renewable energy sources too.

*Nicholas Jackson, Charles Smith
Mentor: Laurie Adams, Radiologic Sciences; Pamela Cartright, Radiologic Sciences

The Feasibility of MRI-Infused Linear Accelerators

Over the past twenty years, there have been many advances in the image guidance technology used for the delivery of radiation therapy. Magnetic resonance imaging (MRI) components are being built into linear accelerator units so that image-guided radiation therapy (IGRT) will now have the advantages of MRI when verifying proper field placement prior to initiating treatment beams. MRI-Linac integration is a feasible technology that can potentially improve the quality of radiation therapy treatments. Imaging in this manner would reduce patient dose to ionizing radiation from verification imaging due to the non-ionizing characteristics of radio waves used in MRI. Another positive effect of having a treatment unit with MRI capabilities will be a soft tissue contrast that is superior to the cone beam computed tomography (CBCT) scans that are common in current practice. Visualization of tumor regression, functional parameters, and real-time prostatic motion due to respiration are additional benefits of MRI-Linac integration. Although concerns have been raised about possible distortions resulting from the magnet’s rotation, a geometric accuracy of 0.5mm has been reported. Post-processing algorithms have been designed to remove radiation induced current artifacts and improve signal-to-noise ratios from image results. The infusion of MRI with linear accelerators is a promising
tool that could provide favorable outcomes for patients and improve the accuracy of treatment delivery in radiation oncology departments.

Mallory Jones, Courtney Lane, Kathryn Strickland  
Mentor: Beth Childress, Childhood/Exceptional Student Education  
**Letter Combinations**

Phonics, one method of teaching students to read, uses letters and their associated sounds to help students learn to decode words and understand meaning in a text. One particular skill associated with phonics is blending. Blending is defined as the skill of combining two or more letter sounds together. The poster we created shows specific examples of how two or more letters can be added together to create a combined sound. Our purpose in demonstrating blending is to create a visual reference for children to use as they increase phonemic awareness. The skills involved in blending letter sounds, both consonants and vowels, are key steps in the language development of younger elementary school students as they begin to read, write, and speak more proficiently. The process of creating this model included determining words to associate with the letter combinations and providing a visual illustration of each word. We felt the visual addition would be beneficial as students could associate each blending example with an authentic and meaningful image.

^Stephen Kennedy  
Mentor: Brent Feske, Chemistry and Physics  
**Biocatalytic Reduction of a Variety of Aromatic Nitro Compounds by Nitroreductases**

Nitroreductases are flavin-dependent enzymes that are well studied for their ability to participate in the bioremediation of explosives such as trinitrotoluene. Recent literature suggests that these enzymes can be responsible for reducing the nitro group directly to the amine. A collection of putative nitroaromatic enzyme substrates have been screened for their ability to be reduced by a small library of nitroreductase enzymes. Some reduction chemistry is observed; however, it is not clear what products have formed.

**Megan Kerkhoff**  
Mentor: Ella Howard, History  
**City of Savannah's Wards through History**

The Digital History class is undertaking several projects and learning several new technical tools, to help create interactive, and informative websites. The project I will present at this symposium is focusing on the City of Savannah’s historic ward system. The wards were mapped out by the Works Progress Administration from 1938-1941. This Cadastral Survey, as it was called, produced over 200 maps and was presented to mayor Thomas Gamble at the time. The maps, now located in the city’s municipal archives, have been pulled out of storage and photographed. My website that I created to present these maps has another purpose for these ward maps as well. I focused in on the Montgomery/I-16 extension that essentially broke down certain wards, by cutting Montgomery Street right into the middle of certain squares. The project I present will show the change over time of these specific wards, how they were constructed according to the cadastral survey in the past, and how they look today. The significance of this survey is important to learn about for the city because there needs to be more information presented to the public of what has changed and what is still the same today. The website will give all this information to the public for free, and for them to view around the world. The
pictures of the wards, and surveys will give the public free visualizations into the past and will greatly influence their view of Savannah’s history.

Jeffrey King
Mentor: Ela Kaye Eley, Adolescent and Adult Education; Wayne Johnson, Engineering Studies

Calibration of and Simplified Operating Procedures for Open Source 3D Printers

Consumer 3-D printing has taken off in recent years, leading to market saturation in affordable, low-cost printers. The large percentage of these printers utilize a method of printing known as Fused Deposition Modelling (FDM), a process by which a thermoplastic filament is heated and extruded in thin layers in order to additively create a physical model of a digital design. This technology is rapidly becoming more mainstream. For example, a growing number of K-12 schools are acquiring low-cost 3-D printers. However the majority of these printers still require an above average knowledge of electronics and computing for set-up and use. This deficit in user-friendliness does not assuage the pressing need for our instructional technology educators to keep pace with this burgeoning technology. To that end, the Armstrong Engineering Studies Program has been working with a College of Education faculty member to improve the 3-D printing process for their recently acquired 3-D printer and to develop new resources to aid student teachers in their understanding and use of this technology in the classroom. We developed a more intuitive method by which 3-D printing can be accomplished using open-source hardware and software. This involves high-quality calibration of hardware, firmware and software as well as creation of concise guidelines and maintenance procedures for inexperienced users.

Khai Le, Shane Ondriezek, William Sloggy
Mentor: Priya Goeser, Engineering Studies

The Saddle Bagger Initiative

This design project employs classic motorcycle styling cues and modern additive manufacturing technology to transform a Honda Rebel motorcycle into a student-friendly commuter motorcycle. It combines the blinkers, taillight, and electrical junction box into a single unit that mounts under the tail of the motorcycle, thereby relocating the blinkers and the taillight. By moving the blinkers from their stock locations, the necessary space can be created to mount a pair of large, waterproof saddlebags. Since the blinkers are plainly visible when installed, free-form curves are used to allow the new design to integrate seamlessly with the lines of the motorcycle. The new taillight uses LED’s that are brighter and more efficient than traditional incandescent bulbs. The design for the junction box is based on the existing original equipment manufacturer box and is engineered to be a bolt-on replacement that requires no modifications to the motorcycle. This new design also incorporates a luggage rack to further increase carrying capacity. The luggage rack is installed using the mounting holes from the stock taillight location and the pillion, and mounting brackets that are integrated into the junction box. It is also a “plug-and-play” component, requiring no other modification to the motorcycle. Currently the design has been completed in SolidWorks and a prototype is in the pre-production planning stages.

Cody Ledford, Travis Livingston
Mentor: Melanie Link-Perez, Biology

Distinguishing Adiantopsis radiata from New Species
Adiantopsis radiata (L.) Fée is a widespread species in the neotropics, ranging from the Caribbean to the countries of Brazil and Argentina. During summer 2014, we collected data from morphologically similar plants that occur within the geographic range of A. radiata in order to differentiate them from A. radiata and each other. We used histology to differentially stain the pinnules to obtain guard cell size. We used herbarium sheets to measure and gather basic morphological data to further quantify different characteristics of the various plants. R-Project Data Analysis allowed us to process the collected quantitative data to show the differences in the new species. Our results allow us to discern distinct differences that support the naming of three new species in Adiantopsis—A. scalariformis, A. aurea, and A. hickeyi—and enable us to formally characterize a previously problematic species, A. alata.

Kelly Long, Kayla McKissick, Kelli Middleton, Tiffany Whetzel
Mentor: Nancy McCarley, Psychology; Joshua Williams, Psychology

History and Systems of Psychology as a Capstone Course

With the time it may take to complete a college education, previously learned information may become inactive, and have a lower likelihood of being retained for the long term. For this reason, upper-level students are encouraged to take capstone courses, which tend to be major-specific, to reactivate previously learned information. Educators believe that capstones should be designed to help students connect the seemingly disparate pieces of an interdisciplinary undergraduate education. The capstone course in psychology is history and systems of psychology. Due to the interdisciplinary background of Psychology, its capstone can be used to help students reconnect with the expansive background of a liberal arts education. At a four year university in the Southeastern United States, students in two history and systems courses wrote 47 reflective essays connecting any topic covered in the course to a topic that had been learned from previous core classes. Students made many connections to core curriculum areas. Essays were coded for primary and secondary connections. A core area was coded as the primary connection if it was the main focus of the essay or if it was discussed first. A secondary connection was coded if it was a supporting topic of the essay. Results indicated most connections were made to physical and life sciences, then humanities and arts, social sciences, communicative and quantitative skills and fewest to ethical and cultural perspectives. These results support the possibility of making History and Systems of Psychology a capstone course across all majors.

Alexis Lorbecki
Mentor: Brandon Quillian, Chemistry and Physics

Preparation and Isolation of 2,2-(bispyrazolyl)ethane

Organic ligands serve an important role in the development of new organometallic catalysts, as they control the activity of the metal. In an effort to construct a new ligand motif for our on-going studies in catalysis, we attempted to prepare 2,2-(bispyrazolyl)ethane as an intermediate and gateway to a host of interesting and novel compounds. 2,2-(bispyrazolyl)ethane was prepared and isolated in a multistep reaction sequence. Reaction of pyrazole with acetaldehyde afforded 1-(N-pyrazolyl)ethanol (1) in situ, which was reacted with thionyl chloride at room temperature to afford 1-(N-chloroethyl)pyrazole (2). Reaction of 1-(N-chloroethyl)pyrazole with pyrazole in the presence of potassium carbonate afforded 2,2-(bispyrazolyl)ethane (3) in good yield. The product was isolated by distillation and column
chromatography and characterized by $^1$H NMR. This intermediate will be further functionalized in future studies to prepare novel ligands for use in ongoing catalysis studies.

Thomas Ludwig
Mentor: Melanie Link-Perez, Biology

Ascertainment of Hybrid Origins and Parentage of Adiantopsis Species

Hybridization is a common occurrence among fern species and is the cause of many divergent species. Several species in the genus Adiantopsis, such as *A. lindigii*, *A. pedata* and *A. pentagona*, are hypothesized either to be hybrids or to have hybrid origins. These hypotheses are based on morphological data, such as spore size compared to that of known diploids, and phylogenetic groupings. The goal of the current research is to amplify two nuclear genes, *gapCp* and *pgIC*, of putative hybrids and hypothesized parents. Extensive literature research has shown that these two nuclear genes are ideal for determining hybrids and hybrid parentage. Once the nuclear genes have been amplified, desired bands are extracted from gels following electrophoresis and products are subjected to molecular cloning. This process includes transformation of bacteria, colony selection and post-cloning re-amplification. The results will be sequenced and analyzed. This experiment is still in the early phases so we have been unable to ascertain parentage at this time. However, amplification of nuclear genes has had few complications and results are expected soon.

Kristopher Maedke-Russell, Robyn May, Apekchaya Pokharel
Mentor: Jay Hodgson, Biology

Charting Regime Shift in Diatom Communities

The subject of our research is a sediment core obtained from a barrier island near the mouth of the Savannah River. Using this core, we aimed to gather data pertaining to environmental processes and subsequent ecological changes that took place during barrier island formation. Diatom communities were analyzed using a combination of principal components analysis (PCA) and a sequential regime shift index to determine changes through time. The data resulting from these analyses showed the top 100 cm of the core was predominated by benthic diatoms, while the remaining 400 cm, after a significant regime shift, was predominated by planktonic diatoms. These results suggest an environmental shift from a deeper, wetter environment in the past to a shallower, more isolated environment in more recent times.

Robyn May, Kristopher Maedke-Russell, Apekchaya Pokharel
Mentor: Jay Hodgson, Biology

Regime Shift in Raccoon Key, Ossabaw Sound: Diatoms and Sediment Composition

We cored the sediments of a saline pond from Raccoon Key, Ossabaw Sound, near Savannah, Georgia, for diatom frustule and sediment analysis. Our objective was to determine the environmental changes this site has gone through during barrier island development. We analyzed the diatoms with principal components analysis (PCA) to elucidate community structure through time. To determine significant changes through time, we used a measure of sequential regime shift detection. The results show that the top 20 cm of the core were predominated by epipellic (attached to silt), epilithic (attached to rocks), and epiphytic (attached to plants) diatoms, which suggests the most recent environment was wetter, more isolated, and more productive than previous environments. The bottom 30 cm were predominated by
episammic diatoms, which suggests the older environments were drier and less mature. Overall, this region has transitioned through time with a significant regime shift.

^Kim Mandigo, Amy Neely  
Mentor: Mitch Weiland, Chemistry and Physics  
Characterization of the Putative TMH2 Region within Human Perforin

Human perforin (PRF) is a pore-forming immune protein secreted by cytotoxic T lymphocytes and natural killer cells. The crystal structure of mouse PRF was recently determined and shows structural homology with a large family of bacterial pore-forming protein known as, cholesterol- dependent cytolysins (CDCs). Perfringolysin O (PFO) is a member of the CDC family and its pore-forming mechanism has been well-characterized. The PFO pore-forming mechanism involves homo-oligomerization, formation of a β-barrel, and a major conformational change that culminates in two transmembrane β-hairpins (TMHs) inserting in a target membrane. The structural similarities between PRF and PFO suggest that the analogous bundles in PRF may follow a mechanism similar of PFO. To investigate if PRF functions similar to PFO, we have engineered two chimeras of PFO whereby the known TMH2 region is replaced with the putative TMH2 region of PRF. Results show that the putative TMH region of PRF can function as a functional replacement for the TMH region of PFO.

Rakeila Manning  
Mentor: Beth Howells, Literature, Languages, and Philosophy  
Caliban, the Black Man

This paper was written for a literary studies class. The assignment was to choose a specific literary criticism to view either, The Dead by James Joyce, Goblin Market by Christina Rossetti, or The Tempest by William Shakespeare. I chose a new historicism approach to view Caliban, a character in The Tempest, and showed how he is representational of the American black man. I chose specific details from the play and showed a parallel to examples of discourse that exist throughout the evolution of the American black man, pre-slavery, during slavery, post-slavery, as well the future of the black man if he does not educate himself. Initially, I was hesitant of this project, but ultimately I thoroughly enjoyed the research and the final product.

Sylvia Martin, Timothy Sheahan, Sara Wittenberg, Brenda Doulin  
Mentor: Barbara Serianni, Childhood/Exceptional Student Education  
A Collaborative Portfolio in the Schools

Historically teacher candidates in the College of Education learn about teaching in courses on the Armstrong campus and later experience teaching through internships and field experiences in the schools. This group of special education teacher candidates participated in a pilot semester-long course taught on the campus of a local K-8 school and worked together to co-create a teaching portfolio similar to the one that will be required of them as they apply to enter the teaching profession. This presentation will feature the lesson portfolio that was the culmination of weeks of collaboration and co-planning. It will highlight critical objectives such as student engagement and student learning outcomes. Additionally the presentation will focus on the candidates’ perceptions of the in-school learning experience and its impact on their preconceptions, attitudes, and efforts related to being classroom ready teachers upon graduation.

** Sami Mastrario
Mentor: Ella Howard, History

_A City of Divided Lives: Segregated Public Facilities in Savannah, 1865-1970_

Digital Humanities, a relatively new field of study, has taken off exponentially in the past couple of years. The use of new tools and technologies to illuminate different topics also allows a wider diffusion of academic discussions and interpretations. Taking primary source documents and adding interpretative narrative as well as utilizing visual data tools all in an online exhibit brings a new dimension to historical study. For my particular project, I am creating an online exhibit of local primary sources housed in the Savannah Municipal City Hall Archives and Library. I have analyzed these documents and found evidence of segregation in public buildings in town. For example, a separate, segregated firehouse existed solely for the African American firefighters. Examining the local city council meeting minutes as well as the Savannah City Codes, I have provided an overview of the public segregation that existed in Savannah from the end of the Civil War until after the Civil Rights.

Emily Mathis, Chloe Webb
Mentor: Kathryn Craven, Biology

_Quantifying Diamondback Terrapin DNA from Different Sample Types_

When working with wildlife, encountering animals and obtaining samples for DNA analysis can be hit or miss. Different sample types can yield different quantities of DNA. To determine which sample types yield the highest concentrations, we extracted DNA using the QIAamp DNA micro kit from a variety of samples taken from diamondback terrapins. Sample types included: dried blood cards, frozen blood, embryos, scutes, and toes. We used the NanoDrop Spectrophotometer to analyze the results. Sample type appeared to have an effect on DNA yield. Variables included: the addition of carrier RNA during the extraction process and number of blood card punches used from dry blood card samples. Buffer AE was used for sample storage. Samples included: dry blood card samples with 1 punch used and carrier RNA added, dry blood card samples with 5 punches used and carrier RNA added, dry blood card samples with 3 punches used and no carrier RNA added, and frozen blood, embryo, scute, and toe, samples with carrier RNA added. On average, frozen blood, embryo, scute, and toe samples resulted in the higher DNA concentrations than dry blood card samples. Frozen blood, scute, and toe samples with carrier RNA added, had the highest concentrations between 29.7ng/µL-66.8ng/µL, with an average of 46.1ng/µL, while dry blood card samples with 3 punches used and no carrier RNA added had the lowest concentrations between 2.2ng/µL-44.5ng/µL with an average of 8.9ng/µL. We recommend taking tissue samples because they yield higher quantities of DNA than dry blood card samples.

** Daniel Mauck, David DeSalvo
Mentor: David Adams, Health Sciences

_Vertical Transmission of Yellow Fever to Infants via Breastfeeding_

Before the development of a vaccine in 1937, Yellow Fever was one of the most feared and lethal diseases in human history. The live, attenuated Yellow Fever vaccine provides lifelong immunity, and is safe for those with a developed immune system. Breastfeeding mothers, however, should not receive the vaccine as it may cause yellow fever in infants. Six cases of Yellow Fever transmitted via breastfeeding have been reported. These cases occurred when vaccine was administered to breastfeeding mothers with infants from 10 to 15 days old. Serum and cerebrospinal fluid were positive for Yellow Fever, and nucleotide sequences
confirmed identical virus profiles between vaccine and cases. Such cases suggest acute central nervous system infection with Yellow Fever through breastfeeding. Further research is needed to evaluate more fully the risk of vertical transmission of such viruses through breastfeeding. Although vertical transmission of Dengue Fever and West Nile has been documented previously, little information exists regarding this phenomenon with Yellow Fever.

**Aundra McCants. Alexandra Acheson
Mentor: April Garrity, Communication Sciences & Disorders**

*Outcome Differences in Aggression in Adults with Traumatic Brain Injury: Cognitive Behavioral Therapy vs. Pharmacological Management*

Traumatic brain injury (TBI) is defined as any injury to the brain sustained by physical trauma or external force. TBI can cause significant damage to the brain and often results in a plethora of subsequent psychiatric symptoms. Of these symptoms, aggression is one of the most commonly treated. Cognitive behavioral therapy (CBT) and pharmacological management (PM) are two well-known therapies that have been used to treat a variety of mental illnesses and disorders. CBT assists participants in generating rational responses by helping individuals shape their perspective and interpretation of events (Alderman, 2013). PM seeks to decrease and control aggressive tendencies by administrating patients prescribed medicines (Fleminger, 2006). The purpose of this study is to determine which of these treatment options yields better outcomes for adults with traumatic brain injury (TBI) who exhibit aggressive behaviors. A literature review of several studies was conducted in which patient outcome measures for each respective treatment was analyzed. The results of numerous studies show that pharmacological management is not an effective means of managing aggression in this population. Findings from Alderman et al (2013) and Fleminger et al (2008) suggest that the amount of medication needed to successfully manage aggressive behaviors results in adverse effects. In contrast, Walker (2010) reports that individuals participating in group CBT experience decreased feelings of aggression as well as outward displays of aggression. Based on these findings, it suggested that both clients and clinicians consider the outcomes for each respective treatment when deciding on therapy options for decreasing aggression.

**Amanda Merill
Mentor: Anne Katz, Childhood and Exception Education**

*Reflections on a Reader and Writer: A Case Study Investigation of a Fourth Grade Student to Support Literacy Goals*

This case study was aimed at investigating the literacy accomplishments of a student in the fourth grade using the *Informal Reading Inventory: Primer to Twelfth Grade 8th Ed.* (Roe, 2011). The student was provided with a range of leveled reading selections based upon a word list administration. Comprehension was assessed based upon oral, silent, and listening modes of reading. It was noted that the student demonstrated proficiency in comprehension when enthusiasm was displayed towards the content. When she encountered unfamiliar topics in the passages, the student generally had difficulty recalling specific information from the story. An examination of the writing sample displays how the student was delighted to share her personal experiences and elaborate with details. However, finding the motivation to edit punctuation and spelling presented a challenge for this student. The case study student was bright, positive, and artistic. She would experience success given the opportunity to make independent reading selections on her level, write freely about her opinion, illustrate her work, and present her
thoughts to the class. These actions would support her literacy goals and allow the student to shine as a reader and writer.

\(^{\text{Pamela Metzger}}\)
Mentor: Sarah Zingales, Chemistry and Physics

*Synthesis of chalcone analogs*

\(^{\text{Wais Mojadedi, Sergey Progushev}}\)
Mentor: Mitch Weiland, Chemistry and Physics

*Expression, Purification, and Characterization of Recombinant Human Perforin*

Human perforin (PRF) is a pore-forming immune protein secreted by cytotoxic T lymphocytes and natural killer cells. The crystal structure of mouse PRF was recently determined and it shows structural homology with a large family of bacterial pore-forming protein known as cholesterol-dependent cytolysins (CDCs). Perfringolysin O (PFO) is a member of the CDC family and its pore-forming mechanism has been well-characterized. The PFO pore-forming mechanism involves a vertical collapse of the protein that brings two transmembrane β-hairpins (TMHs) to the membrane surface resulting in an oligomeric β-barrel pore capable of membrane insertion. The structural similarities between PRF and PFO suggest that the analogous clusters of helices (CHs) in PRF may function in a manner similar of PFO. To characterize the CH1 region of PRF, three PFO/PRF chimeras were engineered. The TMH2 region of PFO was replaced with the CH1 region of PRF at various positions based on amino acid sequence alignment with respect to the amphipathic nature of the region. The plasmids were prepared and transformed into *E. coli* BL21 cells. Current efforts are focused on optimizing expression, purification and characterizing the chimeric function to compare relative activity to native PFO.

\(^{\text{Morgan Moore, Maya Wallace}}\)
Mentor: Sarah Zingales, Chemistry and Physics

*Synthesis of a Chalcone Library for Anti-Cancer Therapeutics*

While current cancer treatments can be effective in killing cancerous cells, their effects on healthy cells are often equally potent. As a result, there is a significant need for more selective therapies. Previous research has already demonstrated the efficacy of chalcones, a class of small organic compounds, as anti-cancer therapeutics. Unlike many of today’s common anti-cancer therapies, research has already shown that some chalcones target cancerous cells without harming healthy cells. The primary goal of our work in Dr. Zingales’ lab is to synthesize a library of new chalcones and have them evaluated for their anti-cancer properties. These chalcones are synthesized from various aldehydes and ketones via the Aldol Condensation reaction. Chalcones with different substituents can have varying levels of cytotoxicities and solubilities in our bodies. After synthesis of our chalcone analogs, we confirm their identity and purity via NMR (Nuclear Magnetic Resonance) and mass spectrometry. In order to make chalcones more soluble and thus more effective in our bodies, we reduce the chalcones that we have already synthesized via sodium borohydride. Once we determine which chalcones from our library are the most effective, we will continue to improve their structures to increase their functional capabilities as anti-cancer therapeutics.

*\(^{\text{Raveenn Smith Mowbray, Kelsey Piersol}}\)*
Mentor: Bryan Riemann, Health Sciences
Validity of Mobile Device Balance Testing Applications

The use of mobile devices and sports medicine has increased in application of mobile devices in sports medicine. The more common applications have been applied in balance and postural stability testing. These apps take advantage of the internal accelerometers within mobile devices. The apps are commonly used to examine possible balance deficits secondary to musculoskeletal, neurological, and head injuries. To date, research has only examined mobile device sway measures to force plate derived sway measures. While force plate overestimate movement of total body center of mass, it remains unknown the degree to which mobile devices measure sway. Specifically the use of a single point on the body to estimate movement of the total body center of mass during various stances used for balance testing has not been examined. Therefore, the purpose of the study is to examine the measurement validity of three mobile apps used for measuring balance. The purpose will be accomplished by utilizing concurrent body sway measurement by a high speed camera motion analysis system.

Wairimu Muriuki
Mentor: Wendy Wolfe, Psychology

Relationship Between Family Problems and Disordered Eating and Body Dissatisfaction

Previous research has demonstrated a relationship between body image and self-reported family dysfunction (Blackmer, Searight, & Ratwik, 2011). Research has also demonstrated that family problems (FP) can serve as predictors of eating disorders (Crowther, Kicheler, Shewood, & Kuhnet, 2002). This study examined the relationship between dysfunctional eating and body dissatisfaction among college women in relation to reports of past mental health treatment for FP. This is an archival study that used data collected from a study investigating the effect of gratitude and cognitive restructuring interventions for body dissatisfaction and dysfunctional eating. Participants reporting past mental health treatment for FP were compared with participants who reported no such past treatment on measures of body dissatisfaction (Body Satisfaction Questionnaire, Body-Esteem Scale, and Body Appreciation Scale), binge eating (Binge Eating Scale), and restrictive eating attitudes and behaviors (Eating Attitudes and Thoughts Scale). Results showed that participants reporting past treatment for FP had higher Binge Eating scores, t(625)=−2.738, p=.006. Body dissatisfaction scores (BSQ) were also higher in those who reported treatment for FP, t(625)=−2.091, p=.037. Those who reported treatment for FP had lower Body Esteem and Body Appreciation scores; t(625)=2.039, p=.042) and t(625)=2.157, p=.031, respectively. However, t-test comparisons of participants who reported past treatment for FP versus past treatment for other concerns (e.g., attention, mood) did not yield any significant differences on the above measures (all p’s>.05), suggesting that body dissatisfaction and dysfunctional eating may be related to general past mental health problems and not specific to family issues.

Tammy Nguyen, Rishva Patel
Mentor: Aaron Schrey, Biology

Genotyping-by-Sequencing of the Southern Toad

The Southern toad (Bufo terretris) occurs throughout the southeastern region of the United States. They can be found in a variety of habitats including: lake and pond shores, sandy areas, forests, highland scrub, and connecting habitats. We are comparing the genetic characteristics of Southern toads from different places that have different habitats to see if the ecological characteristics of habitats predict genetic differences amongst these species. To do
this, we will perform genotyping-by-sequencing. Genotyping-by-sequencing uses next-generation sequencing to screen thousands of genetic markers among individuals. It is a very powerful technique. We will compare the genetic patterns among locations to infer evolutionary and ecological processes that shaped the Southern toad’s populations. Significant isolation by distance can occur over all populations despite the genetic similarity, suggesting that differentiation can occur at a broader scale. We will also look for significant relationships between genetic characteristics and wildfires, which are known to be important in the area sampled.

Chidinma Okafor
Mentor: Sara Plaspohl, Health Sciences

Advantages of Health Promotion over Drug Dependency: Evidence Based Support

This presentation intends to profile the benefits of health promotion intervention over constant dependency on drugs as supported by evidence based research. The world is advancing in equipping people with the power to improve their health through health behavior interventions, such as regular exercise, eating a balanced diet, vaccinations, and health education through social networks, internet, television commercials, and health professionals; however, it is also advancing the excess availability of drugs for every ailment. The advantages of relying on health promotion for a better health outcome outweigh the gains of drug reliance, according to current literature. This exposition explores the following key questions via a systematic review of credible research and authenticated facts: How can health promotion reduce drug reliance? Do all ailments need medications? Are there any alternative methods of treatments apart from drug administration? What are the side effects of excessive drug ingestions? How can the government allocate more resources and efforts to public health? Can drug dependency be reverted? Should television commercials focus more on health education than on drug marketing? The learning objectives of this write up is to: A) identify the side effects of excessive drug reliance, including morbidity and mortality prevalence; B) analyze health behavior interventions for chronic diseases; and C) describe alternative medication therapies, such as acupuncture. Future research might look at cutting edge techniques which will promote public health over the excessive manufacturing of drugs.

Jay Patel
Mentor: Gary Guillet, Chemistry and Physics

B-N linkages formed between silylamines and dibromoborylferrocene

My research focuses on synthesizing compounds that contain boron-nitrogen bonds (B-N), because of their ability to promote communication between metal ions in close proximity when the nitrogen is also bonded to the metal ion. These B-N bonds are formed through the reaction of reagents containing boron-bromine bond (B-Br) and other reagents containing nitrogen-silicon bonds (N-Si). A poster will be presented outlining progress in this synthesis.

Devlin Patrick
Mentor: Ella Howard, History

Bacon Park Peace Festival

In the late 1960's and early '70's a mass amount of Americans were against the war in Vietnam. A popular form of protest during this time was Peace Festivals. At the Festivals, the attendees played music, danced, and spread the word of peace. The whole point of these festivals
was to get people to understand that violence is not the answer, and that in the long run it will not actually solve the problems at hand. In the Albion's Voice articles in 1970, the author describes the events of the first ever peace festival here in Savannah. Although it took some work and persistence, the festival finally kicked off on the 2nd of May in Bacon Park, and turned out to be a great success.

Kaitlyn Patterson, Hannah Towhey
Mentor: Wendy Wolfe, Psychology

The Effects of Gratitude on Body Dissatisfaction

Gratitude interventions have been used effectively in the treatment of depression, PTSD, and for improving psychological wellness (Nelson, 2009). Researchers have investigated the efficacy of gratitude interventions for decreasing body dissatisfaction among self-selected adults (Geraghty, Wood, & Hyland, 2010). Results demonstrated that the gratitude intervention worked equally well to decrease body dissatisfaction as a cognitive restructuring intervention and that both performed significantly better than no intervention. Moreover, fewer participants dropped out of the gratitude condition, indicating that such an intervention may be associated with greater adherence. We hoped to replicate and extend the findings of Geraghty et al. (2010). Female ASU students (N=107) were randomly assigned to the Gratitude (daily gratitude list), Cognitive Restructuring (automatic thought record), or Control (no intervention) conditions. Responses to body dissatisfaction, eating, and mood measures after the two-week intervention period were compared to participants’ earlier responses. Results show that the gratitude intervention performed better than the other conditions at decreasing levels of body dissatisfaction on the B-ES \[F(2, 104)=8.54, p<.01\] and the BSQ \[F(2, 105)=4.95, p<.01\]. The gratitude intervention also performed better at decreasing negative mood on the PANAS \[F(2, 105)=5.02, p<.01\] and the CES-Depression Scale \[F(2, 104)=6.45, p<.01\]. Moreover, the gratitude intervention increased positive mood on the PANAS \[F(2, 105)=3.56, p<.05\]. Not only did the gratitude intervention perform better on these measures, but the cognitive restructuring intervention tended to have the opposite effect. Our results suggest that in a nonclinical population, gratitude interventions should be considered to decrease body dissatisfaction, depression, and negative mood.

Cicely Payne
Mentor: Geneva DeMars, Biology; Traci Ness, Biology

Analysis of Student Progress and Attitudes in the New LEAPS (Laboratories Engaging students in the Application of Science) Curriculum for Biology 1107 Lab

Analysis of Student Progress and Attitudes in the New LEAPS (Laboratories Engaging students in the Application of Science) Curriculum for Biology 1107 Lab. In Fall of 2013 the LEAPS curriculum was implemented in biology 1107 lab. This semester, data has been gathered from student attitudinal surveys and pre- and post- semester content assessments to determine if the students’ knowledge, confidence, and interest for molecular biology and STEM topics increases as the semester progresses. Four main areas have been assessed: quantitative analysis, technical skills in molecular biology, scientific communication, and scientific information literacy. Responses were scored from particular survey questions of the four core areas, and pre- and post- content assessment results were attained. Both were analyzed across the past three semesters: Fall of 2013, Summer/Spring of 2014, and Fall of 2014. After analyzing scores from the survey and content assessment questions, the data illustrated that students developed certain molecular biology skills as well as improved understanding of molecular biology and STEM
Also, students maintained interest for the molecular biology project as the semester progressed. This data supports the implementation of the LEAPS curriculum and will be used when Armstrong faculty present these ideas to the scientific community.

Lydia Peavy, Rebekah Robinson, Wais Mojadedi  
Mentor: Traci Ness, Biology; Mitch Weiland, Chemistry and Physics

A Streamlined Western Blot Exercise: An Efficient and Greener Approach in the Classroom  
SDS-PAGE and western blotting are two commonly taught protein detection techniques in biochemistry and molecular biology laboratory classrooms. A pitfall associated with incorporating these techniques into the laboratory is the significant wait times that do not allow students to obtain timely results. The waiting associated with SDS-PAGE comes from staining and destaining, whereas with western blotting it is the times required for antibody incubations and the numerous wash steps. This laboratory exercise incorporates 2,2,2-trichloroethanol (TCE) into the SDS-PAGE gel allowing for visualization of migrated proteins in a matter of minutes, saving both the time and chemical waste associated with traditional Coomassie staining. Additionally, TCE staining does not affect protein transfer eliminating the requirement for duplicated gels for total protein and western analyses. Protein transfer can be confirmed immediately without the use of Ponceau S staining. Lastly, this western blot procedure has been further shortened by using an HRP-conjugated primary antibody, which eliminates the secondary antibody incubation and washes, and uses a colorimetric detection to allow for visualization by students without the need for specialized equipment.

Alexander Pittman  
Mentor: Aaron Schrey, Biology

Next-Generation Sequencing of the Blue-tailed Mole Skink  
My research project targets the Blue-tailed mole skink and the Green anole in central Florida. While very little is known about the biology of the Blue-tailed mole skink, they are threatened. In contrast, the Green anole is much more common and has its genome sequenced and co-occurs with the Blue-tailed mole skink. Both are found one of the worlds most threatened habitats, Florida scrub. Florida scrub is fire maintained habitat. I am interested in determining how wildfires affect genetic characteristics of both species. Therefore, I screened individuals that had been collected from multiple locations with different fire history. I will use next-generation sequencing with the Ion Torrent PGM. This will allow me to identify genetic variation among locations. I will use these data to estimate dispersal patterns, identify any geographic barriers, and identify consistent genetic responses to fire.

** Elisabeth Pleasant, Kiera Rosa, Bridgette Woodard  
Mentor: April Garrity, Communication Science and Disorders

Outcomes of Treatment in the Non-Dominant Language versus the Dominant Language on Cross-Linguistic Generalization in Individuals with Bilingual Aphasia  
Aphasia is a disorder characterized by language difficulties not related to cognitive deficits. In bilingual individuals, aphasia typically affects skills in both languages to some degree. The concept of cross-linguistic generalization suggests that treatment in one language positively benefits the other non-targeted language. Our research seeks to answer: “Are individuals with bilingual aphasia more likely to experience cross-linguistic generalization if treated in the non-dominant language (L₂) than if treated in the dominant language (L₁)?” With
increasing globalization, bilingualism has become more prominent, creating an influx of bilingual individuals with aphasia. This question is an issue of concern due to the lack of bilingual speech-language pathologists and evidence-based guidelines for decisions regarding intervention strategies. To answer our question, we conducted a systematic review of the current research found in peer-reviewed journals. Four studies were selected to investigate cross-linguistic generalization when English monolingual treatment approaches were used (Edmonds & Kiran, 2006; Knoph, 2013; Marangolo & Rizzi, 2009; Padilla & Mayer, 2012). Results of these studies provide significant evidence suggesting that treatment in $L_2$ led to greater cross-linguistic generalization than treatment in $L_1$. Treatment in the non-dominant language ($L_2$) has shown to be an effective intervention method in individuals with bilingual aphasia. These results suggest that English monolingual speech-language pathologists can provide effective intervention, in English, for bilinguals with aphasia. Although our results support $L_2$ to $L_1$ cross-linguistic generalization, findings are not conclusive. Advocacy for further research in this growing area is needed.

Matthew Pozorski
Mentor: John Hom, Art, Music, and Theatre

Transitional Spaces

The economy has had a huge impact on the Coastal Empire. The impact can be witnessed in the growth, expansion, and modernization of Chatham County. You find Chatham being revitalized through commerce at the port, tourism, the military, and large corporations such as International Paper and Gulfstream Aerospace. Many parts of the county that were rural or underdeveloped, such as West Chatham and Pooler, have seen enormous growth in the past decade. This has come at the expense of land that was traditionally used for farming and hunting, and in many cases was just forest or marsh. The recently completed Truman Parkway has pushed its way through formerly scenic saltmarsh that runs into the Intracoastal Waterway. Using photography I am working to document this interaction between urbanization, and the development (in some cases destruction!) of formerly rural and natural areas. I plan to photograph the already industrialized and expanding parts of the county, the transitional spaces where development is occurring, the beauty of the remaining natural habitat, and the people being impacted or displaced by development. I believe capturing the images digitally, but using the Albumen historical photographic process to present the work will further emphasize the dichotomy that exists here in Chatham County between urban economic development, and the rural lifestyle and natural habitats being affected.

Oliver Pratt
Mentor: Ella Howard, History

Malaria and Savannah Containment

Digital History is a growing field amongst historians. Scholars are using the new technologies and digital media of today to further their works’ historical interpretation, research, and presentation. History in the form of a new medium has allowed projects to disseminate more quickly to more audiences. Anyone can view a project online at anytime. In working with Omeka, our class has begun to transform our work and research digital projects. Most recently we worked on a local underground paper, Albion’s Voice, and opened it up to the public. My class illuminated many themes in the paper, which has helped us develop a sense of what Savannah was like in the 1970s. It also provided an opportunity to look at what the key issues
and opinions that were of great importance. Through this project we worked with many different tools that have enriched our projects and made them easier to understand. Using these learned tools, I plan to do the same with my project, *Malaria and Savannah Containment*. Through this project I explore the impact this disease has had on Savannah and the role it played during World War II. I have learned that there were several buildings and even an island devoted to malaria and mosquito control in the city. I plan to present my research in an online exhibit that consists of a narrative, maps, images, and videos.

Alexandria Ragsdale  
Mentor: Aaron Schrey, Biology  

*Next-Generation Sequencing of the House Sparrow*

The house sparrow is one of the world’s most successful introduced species. It has been introduced onto nearly every continent. Interestingly, the house sparrow rapidly adapts to the new environments where it has been introduced. This adaptation happens on an extremely short time-scale in evolutionary terms. Thus, it is important the genetic variation present among introduced house sparrow. We focused on house sparrows from Kenya, because it is one of the most recent areas of introduction and house sparrows are still expanding their range. We used genotyping-by-sequencing to screen genetic variation among house sparrows from multiple samples across Kenya. Genotyping-by-sequencing identifies thousands of genetic variants among individuals using next-generation sequencing. We will identify patterns of change in genetic characters with introduction history. We will also identify genes that show evidence for selection across the introduction.

**Sarah Richardson, Staisha Riehl**  
Mentor: April Garrity, Communication Science and Disorders  

*Effectiveness of Spaced Retrieval Training (SRT) on Improving Recall in Older Adults with Mild to Moderate Dementia*

Dementia is a progressive disorder that occurs gradually. Individuals in the mild-moderate stages exhibit memory deficits, however, implicit memory, which stores procedures and instructions, is relatively spared. Our research topic explores the question, “Is Spaced Retrieval Training (SRT) an effective intervention strategy for improving recall in older adults with mild to moderate dementia in comparison to no intervention?” SRT is a fairly new behavioral intervention strategy that employs implicit memory to increase the likelihood of retrieval success for functional information. Since the effectiveness of behavioral interventions on memory deficits associated with dementia is an area of growing research, this topic was of particular interest to us as future speech language pathologists. To answer this question, we referred to external scientific research published in scholarly journals within the last ten years. We also referred to the American Speech-Language Hearing Association (ASHA) evidence based practice recommendations. Four studies were identified as useful resources: Cherry, et al., (2010); Hawley, et al., (2008); Hopper (2010); Small (2012). After a thorough review of the research, we were able to conclude that SRT is an effective and valuable intervention strategy for treating individuals with dementia. The combined research supports the efficacy of SRT intervention strategies as a method that increases immediate and long-term recall. Another positive outcome of this approach is the ability for patients to transfer what they have memorized in therapy and apply it to real life situations. For caregivers and family members who are
concerned about the memory deficits associated with dementia, these results are extremely encouraging.

Rebekah Robinson, Mahmud Abdallah, Claudia Alvarado, Morgan Greenlee, Emily Norris, Jill Sharma
Mentor: Traci Ness, Biology; Ronald Garner, Mercer University School of Medicine

*Candida Mannoproteins Activate TLR4-transfected Cells in a COX-2 Dependent Manner*

*Candida* mannoproteins (CMP) are the most abundant molecular patterns expressed on the outer cell wall of *Candida albicans*. Pattern recognition of CMP by host macrophages occurs through toll-like receptor 4 (TLR4) and the mannose receptor (MR). While both of these receptors are present on macrophages, other cell types express TLR4 in the absence of MR. We hypothesized that purified CMP would bind to and activate TLR4 in epithelial cells which lack MR, and that this activation would be susceptible to NSAID modulation, similar to what has been observed after lipopolysaccharide (LPS)-induced TLR4 stimulation. To test these hypotheses, we used a stably transfected human embryonic kidney-293 (HEK293) cell line that expresses human TLR4 and its co-receptors in the absence of MR. These cells (HEK-Blue hTLR4) are also engineered to express a secreted embryonic alkaline phosphatase (SEAP) reporter gene. LPS, a well-known TLR4 activator, was used as a positive control. HEK-Blue hTLR4 cells exhibited a dose-dependent response to CMP, with peak activation at 40-50 µg/ml, and this activation increased COX-2 and TNFα transcription. The NSAID celecoxib, a relatively-selective COX-2 inhibitor, was found to inhibit TNFα-, LPS-, and CMP-dependent activation in HEK-Blue hTLR4 cells. Indomethacin, a relatively-selective COX-1 inhibitor, had little effect on these responses. These data indicate that CMP activates the TLR4/CD14/MD2 receptor system in a COX-2 dependent manner in cells lacking MR. Future studies may help elucidate the role that the interactions between mannan and TLR4 play in the epithelial cell recognition of invading pathogens.

Aaryn Rogers
Mentor: Gary Guillet, Chemistry and Physics

*Synthesis of Multinucleating Ligand Platform Utilizing Ferrocene*

Metalloenzymes have the ability to delicately control the extent of reaction with small molecule substrates, for example methanemonoxygenase. Presented herein is synthetic progress towards 3d transition metal complexes that generally reproduce structural features seen in metalloenzyme active sites, namely they contain multiple metal sites used as redox equivalents and for coordinating substrate. The source of reducing equivalents will be the well-established ferrocene moiety which is connected to ancillary metal sites to be generated utilizing oxidative addition of an arylbromide with Ni(0). Open coordination sites on the Ni ion are designed to coordinate substrate for modification. The intent is to synthesize complexes that can promote multi-electron reactions with a substrate with the electron source/sink originating at peripheral metal sites.

Nicolas Rios, Brittany Whitley
Mentor: Jennifer Brofft Bailey, Biology

*Survey of herbivorous insects for nitrogen fixing microbes.*

Herbivorous insects, such as mealy bugs and scale insects, feed on plants which are a poor source of nitrogen. Nitrogen is essential for the synthesis of proteins and nucleic acids. To
compensate, some herbivorous insects have evolved a mutualistic relationship with intestinal endosymbionts that supply the insect with fixed nitrogen. These bacterial endosymbionts perform nitrogen fixation which involves converting N\(_2\) gas from the atmosphere to ammonia (NH\(_3\)). Excess ammonia is then absorbed by the host for growth and maintenance. The objective for this project is to determine whether specific herbivorous insects harbor nitrogen fixing bacteria. We are currently screening mealy bugs and scale insects collected from Florida Panther National Wildlife Refuge in Summer 2014. Threatened ghost orchids harbor these insects and are known to have infestations. However, it is unknown whether these insects possess nitrogen fixing bacteria. DNA extractions of mealy bugs and scale insects will be screened by PCR for the \(nifH\) gene. \(nifH\) gene encodes for nitrogenase, a key enzyme for nitrogen fixation that is specific to nitrogen fixing bacteria. Amplified \(nifH\) genes will be sequenced and compared to those detected within others insects possessing nitrogen fixing endosymbionts. This experiment will help determine whether a symbiosis exists between mealy bugs/scale insects and nitrogen fixers.

^ Sarah Shafer  
Mentor: Sarah Gray, Chemistry and Physics  
*Using Spectrophotometric Methods to Calibrate an ISFET pH Electrode for Use in in situ Ocean Acidification Studies.*

Since the industrial revolution increasing anthropogenic carbon dioxide (CO\(_2\)) emissions are causing the oceans to take up more CO\(_2\) and become more acidic. This phenomena is called ocean acidification. Previous research has shown that ocean acidification is occurring but it is unclear how quickly it is progressing or the impact that it will have. There is limited data available on brackish areas such as marshes and estuaries. Our research lab endeavors to test whether or not the water in our area is becoming more acidic over time. To determine the pH of the water samples, an Ion-selective field effect transistor (ISFET) pH electrode will be used to take measurements in situ. This electrode is suitable because it is easily transportable, accurate, and does not have to be stored in solution. Before use in the field, the electrode will be calibrated spectrophotometrically to increase precision and accuracy. Synthetic seawater samples will be prepared at different salinities and temperatures. An indicator solution will be added to the seawater and measured on a UV/VIS spectrophotometer. The results will then be used to create a standard addition calibration curve. The pH measurements taken in situ will be compared with calculated spectrophotometric pH measurements in the laboratory. During several semesters, water samples will be taken and analyzed in the same locations to observe trends over time.

** Natalie Shaw  
Mentor: Anne Katz, Early Childhood Education  
*Concepts about Print: An Emergent Literacy Case Study*  
The purpose of my emergent literacy case study report was to engage an early reader in a discussion to assess his concept of print awareness around text. Once the student chose a text that captured his interest, I invited him to review the illustrations and create a story map. It is important to gather data on the student’s concepts about print in order to learn more about the student’s early reading abilities. I invited the student to point out words he could identify independently in the text as I read. The majority of them included sight words. I continued to collect assessment data through a range of questions posed based upon concepts about print assessment strategies. Once the story was completed, I was able to analyze the reading process to
discover the student’s strengths and needs. The student possesses strong concepts about print and could apply important early reading skills such as identifying initial sounds of words as well as letter sounds to determine meaning in conjunction with the illustrations. The student could benefit from additional sight word practice as well as context clue exploration in order to become a more fluent reader, an important factor in facilitating comprehension.

Evelyn Shealy  
Mentor: Laura Seifert, Criminal Justice, Social and Political Science

*Digging Savannah*

Digging Savannah is an Armstrong program that promotes the knowledge and awareness of archaeology throughout Savannah. As a Research Assistant for Digging Savannah, I have been granted the opportunity to work with Professor Seifert and local state parks to create an interactive program for elementary and middle school children. This program will be free for the state parks and will enhance the historical programs already present at the site. Park rangers will conduct the hands-on activities. These activities, correlating with the Georgia Performance Standards, will strengthen the appreciation and understanding that children have for the conservation of archaeology.

** Robert Slater  
Mentor: Ella Howard, History

*Police Brutality - City of Savannah, GA*

The grandiose city of Savannah, Georgia founded and established in 1733, is Georgia's first capital, and thus Savannah is host to many of the state's historical landmarks. This city has also been rich with crime and turmoil. This exhibit takes a look more specifically at police brutality in the 1970s. The newspapers' and media's focus on crime in the 1970's city of Savannah, GA. When we focus on the issues of the time, the '70s in many ways was a revolutionary or transitional period, for the city of Savannah, Georgia. This was a time of civil unrest, as crowds gathered, and cases and incidents of police brutality and misuse of force arose. The media was faced with many challenges to adequately report the truth. This site contrasts the city of Savannah, Georgia to Washington, D.C., and further west Los Angeles, California. This site examines an assortment of different instances of crime, related to police brutality. It covers the seriousness of the cases and how they affected the communities. It also explores whether or not the level of media attention made a difference in the outcome of the cases.

** Brittany Speller  
Mentor: Ella Howard, History

*Digital History Approaches to Albion's Voice*

For my symposium presentation I will be focusing on the digital history approaches to the underground newspaper *Albion's Voice*. This project is affiliated with my digital history class. More specifically, I will discuss the various complaints so-called subversives voiced against authority figures as showcased in *Albion's Voice*. This will be demonstrated as a digital display along with those of other members of that class, and will also highlight the role digital history can play in the profession. For instance, I will discuss the functionality of Omeka in regards to the project, and how that platform helped me to display both the primary sources and my narrative analysis of them.
Reconstructing the Harlem Renaissance

In the fall semester of 2015, the class HIST 5650: Special Topics in American History-The Harlem Renaissance created an installation of primary source documents to be displayed in the Lane Library at Armstrong State University. People generally understand the Harlem Renaissance as a wave of creation of African American art and literature from Harlem, New York during the early twentieth century. However, this project focuses more closely on the historical forces from which this cultural phenomenon emerged. Under critical analysis, the Renaissance’s flourishing proves to be the result of purposeful construction, not necessarily organic expression, by influential leaders geared toward the specific goal of combating the prevailing racial inequalities in America. Barred from other means of political and social improvement, the movement looked to the production of art to correct discriminatory conceptions of blacks. This attempt consequently posed an enduring question: Was the project successful?

The Effectiveness of Imitative Therapy on Aprosodia

Right hemisphere brain damage (RHD) is damage to the right side of the brain that may be caused by strokes, tumors, infections, or traumatic brain injuries. Individuals with RHD typically present with a number of deficits related to cognition and communication. One such deficit is aprosodia, which is the inability to use normal variations in pitch, loudness, intonation, and rhythm. One intervention method for addressing aprosodia, imitative therapy, involves the client and clinician saying sentences in unison using the targeted emotional prosody in the initial stages of treatment. In later stages, less support is given and treatment is more conversationally based. Our research proposes to answer the question “Is imitative therapy an effective treatment for aprosodia deficits in patients who have Right Hemisphere Brain Damage compared to receiving no imitative therapy?” To answer this question, using evidence-based practice, we investigated available literature. Three studies were identified as useful: Rosenbeck et al. (2006), Leon et al. (2005), and Russel, Laures-Gores, & Patel (2010). The outcomes of these studies provided evidence that supported the use of imitation therapy. All of these studies found perceptual and acoustical improvements in prosody following imitation treatment. Imitation as a treatment for aprosodia in patients with RHD was found to be effective when compared to no treatment, and even when compared to other treatments. Prosody is a necessary part of everyday interactions, and effective treatments, such as imitation therapy as we investigated, increase the use of functional communication among individuals with RHD.

Chemical Shifts of common laboratory Solvents in Dioxane-d8

Nuclear Magnetic Resonance (NMR) Spectroscopy is routinely used by chemist to elucidate structure. In the synthesis of new products solvent will be inevitably included in the NMR spectrum of the resulting product, making it sometimes difficult to distinguish between actual contaminants (by products) from benign contaminants such as solvents and/or common precursors. While two articles are available that list a variety contaminants in a number
deuterated solvents, dioxane-d₈ and its contaminants are missing from the literature. In an effort to fill this gap in the literature, we have collected ¹H and ¹³C NMR spectra of common solvents and benign contaminants in dioxane-d₈. This work would serve as a one-stop reference for future scientist working with dioxane-d₈.

Ayanna Thompson
Mentor: Deborah Jamieson, Art, Music, and Theatre

*The Harlem Renaissance and the Power of Art in Society*

The Harlem Renaissance and the Power of Art in Society explores the message of the Harlem Renaissance and the creation of a space for creative activists, also known as artivists, to use their artwork to make a social impact. Artists such as James van der Zee, Aaron Douglass and many others used their work to make a social statement. They wanted to make a statement to encourage real, tangible change. Many black artists, especially, recognized that there was an extreme need for a change in the way black Americans were treated in society and, through art, created a platform to rewrite this narrative; while there was no huge, legal change that happened immediately, the Harlem Renaissance began to change the mindsets of many Americans concerning black America by way of simply changing the narrative. This planted the seed that eventually led to tangible change. “It is an artist's duty to reflect the times in which we live”—Nina Simone. The Harlem Renaissance artivists paved the way for all artists, not just blacks, to use their creativity in a powerful manner. The Harlem Renaissance and the Power of Art in Society unveils the correlation between what the Harlem Renaissance artivists did and the similar path that artists are following today. It can be argued that the Harlem Renaissance was the model that gave the civil rights activists the courage to take a stand some three decades later, which in turn is providing inspiration for the artivists/activists of today’s social issues.

John Trainor
Mentor: Ella Howard, History

*Drugs and the Counter Culture*

Albion's Voice, as with many underground newspapers of the 1960's and 1970's, approached many subjects of race, sex, sexuality, politics, and drugs. Although it is a widespread belief that this "movement" had a cohesive ideology, in truth, there are many divergent viewpoints in all these matters. Albion's Voice included eight articles relating to drugs printed within this short six issue publication. For the most part, these points of view direct the reader to the dangers of government intervention within personal liberty, but there are also some divergent views between the authors. One article elects to represent the overall danger of rising heroin addiction while another steps in to state that it's not the addiction that is the danger of fatalities, but the "cold turkey" shock that kills most addicts due to the unavailability of the drug or incorrect rehabilitation. Another article takes the heroin versus marijuana debate to the comparison of wine versus beer and the ludicrous nature of prohibition. Many are quick to point the finger at different levels of government using the issues of drugs as a diversionary tactic: covering up massacres overseas, general election year statistics, and cloaking local Savannah city scandals. In an article relating to LSD and the slipping away from reality to a spiritual moment, the author depicts the concept that its not the drugs that cause addicts, but society itself. As this exhibit showcases, although there is a "movement," the common misconception of a collective consciousness is a misnomer.
Blair Weaver  
Mentor: Brent Feske, Chemistry and Physics  

**Synthesis of a Natural Product Derivative**  
This synthesis toward 1-[[2,2’-bipyridin]-6-yl]ethan-1-one oxime is a 4 step synthesis that yields an analog to a natural product. In this synthesis, 2,2’-Bipyridine was oxidized by meta-Chloroperoxybenzoic acid to yield a 2,2’-bipyridyl-N-oxide. This 2,2’-bipyridyl-N-oxide was then reacted with Trimethylsilyl cyanide and benzoyl chloride to yield the 6-Cyano-2,2’-bipyridine. The 6-Cyano-2,2’-bipyridine was reacted with Methyl Grignard to form the 2-Acetyl-6(2-pyridyl)pyridine. The 2-Acetyl-6(2-pyridyl)pyridine will be treated with hydroxyl amine under basic conditions resulting in 1-[[2,2’-bipyridin]-6-yl]ethan-1-one oxime. Other 2,2’-Bipyridine analogs are being investigated as potential substrates for this synthesis.

Deiondra Winn  
Mentor: Anne Katz, Childhood/Exceptional Student Education  

**Exploring the Power of Open-Ended Questions in the Classroom**  
Open-ended questions prompt children to explore new ideas, integrate vocabulary knowledge, and participate in a language-rich classroom environment. While reading a *Reading Teacher* journal article on the topic (Wasik & Hindman, 2013), I reflected upon creative ways to engage my future students in their learning. Open-ended questions are designed to encourage a full, meaningful answer using the subject’s own knowledge and/or feelings. This practice creates a student-centered classroom rather than a conversational style where the teacher initiates most of the discussion. As a future professional in the education field, I will help students expand upon their thinking and elaborate on the questions that are asked in the classroom. It is important to provide students with meaningful language opportunities rather than accept a one word response. When children are asked open-ended questions, it shows them that their opinions, thoughts, and feelings matter. It reinforces the concept that their contributions are valued and that you are genuinely interested in their ideas. All of these practices contribute to building a child’s positive self-image as well as creating a sense of community in the classroom.

Juan Rodriguez Vazquez  
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**The role of parental demographics on student achievement**  
The purpose of this poster presentation is to report the findings from a literature review examining the different variables impacting student academic performance. The goal is to identify statistically significant variables that have a causal relationship with student achievement in the home environment. The information obtained from the studies is a result of an in depth review of extant research and a synthesis of over 800 meta-analyses examining contributing factors influencing student academic success. Upon inspection, parental demographics such as income and maternal education, are the most influential factors contributing to student achievement in the home environment. Parental demographics significantly impact school readiness for children from lower socioeconomic families. Children from lower socioeconomic home environments start school behind their middle and upper class peers. Examining these variables and their impact on student achievement helps future and novice teachers understand the impact of family diversity on academic success.